ICTP College on Medical Physics

Celebrating 30 Years

A brief College History and
Compilation of Appreciation Messages from around the World

This Folder for the ICTP Board was presented
to the ICTP Deputy Director Prof. Sandro Scandolo
and to the ICTP Director Prof. Fernando Quevedo
during ICTP College on Medical Physics, 2018

The Folder was compiled by Prof. Slavik Tabakov
on behalf of the Directors and Faculty of ICTP College 2018,
it includes appreciation messages from College students from 40+ countries,
as well as brief history of the College on Medical Physics and its global impact.

ICTP College on Medical Physics Celebrating 30 years (free e-book)

Content

The ICTP College on Medical Physics - need and impact on healthcare in LMI countries

Medical physicists have a very important role in contemporary medicine, associated with the clinical application of various physical principles – most often applied to medical imaging and radiotherapy equipment plus associated radiation safety. This way it is only natural to see growth of the number of medical physicists with the increased use of this equipment in healthcare. Medical physicists work mainly in hospitals, but also in Universities, Research Institutions, Regulatory bodies, Industry, etc.

According to the data of the International Organization for Medical Physics (IOMP) in 2017 there are close to 26,500 medical physicists in the world. However these are very unequally distributed (Fig.1). About 70% of all medical physicists are in North America and Europe, serving population of the order of 1 billion. The remaining 30% of medical physicists serve the healthcare of the rest of the world – about 6.5 billion population [1].

The number of medical physicists in Low-and-Middle-Income (LMI) countries is below all current recommendations and this affects the healthcare provision in these countries, especially in the fields of diagnosis and treatment of noncommunicable diseases (e.g. cancer, heart disease, stroke). Many LMI countries have diagnostic imaging equipment and radiotherapy equipment, but do not have staff, especially medical physicists, who can assure the effective and safe use of this complex equipment [2].

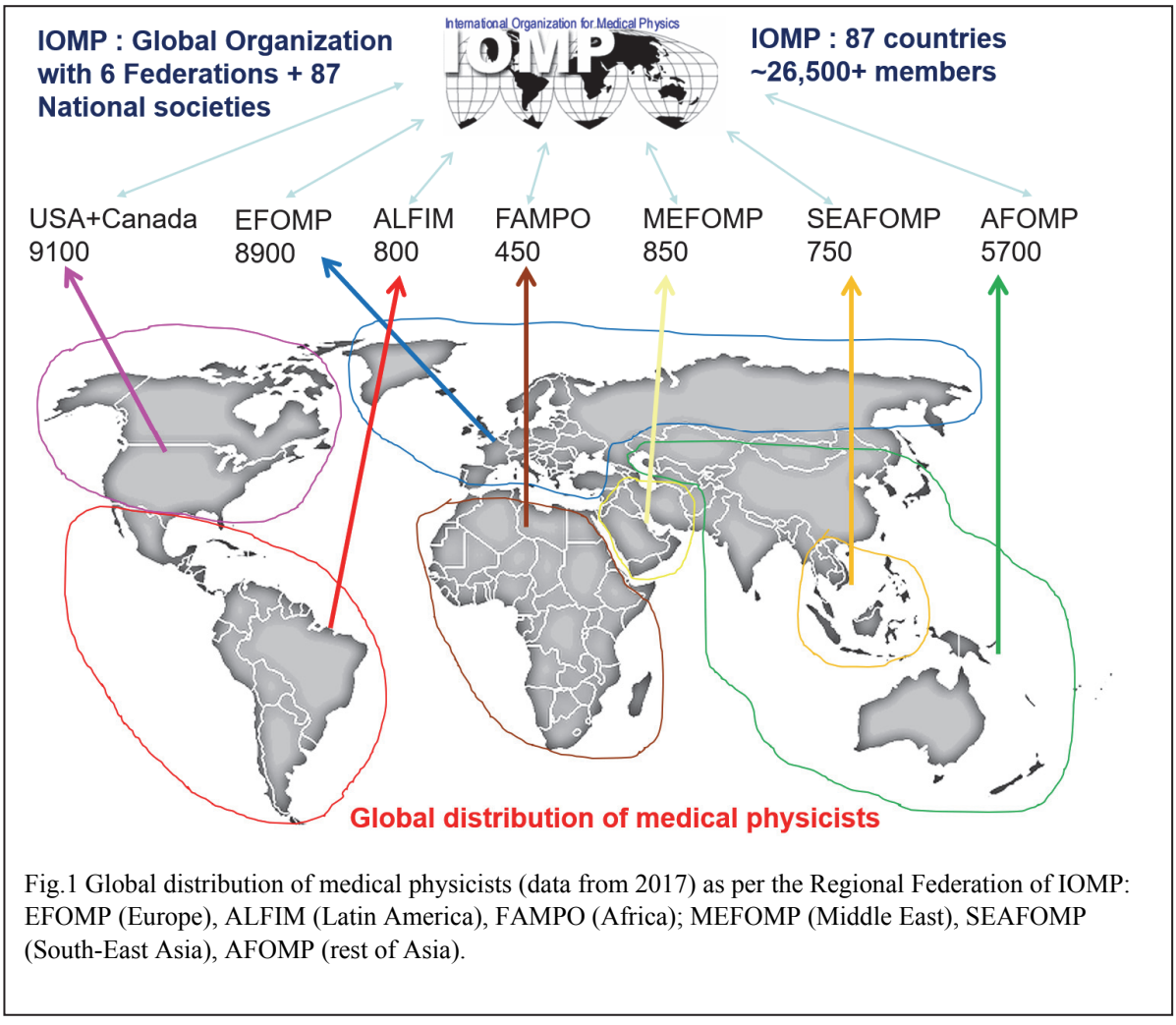

Fig.1 Global distribution of medical physicists (data from 2017) as per the Regional Federation of IOMP: EFOMP (Europe), ALFIM (Latin America), FAMPO (Africa); MEFOMP (Middle East), SEAFOMP (South-East Asia), AFOMP (rest of Asia).

Most of medical physicists (about 2/3) work primarily in the field of radiotherapy. Understandably there are courses in this field organised by IAEA and other international and national organizations. Some of these and the remaining 1/3 of medical physicists work in the field of medical imaging using various imaging modalities and related radiation safety. This is also a very important field, as more than 95 per cent of the radiation dose to the global population, coming from man-made sources, stems from medical exposures [3]. As per the UNSCEAR 2008 Report [4], the annual number of medical diagnostic radiation uses in the world are:

- 3,143 million diagnostic medical examinations (X-ray) – c. 220% increase compared with 1988;
- 32,7 million nuclear medicine procedures – c. 40% increase compared with 1988.

This very high increase of the radiation use in diagnostic medicine continues with similar trends. This requires well trained medical physicists, capable to optimise medical exposures, aiming to achieve high image quality with low radiation dose.

Over the recent decades medical imaging has developed from basic x-ray procedures to include many more complex imaging methods including computed tomography (CT), magnetic resonance imaging (MRI), and methods administering radioactive materials to patients including SPECT and PET. A medical physicist is the medical imaging professional with the knowledge and experience to analyse and optimize procedures with these modern imaging methods to obtain accurate diagnostic information at the lowest risk to patients.

Beginning in the 1990s general X-ray imaging transitioned from producing images on film to producing images in electronic digital format. While this provided many values and advantages it also introduced a complexity that requires medical physicists in the hospitals and clinics to support the modern imaging procedures. This required modified education and training of LMI medical physicists to be introduced at the beginning of the new century, associated specifically with digital imaging. Thus the College provision was changed during 2001 to make it suitable for educating young physicists from LMI countries who can deliver such service to the healthcare of their own countries. All ICTP College lectures were adapted to provide the most important information to these colleagues, alongside with skills related to imaging optimisation, quality control and radiation safety. The modification of the educational program took in consideration also the background physics education in most LMI countries. The unique new education program of the College included also the pioneering medical physics e-learning materials - Sprawls Resources, EMERALD, EMIT and EMITEL. Thus the College succeeded in the limited period of only 3 weeks to prepare specialists who were then able to apply their knowledge in their own healthcare systems and university courses. More than 700 students from 89 countries passed through this unique ICTP College in the period 2002-2018 (Fig.2).

A major objective of the College is to develop the participants as educators who can create effective medical imaging programs in their countries. This is being achieved through the combination of three specific activities. 1. Providing them with instruction on the modern imaging methods; 2. Providing instruction on the process of learning and teaching and the development of appropriate educational programs for their institutions; and 3. Providing them with extensive high-quality teaching materials and resources to be used in their courses. Through this process much of the learning that occurs in the College on Medical Physics program in Trieste is duplicated in many countries around the world as these students further disseminate the knowledge in their countries using the materials provided to them at the ICTP College. A number of the participants organised medical physics courses – both local and university (MSc-Level) in their own countries. Some of them created medical physics societies or became officers of the existing societies. This provided a real backbone of the medical physics professional development in LMI countries. Even most importantly these students assisted in the diagnosis and treatment of millions of patients in this part of the world.

The ICTP College on Medical Physics is unique worldwide in its role of providing such education. Due to this reason it was logical for it to become member of the first Medical Physics e-Learning project EMERALD, which global impact was the reason for receiving in 2004 the inaugural Award for Vocational Education of the European Union – the Leonardo da Vinci Award. Further the ICTP College and its students took an active part in the creation of the first Multilingual Dictionary of Medical Physics Terms, which is currently translated to 30 languages: English, French, German, Italian, Swedish, Spanish, Portuguese, Bulgarian, Czech, Greek, Hungarian, Lithuanian, Polish; Estonian, Romanian, Turkish, Latvian, Russian, Thai, Arabic, Iranian, Bengal, Slovenian, Malay, Chinese, Croatian, Japanese, Finnish, Korean, Georgian. About 1/3 of the languages were translated by past students of the ICTP College. Based on this Dictionary a large further project - EMITEL Encyclopaedia of Medical Physics - was developed. This was the largest international project in the profession and its team included the Presidents of 21 National and International Societies (some of them past College participants). The Encyclopaedia Conference and the first International Conference on e-Learning in Medical Physics were organised at ICTP, Trieste. Until now these unique educational materials are used by over 4000 specialists per month through the web site: www.emitel2.eu [5].

Over the years the ICTP College on Medical Physics triggered the initiation of other medical physics activities in ICTP [6] as various IAEA courses, the Radiotherapy School, the unique international MSc programme and others. Today most of the medical physicists from LMI countries consider ICTP as the place of medical physics knowledge.

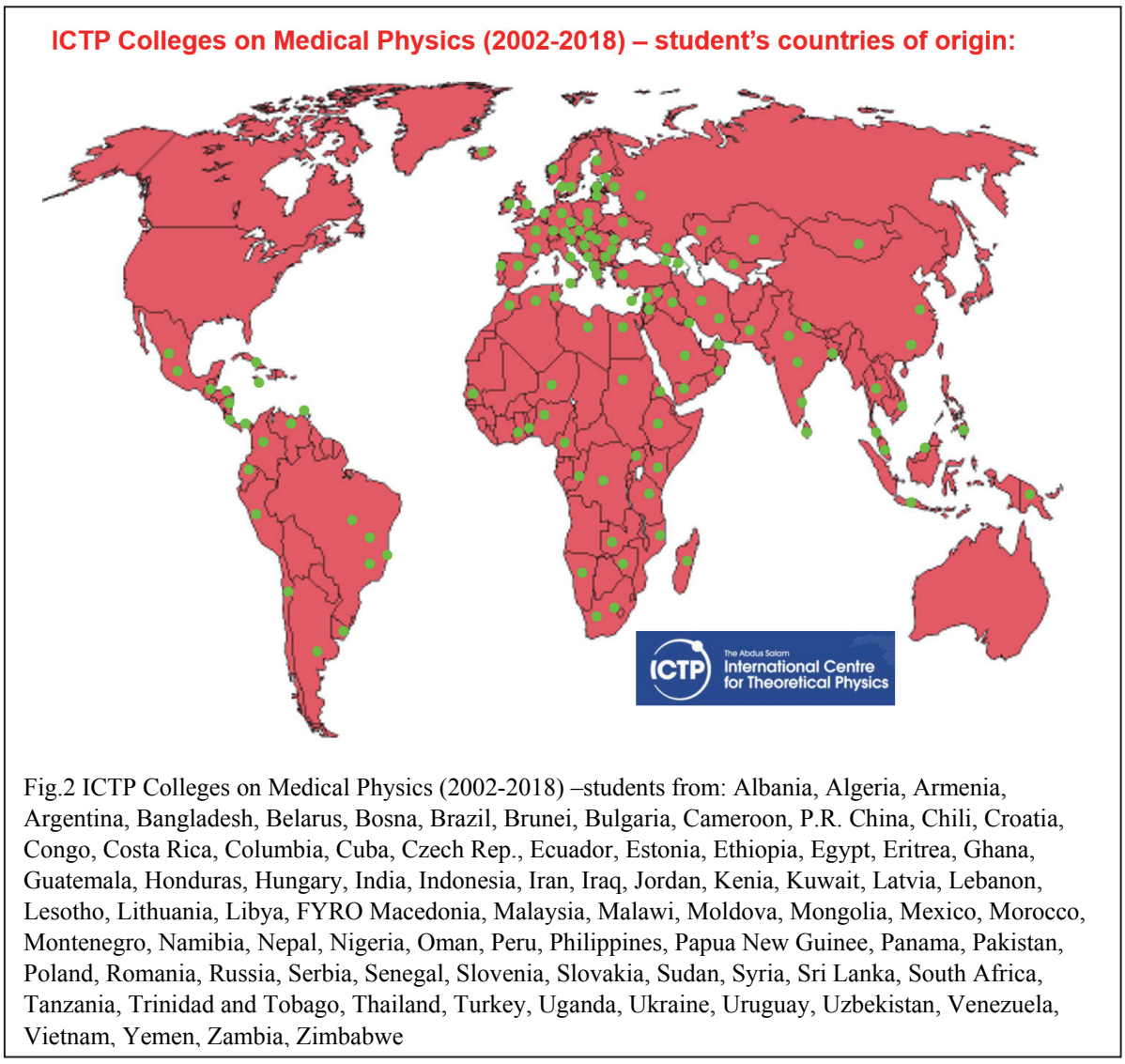

Fig.2 ICTP Colleges on Medical Physics (2002-2018) –students from: Albania, Algeria, Armenia, Argentina, Bangladesh, Belarus, Bosna, Brazil, Brunei, Bulgaria, Cameroon, P.R. China, Chili, Croatia, Congo, Costa Rica, Columbia, Cuba, Czech Rep., Ecuador, Estonia, Ethiopia, Egypt, Eritrea, Ghana, Guatemala, Honduras, Hungary, India, Indonesia, Iran, Iraq, Jordan, Kenia, Kuwait, Latvia, Lebanon, Lesotho, Lithuania, Libya, FYRO Macedonia, Malaysia, Malawi, Moldova, Mongolia, Mexico, Morocco, Montenegro, Namibia, Nepal, Nigeria, Oman, Peru, Philippines, Papua New Guinee, Panama, Pakistan, Poland, Romania, Russia, Serbia, Senegal, Slovenia, Slovakia, Sudan, Syria, Sri Lanka, South Africa, Tanzania, Trinidad and Tobago, Thailand, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe

History, Development, Dissemination and Projects

The links between physics and medicine go back for centuries. Medical Physics, as we know it today, emerges after the discovery of X-rays. Since then physical principles have entered firmly in medicine and continue to transform it creating the advanced contemporary medicine. It is not without reason that the first Nobel Prize was given to Wilhelm Roentgen primarily because of the medical application of the X-rays.

By a coincidence Prof. Abdus Salam received his Nobel Prize in Physics in 1979, the same year when an engineer and a physicist - Godfrey Hounsfield and Allan McLeod Cormack - received the Nobel Prize for Physiology or Medicine (Fig.3). Their discovery and development of the X-ray Computed Tomography totally transformed medical diagnostic imaging and opened the way for the discovery and medical implementation of many new medical imaging methods – to name a few: Single Photon Emission Tomography, Positron Emission Tomography, Magnetic Resonance Imaging (a method whose physics creators received the Nobel Prize for Physiology or Medicine in 2003).

The association of the ICTP with medical physics began in 1982 with an International Conference on the Applications of Physics to Medicine and Biology, organised by Giorgio Alberi (see the history paper of L Bertocchi in an Annex to this Folder). However the idea for creating a College on Medical Physics at ICTP for colleagues from developing countries originated from Dr Anna Benini (at that time IAEA expert) and was supported over the years by Prof. Luciano Bertocchi (at that time ICTP Deputy Director). Both continue to be at the heart of the College and of other medical physics activities in the ICTP (Fig.4). The first ICTP College on Medical Physics was held in 1988 and since then continues to be one of the most oversubscribed regular activities of the ICTP (currently the College is held for 3 weeks, bi-annually).

Fig.3 Nobel Prize winners 1979, including Abdus Salam (3rd from right), Godfrey Hounsfield and Alan Cormac (1st and 3rd from left) – image courtesy to ICTP Archives.

Fig. 4 Anna Benini and Luciano Bertocchi (2nd and 3rd from right) with fellow College Directors (R>L): F Milano, A Benini, L Bertocchi, P Sprawls, M De Denaro and S Tabakov, at the 20th anniversary of the College, ICTP, 2008

Since the start in 1988 the Medical Physics Colleges at ICTP were held during 1992, 1994, 1996, 1999, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018 (see List of Directors in an Annex). During 2001 the Coordinating Directors (P Sprawls and S Tabakov) modified the Teaching programme to allow forming a cohesive teaching entity, adapted for colleagues from LMI countries, and gradually building the knowledge necessary for the clinical application of digital medical imaging.

The materials presented to the students after 2002 were enriched with the purpose built e-learning materials, which were given to each student at the end of each College. This facilitated the global dissemination of the knowledge from the College, as many of the College students used these materials for their teaching activities and organising courses in their countries (see College students' achievements and appreciation in the Annexes).

The new programme structure also allowed the College to be condensed in 3 weeks (from 2008) and to introduce to each College a different emphasis. This structure allowed introduction of laboratories with simulations, and further (from 2012) practical labs at the Trieste Hospital, facilitated by M De Denaro, P Bregant and A Benini. This structure continues to be the backbone of the College and is appreciated by all students (see Students' appreciation in an Annex).

The structure of the ICTP College on Medical Physics was used as background for similar activities in India, in South-East Asia and in Latin America and Caribbean Region. The structure also included a Workshop, where students present the main activities in their countries. This exchange of experience facilitated the creation of professional networks and friendship, which they continue to support.

In 1995 the Coordinator of the first e-learning project in Medical Physics EMERALD (S Tabakov) invited ICTP to join this pioneering international activity. The project developed the 2nd in the world image database on CD-ROM with ISBN (Fig.5, 6). The e-learning materials of the project were tested at the ICTP College and further became a regular part of it. These materials, together with the further e-learning project EMIT, brought to the team in 2004 the inaugural EU Leonardo da Vinci Award. Alongside P Sprawls published all his renowned educational books on free e-books. Copies of these materials were made available to each College student. This association of ICTP with education and training in medical physics led to various other international activities: ICTP hosted the first International Conference on Medical Physics Training (EMERALD) in 1998; ICTP hosted the first International Conference on Medical Physics e-learning (EMIT) in 2003; ICTP hosted the Medical Physics Encyclopaedia Conference (EMITEL) in 2008 (Fig.7, 8). In 2011 ICTP published the book "Medical Physics and Engineering Education and Training" and distributed it free to College students.

The ICTP College on Medical Physics was also the first international user of the pioneering medical physics educational web sites (www.emerald2.eu and www.sprawls.org opened in 1999 and 2000), significant parts of these web sites being made specifically for the College. Since 2004 the College participants became part of the large international project Dictionary of Medical Physics (led by S Tabakov), providing cross translation of medical physics terms between any of its 30 languages.

In 2005 ICTP was Co-Organiser of the large UNESCO World Conference on Physics and Sustainable Development (November 2005, Durban, South Africa). At this high-level international event the case of *Physics and Health* was presented by P Sprawls, D Van Der Merwe, S Tabakov and A Niroomand-Rad. This resulted in selecting of this area of applied physics to be one of the 4 main areas with special importance for the years ahead.

The success of the College on Medical Physics led to opening and supporting of other medical physics activities in ICTP – notably various IAEA Courses. In 2015 ICTP started a regular activity - School of Medical Physics for Radiation Therapy (in alternating years with the College). This School is headed by R Padovani, with the support of L Bertocchi (Fig. 9). From 2006 Administrator of most medical physics activities in ICTP is S Radosic.

In 2002 and 2004 the College Directors (S Tabakov, P Sprawls and L Bertocchi) discussed with the ICTP Director the idea of forming a regular post-graduate educational course in ICTP. This continued to be discussed and updated until in 2014 ICTP formed an alliance with the University of Trieste, resulting in the first international MSc programme in Medical Physics, headed by R Padovani and R Longo. This MSc on Advanced Studies in Medical Physics, with IAEA support, has already produced several alumni and has the strong support of the Italian Association of Medical Physics (Fig.10, 11).

Fig.5 Project EMERALD team, developing the first e-learning in medical physics 1995-98 – Project Consortium

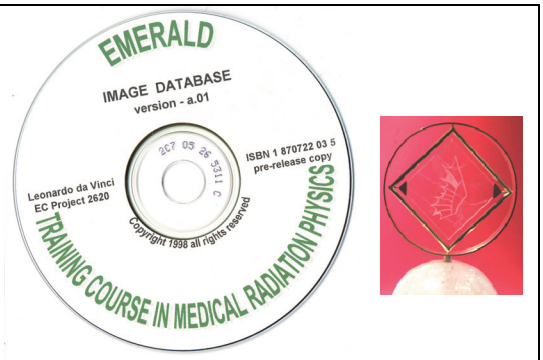

Fig.6 The second in the world CD-ROM Image DB with ISBN with Leonardo da Vinci Award

Fig.7 EMIT Conference – the first International Conference on e-Learning in Medical Physics, ICTP, Trieste, 2003: L>R: C Lewis, C Deane, A Cvetkov, C Oates, T Jansson, D Goss, G Helms, S Keevil, M Buchgeister, M Stoeva, C vaan Pul, G Clarke, K Nagyova, A Krisanachinda, P Sprawls, N Poutanen, J Young, Y Ider, A Milan, A Rosenfeld, A Simons, R Wirestam, I Hernando, V Gersanovska, P Zarand, P Caplanis, F Stahlberg, C Etard, N Fernando, R Stollberger, P Smith, F Milano, A Lukoshevicius, V Aitken, E Perrin, A Evans, A Briquet, C Bigini, A Paats, M Almqvist, G Boyle, F Fidecaro; in Front: C Roberts, J-Y Giraud, Mr L Torres, S Riches, S Tabakov, I-L Lamm, M Radwanska, S Naudy, R Magjarevic, L Musilek, T Wehrle

Fig.8 EMITEL Encyclopaedia on Medical Physics Conference, ICTP, Trieste, Italy, 2008 (part of participants): from L>R sitting: E Morris, E Chaloner, J Calvert, G Clarke, J Chick, A Krisanachinda, I-L Lamm, M Radwanska, B Allen, M Lewis, R McLauchlan, I Horakova, M Almqvist, V Tabakova, S Tabakov, A Benini; standing: C Oates, K Olsen, G Mawko, M Petersson, B-A Jonsson, R Magjarevic, M Secca, E Moser, J Boyle, P Bregant, N Pallikarakis, S Christofides, D Bradley, F Schlindwein, S Keevil, R Wirestam, F Milano, D Frey, E Podgorsak, A Cvetkov, K Keppler, D Goss; 2nd row: M DeDenaro, C Deehan, M Buchgeister, G Taylor, A Simmons, T Schaeffter, J Thurston, D Platten, H Terrio, M Leach, T Jansson, C Deane, P Zarand, A Evans, M Grattan, P Smith, C Lewis (photo includes 21 past & present Presidents of National/International Societies).

Conclusion

For the 30 years of its existence the ICTP College on Medical Physics became a real beacon of medical physics for colleagues from LMI countries. It supported the professional growth of medical physicists in almost 100 countries and created more than 1,000 medical physics professionals, who contribute to the healthcare in their countries. The applications to the College (each time more than 200 applications for 40-50 places) shows the College popularity among young medical physicists. Similarly high are the applications for the MSc course and other ICTP medical physics activities.

In 2016 the ICTP College and its participants addressed all medical physicists in the world on the occasion of the IDMP – the International Day of Medical Physics (celebrating in 2016 the 150th birthday of the Patron of Medical Physics - Maria Sklodowska Curie).

The education and training activities of the ICTP College on Medical Physics will be pivotal in the dealing with the current challenge confronting the profession – the shortage of medical physics specialists in many countries and, related to this, the need of almost tripling the medical physicists globally by 2035 [1].

This Folder, celebrating the 30th Anniversary of the ICTP College on Medical Physics, is a real example of the immense appreciation and gratitude of hundreds of medical physicists from LMI countries, who have benefitted from this unique ICTP College, and who have made the physics applied to medicine an inseparable part of the lives of millions of patients globally.

References:

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6. Bertocchi L, A Benini, F Milano, R Padovani, P Sprawls , S Tabakov (2014), 50 Years ICTP and its Activities in the Field of Medical Physics, J Med. Phys International, vol.2, No.2, p 410-412

ANNEXES:

1. List of ICTP College on Medical Physics Faculties (Directors and Organisers)
2. Photos of ICTP College students
3. Achievements of College students (2002-2010) from 25 countries
4. Appreciation from College students (2010-2016) from 40 countries
5. Letters from various medical physics-related International Organisations
6. Papers related to the ICTP College on Medical Physics and its global impact

Fig. 9 The newly established ICTP School on Medical Physics for Radiation Therapy, 2015

Fig. 10 Master of Advanced Studies in Medical Physics – ICTP and University of Trieste, 2015

Fig. 11 Graduation of students from Master of Advanced Studies in Medical Physics with supporting colleagues from the Italian Association for Medical Physics, 2017

ST, 2018

ANNEX 1

Directors/Organisers of all ICTP Colleges on Medical Physics

1988 – College on Medical Physics

A Benini, L Bertocchi, J Cameron, F De Guerrini , S Mascarenhas

1990 – College on Medical Physics

A Benini, L Bertocchi, J Cameron, F De Guerrini , S Mascarenhas

1992 – College on Medical Physics: Imaging and Radiation Protection

A Benini, L Bertocchi, S Mascarenhas, J Cameron, F De Guerrini

1994– College on Medical Physics: Radiation Protection and Imaging Techniques

A Benini, L Bertocchi, S Mascarenhas, J Cameron, F De Guerrini

1996 – College on Medical Physics: Methods, Instrumentation and Techniques in Medical Imaging

A Benini, R Cesareo, S Mascarenhas, P Sprawls, L Bertocchi, J Chela-Flores

1999 – College on Medical Physics

A Benini, P Sprawls, L Bertocchi

2002 – College on Medical Physics

A Benini, P Sprawls, S Tabakov, L Bertocchi (faculty including C Lewis, F Milano, G D Frey)

2004 – College on Medical Physics

P Sprawls, A Benini, S Tabakov, L Bertocchi (faculty including C Lewis, F Milano, G D Frey)

2006 – College on Medical Physics

P Sprawls, A Benini, S Tabakov, F Milano; L Bertocchi (faculty including M DeDenaro,C Lewis, G D Frey)

2008 – College on Medical Physics

ABenini, GD Frey, F Milano, S Tabakov, P Sprawls. L Bertocchi (faculty including M DeDenaro, P Bregant, C Lewis)

2010 - College on Medical Physics: Digital Imaging Science and Technology to Enhance Healthcare in the Developing Countries

STabakov, A Benini, F Milano, GD Frey, L Bertocchi, P Sprawls (faculty including M DeDenaro, P Bregant, C Lewis)

2012– College on Medical Physics: Applied Physics of Medical Imaging

S Tabakov, A Benini, F Milano, G D Frey, L Bertocchi,P Sprawls (faculty including M DeDenaro, P Bregant, C Lewis)

2014 - College in Medical Physics: Advances in Medical Imaging Physics to Enhance Healthcare in the Developing Countries

S Tabakov, A Benini, F Milano, GD Frey, P Sprawls, L Bertocchi(faculty including S Tipnis, M DeDenaro, P Bregant, C Lewis)

2016 - College on Medical Physics: Enhancing the Role of Physicists in Clinical Medical Imaging: Procedure Optimization, quality Assurance, Risk Management, Training

S Tabakov, A Benini, F Milano, S Tipnis, M DeDenaro, P Sprawls, L Bertocchi (faculty including J Oshinski, M Stoeva, P Bregant, C Lewis)

2018 - College on Medical Physics: Applied Physics of Contemporary Medical Imaging – expanding utilization in developing countries

S Tabakov, A Benini, F Milano, M DeDenaro, L Bertocchi, P Spawls, M Stoeva, S Tipnis, J Oshinski

(faculty including: P Bregant, V Tabakova, A Seibert)

PHOTOS from some College activities

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>ICTP College on Medical Physics – visit at Trieste Hospital with practical</td><td>ICTP College on Medical Physics – PC laboratory with simulations practical</td></tr>
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ICTP College on Medical Physics – discussion of Participants' posters

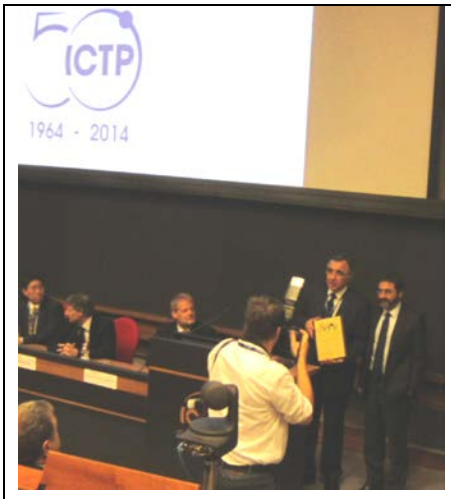
ICTP College on Medical Physics – Feedback discussion at the last day of the regular College

ICTP College on Medical Physics – topical meeting with students from Latin America

ICTP College on Medical Physics – topical meeting with students from Africa

ICTP College on Medical Physics – topical meeting with students from Asia

ICTP College on Medical Physics – topical meeting about the Medical Physics Encyclopaedia

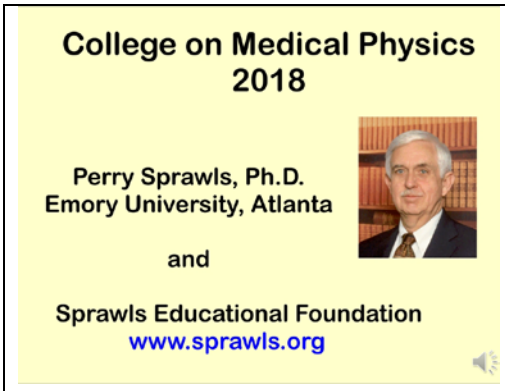


Presenting ICTP Director Prof. Quevedo with IOMP Plaque by IOMP Vice-President Prof. S Tabakov

Presenting College Co-Director Prof. S Sprawls with ICTP Plaque for long service to College

Presenting the College Founders Prof. L Bertocchi and Dr A Benini with IOMP Appreciation plaques

The joint contribution of College faculty to the common aim:supporting medical physicists from LMI countries – made all lecturers and students part of a network: Faculties 2016 – private gatherings with friends



Prof. P Sprawls and Prof. A Seibert deliver online lectures from USA to the ICTP College students

Presenting Diplomas to participants at completion of ICTP College studies

ICTP College 2016 and 2018 – Students receive the newly established EMERALD Award Certificates

ANNEX 2, 3 and 4

2. Photos of ICTP College participants

3. National/International Achievements of College students (2002-2010) from 25 countries

4. Appreciation from College students (2010-2016) from 40 countries

ANNEX 2

Photos of ICTP Colleges on Medical Physics (1988-2016) faculty, students (some with their countries)

ICTP College 1988

ICTP College 1990

ICTP College 1992

ICTP College 1994

ICTP College 1996

ICTP College 1999

ICTP College 2002 (students from 39 countries): ALBANIA, ALGERIA, ARGENTINA, BANGLADESH, BOSNIA, BRAZIL, CAMEROON, CHINA, CONGO, CUBA, ESTONIA, ETHIOPIA, GHANA, GREECE, INDIA, IRAN, ITALY, KENYA, LATVIA, LIBYA, MALAYSIA, NEPAL, NIGERIA, PAKISTAN, PHILIPPINES, ROMANIA, RUSSIA, SENEGAL, SOUTH AFRICA, SRI LANKA, SUDAN, SYRIA, TANZANIA, THAILAND, TURKEY, UKRAINE, VIETNAM, YUGOSLAVIA, ZIMBABWE

ICTP College 2004 (students from 34 countries): ARGENTINA, BANGLADESH, BELARUS, BULGARIA, BRAZIL, CAMEROON, CHINA, COSTA RICA, CROATIA, CUBA, ETHIOPIA, EGYPT, INDIA, IRAN, ITALY, KENYA, LATVIA, MALAWI, MEXICO, MOROCCO, MALAYSIA, NEPAL, NIGERIA, PAKISTAN, PHILIPPINES, SRI LANKA, SUDAN, TANZANIA, THAILAND, TURKEY, UKRAINE, VIETNAM, YUGOSLAVIA

ICTP College 2006 (students from 40 countries): BANGLADESH, BULGARIA, BRUNEI, BRAZIL, CAMEROON, CZECH REPUBLIC, CUBA, EGYPT, EQUADOR, ETHIOPIA, HUNGARY, INDONESIA, GHANA, GUATEMALA, INDIA, IRAN, ITALY, KENYA, LEBANON, MACEDONIA, MOLDOVA, MONGOLIA, MONTENEGRO, MOROCCO, MALAYSIA, NEPAL, NIGERIA, PAKISTAN, PHILIPPINES, PERU, ROMANIA, SOUTH AFRICA, SRI LANKA, SUDAN, SYRIA, THAILAND, TURKEY, UKRAINE, VENEZUELA, WEST BANK

ICTP College 2008 (students from 48 countries): ALGERIA, ARGENTINA, ARMENIA, BANGLADESH, BRAZIL, CHINA, CAMEROON, CHILE, COLOMBIA, CUBA, ETHIOPIA, GHANA, INDONESIA, IRAQ, INDIA, IRAN, KENYA, LATVIA, LESOTO, LIBYA, MEXICO, MOROCCO, MOLDOVA, MONGOLIA, NEPAL, NIGERIA, PAKISTAN, PANAMA, PAPUA NEW GUINEA, PHILIPPINES, PERU, POLAND, RUSSIA, SERBIA, SLOVENIA, SOUTH AFRICA, SRI LANKA, SUDAN, SYRIA, TANZANIA, THAILAND, TRINIDAD AND TOBAGO, URUGUAY, UKRAINE, VIETNAM, VENEZUELA, ZIMBABWE

ICTP College 2010 (students from 35 countries): ARGENTINA, BANGLADESH, BULGARIA, BRAZIL, CAMEROON, CHINA, CROATIA, CUBA, ESTONIA, GHANA, HONDURAS, INDONESIA, INDIA, IRAN, IRAQ, JORDAN, KENYA, LITHUANIA, MEXICO, MOROCCO, NEPAL, NIGERIA, PAKISTAN, PHILIPPINES, PERU, RUSSIA, SRI LANKA, SUDAN, SYRIA, SPAIN, THAILAND, VENEZUELA, VIETNAM, ZIMBABWE, ZAMBIA

ICTP College 2012 (students from 37 countries): ALGERIA, ARGENTINA, BANGLADESH, BRAZIL, BULGARIA, CROATIA, COLOMBIA, CUBA, EQUADOR, ETHIOPIA, GHANA, GUATEMALA, INDIA, IRAN, IRAQ, ITALY, INDONESIA, MACEDONIA, MALAYSIA, MOROCCO, MONGOLIA, NEPAL, NIGERIA, OMAN, PAKISTAN, PHILIPPINES, RUSSIA, SERBIA, SLOVENIA, SRI LANKA, SUDAN, THAILAND, TURKEY, UKRAINE, UGANDA, VENEZUELA, ZIMBABWE

ICTP College 2014 (students from 38 countries): ALGERIA, ARGENTINA, BANGLADESH, BULGARIA, BRAZIL, CAMEROON, COLOMBIA, CUBA, ERITHREA, GHANA, INDONESIA, INDIA, IRAN, IRAQ, JORDAN, KENYA, KUWAIT, MALAYSIA, MEXICO, NEPAL, NIGERIA, PAKISTAN, PHILIPPINES, PERU, SERBIA, SRI LANKA, SUDAN, TANZANIA, THAILAND, TURKEY, UKRAINE, VIETNAM, VENEZUELA, UGANDA, UZBEKISTAN, YEMEN, ZAMBIA, ZIMBABWE

ICTP College 2016 (students from 47 countries): ALGERIA, ARMENIA, ARGENTINA, BANGLADESH, BRAZIL, BULGARIA, BURKINA FASO, COLOMBIA, COTE D'IVOIR, CROATIA, CUBA, EGYPT, EL SALVADOR, EQUADOR, ESTONIA, ETHIOPIA, GHANA, GUATEMALA, HONDURAS, INDIA, IRAN, IRAQ, JORDAN, KENYA, MADAGASCAR, MALAYSIA, MEXICO, MONGOLIA, MOROCCO, NAMIBIA, NEPAL, NICARAGUA, NIGERIA, OMAN, PAKISTAN, PHILIPPINES, PERU, SENEGAL, SERBIA, SUDAN, THAILAND, TURKEY, UGANDA, UKRAINE, VIETNAM, ZAMBIA, ZIMBABWE

- The College congratulates medical physicists worldwide with the International Day of Medical Physics

ICTP College 2018 (students from 32 countries): ALGERIA, ARGENTINA, BANGLADESH, BELARUS, BRAZIL, BULGARIA, COSTA RICA, COLOMBIA, CUBA, EGYPT, GEORGIA, GHANA, GUATEMALA, HONDURAS, IRAN, LATVIA, MALAYSIA, MEXICO, MOROCCO, NAMIBIA, NIGER, NIGERIA, PHILIPPINES, SAUDI ARABIA, SINGAPORE, SUDAN, TANZANIA, THAILAND, TURKEY, UGANDA, VIETNAM, ZIMBABWE (see also the photo on the cover – celebrations of 30th anniversary)

ANNEX 3

National and International Achievements of students from the ICTP College on Medical Physics

Many of the students from the ICTP College on Medical Physics became respected specialists in their countries who established Department and Societies; became Professors, Heads of Department and Officers of their Societies; took active role in the further professional development and healthcare provision in their countries; took part in various international projects, including the Multilingual Medical Physics Dictionary.

As per our current knowledge we are listing here below some of the early College students (2002-2010) from 25 countries, who have become leading scientists in their countries, have taken part in international projects, have further established medical physics courses and other activities:

Algeria
GURAIONIS Hussein - Dictionary Arabic translation

Argentina
RUGGIERI Ricardo Miguel - Secretary General of the MP National Association in Argentina

Bangladesh
AZHARI Hasin - Founding President of MP National Society in Bangladesh, Dictionary Bengal translation
AKHTARUZZAMAN Md – Secretary General of National Society, Dictionary Bengal translation

Brazil
PEDROSA de AZEVEDO, A.C. – Officer of MP National Society in Brazil, IOMP Committee member

Bulgaria
AVRAMOVA Simona – President of MP National Society in Bulgaria
STOEVA Magdalena – Editor IOMP Medical Physics World, Co-Editor of Springer J. Health and Technology, Dictionary Software developer, IUPAP Young Scientist Medal

Colombia
MARIN Vanessa Peña – Vice President of Colombian Asociación for Radiation Protection

Cuba
PEREZ Marlen – Officer of National Society in Cuba

Estonia
KEPLER, Kalle – Officer of MP National Society in Estonia, IOMP Committee member

Ghana
SCHANDORF, Cyril - Officer of MP National Society in Ghana, supports MSc and other courses in the country
INKOOM Stephen - Officer of National Society in Ghana,
HASFORD Francis – Secretary General of African medical Physics Federation (FAMPO)

India
JHEETA, Kuldeep Singh- Officer of MP National Society in India,
SHARMA Sunil Dutt - Officer of MP National Society in India, Officer of National Regulatory Body
CHOUGULE Arun, President of National Society, President of Asia Med.Phys Federation (AFOMP), Chair ETC of IOMP

Iran
BINESH, Alireza - Officer of National Society in Iran, supports MSc and other courses in the country, Dictionary Iranian translation
MOWLAVI, Ali A. - Officer of National Society in Iran, Dictionary Iranian translation, IUPAP Young Scientist Medal

Jamaica
VOUTCHKOV Mitko – established MSc medical physics programme in Jamaica

Malaysia
TAJUDDIN, Abdul A.- Officer of National Society in Malaysia, supports MSc and other courses in the country

Mexico
MEDEL BAEZ Eva - supports MSc and other courses in the country

Morocco
BENATYEB Farida - Officer of National Society in Morocco, Dictionary Arabic translation

Nepal
CHAURASIA, Pradumna P. – Founding President of National Society in Nepal
ADHIKARI Kanchan P. – Secretary General of National Society in Nepal

Romania
POPESCU, Aurel - Officer of National Society in Romania, Dictionary Romanian translation

Russia
KAZANTSEV Pavel – Secretary General of National Association in Russia

Serbia
CIRAJ, Olivera – Officer of National Society in Serbia, IAEA/IOMP Web site person

Slovenia
TOMSE Petra – Dictionary Slovenian translation

Sudan
ABBAS, Nada Ahmed - Officer of National Society in Sudan, Officer of National Regulatory Body
OMER Hiba Baha Eldin Sayed - organises MSc and other courses in the country

Tanzania
MUHOGORA Wilbroad - IOMP Committee member

Thailand
KRISANACHINDA, Anchali – Founding President of National Society in Thailand, President of South-East Asia MedPhys Federation, Officer IOMP
SUWANPRADIT YANGDERM P – Organises courses and materials

Turkey
UNAK Perihan - Dictionary Turkish translation

Vietnam
HOANG Trang – Organises courses and materials

ANNEX 4

Appreciation and Gratitude from ICTP College on Medical Physics students (2010 to 2016) from 42 countries (collected by Prof. Slavik Tabakov in the period May-August 2018)

ARGENTINA
Ricardo Miguel Ruggeri, Agustina Corti

Dear Slavik,

Currently I work as head of the Medical Physics service of the Fundacion Medica de Rio Negro (FUNMED) and Neuquen and the Integral Oncology Center (belong to the same institution) in the areas of Radiotherapy, Nuclear Medicine and Diagnostic Imaging.

I also work as Director of the first Medical Physics Residence in the country that includes the areas of Nuclear Medicine, Diagnostic Imaging and Radiotherapy with University endorsement (Universidad Nacional del Comahue) with the first entrants this year.

The theoretical content acquired during my course in the summer school of ICTP, is used in the theoretical classes of the residence and distributed among them.

From SAFIM, and with the collaboration of FUNMED and COI, we have developed the First Pace of Physics of Patagonia, which has had more than 50 Physician assistants from all over the country presenting and sharing their work in all areas of the same.

I greet you with great affection and cordiality.

Secretary of Argentine Society of Medical Physics (SAFIM)

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Dear Mr. Tabakov,

I am very honored to receive your email. This contact is especialy important for mi because I am working in the preparation of the contents of a course "Medical images laboratory" in Medical Physics (degree career). I´ll be to start to teach this course this year in my University.
I am very glad, and working a lot, specially with material from the College!

I would like to thank you again for the enormous work you do to teach us to teach this beautiful and important discipline.

ALGERIA
Amel Cherfi

Dear Professor Tobakov,

I would like to thank you and thank ICTP for that great experience I shared with you, the other professors and all the participants in the college. It was very beneficial for me and I learned a lot especially in the practical sessions at ICTP and at the hospital.

I am in touch with most of the participants in the college and we share many informations. Nowadays, I teach atomic and nuclear physics, and in my course I give many informations about the applications of nuclear especially in Medical physics.

Unfortunately I don't teach medical physics, and I don't use the materials I received in the college because we don't have a master in Medical physics in our faculty. We plan to reopen it in the 2019 – 2020 academic's year. I'll provide students with all the informations I have acquired during the college, I know how they will be useful for them. We will need your valuable advices for that Master.

I'm in the 5th year in my Phd. I have difficulties especially in the experimental part of my thesis which concerns the correction of the respiratory motion in PET/CT imaging. Unfortunately we don't have a PET/CT in our country (there is just one in a private centre), I try to obtain an internship abroad in order to do the experimental part.

Again, it was a great pleasure to meet you and I hope I will have the opportunity to meet you again on other occasion.
Thanks a lot

BANGLADESH
Hasin Anupama Azhari, Nahid Hossain

At ICTP the training activities in medical physics began in 1983 with efforts of Anna Benini, Sergio Mascaren. Later in 1988, for strengthening the medical physics in developing countries the series of college on medical physics [CMP] began to make the scientists familiarize the role and responsibilities of medical physicists in radiology and imaging. The main promoters and organizers of CMP, ICTP are Anna Benini, John Cameron, Perry Sprawls, Luciano Bertocchi , Slavik Tabakov, Franco Milano and others. In this report, I would like to describe a brief report of my gain in CMP, ICTP.

After having M.Sc degree in medical physics (2006) from the Dept of Medical Physics and Biomedical Engineering (MPBME), Gono University (Thesis semester in Heidelberg University, Germany), I have applied to ICTP college of medical physics in 2006 for attending the course CMP, ICTP. As this course is enriched in imaging which is really helpful for a beginner as an academic person. I must remember during that period organizers asked the participants to present medical physics situation in their countries. Recall myself some of countries representative has present their situation and I was one of them. I have prepared my slides working hard, day and night collecting from different sources specially from Prof Zakaria, Germany. I must admit, I am the beginner of that time knowing very little about the MP in Bangladesh. On behalf of Bangladesh I am the only one participant, my thought was I must do something for the sake of my country. Really that was the guidance of rest of my pathway in MP. Since 2008 I have awarded as the associate member in ICTP in Medical Physics area till 2021. During my visit as regular associate, ICTP, I have joined several times the course on College on medical Physics. We have got the best poster presentation award in 2014.

In the following years I have attended CMP, ICTP course shows in the following figures:

- 4 September to 29 September, 2006, ICTP, Trieste, Italy
- 12 - 23 November 2007, ICTP Regional College on Medical Physics - 2007 in Radiological Physics & Advisory Division, Bhabha Atomic Research Centre, India
- 10 September - 28 September 2012, College on Medical Physics, Trieste, Italy
- 1 September 2014 - 19 September 2014, College on Medical Physics, Trieste, Italy

- Other than CMP ICTP I also attended in 4 November- 1 December, 2013:Training course on medical physics for radiation therapy; 25 March-25 April, 2017: School of Medical Physics on radiation Therapy: Dosimetry and treatment planning for basic and advanced applications. Organizer(s): R. Padovani (Udine), M. De Denaro (Trieste) with EFOMP and IOMP. ICTP Local Organizers: L. Bertocchi, J. Niemela.

Contribution of Knowledge of Emerald to the Department of Medical Physics and Biomedical engineering:
For my 15 years of teaching experience I have transferred my knowledge to the students, colleagues of the CMP, ICTP course. Sprawls Educational Foundation and e-learning materials of the projects EMERALD is using in the department as one of the teaching material. The chapters of radiology and imaging with figures is helping the students quiet a lot. This website will guide the us the direction of the pathway of study parallel to the book. Book on Magnetic Resonance Imaging: Principles, Methods and Techniques has been written in a very simple way for easy understanding of the students. The students are practicing the workbook with tasks and visualizing the database of digital images is of a great help for them to update their knowledge. The radiation protection class delivered by Anna Benini was very informative at that time for our country. Also lesson plan can be organized in radiology and imaging course using the structured timetable provided in the website.

Contribution of Knowledge of College on Medical Physics to the BMPS (Bangladesh Medical Physics Society):
In Bangladesh there is no medical physicist working in the radiology and imaging sector. Knowledge from college on medical physics has been disseminated to the BMPS through its members. BMPS, MPBME together we have started to make public awareness as well as approach to the hospitals to make them understand the role, importance of MP in radiology and imaging. Emerald website, knowledge of ICTP is also helping us for this type of activities.

Contribution of Encyclopaedia EMITEL and its Multilingual Dictionary:
I am one of the fortunate person selected by Prof Dr Slavik Tabakov to conduct the project international Encyclopedia EMITEL and its Multilingual Dictionary representing Bangladesh as a coordinator.

The other members are Mr Safayet Zaman, Mr Akhtaruzzaman and Prof. Dr. G A Zakaria. We are informing to our students to use this Encyclopaedia, which is beneficial for the students. In Bangladesh education language is Bengali upto the higher secondary stage (12th grade) so after university admission it is very handy for the undergraduate students having the MP Encyclopaedia from Bengali to English.

Acknowledgement: Thanks to Luciano Bertocchi for always supporting during my visit in ICTP, Dr. Slavik Tabakov who always encouraged medical physicists in the developing countries and his vision for women empowerment, thanks to Dr. G A Zakaria who continuously encourages us for attending this type of activities and driving his force towards improvement of MP in Bangladesh.

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“College on Medical Physics- Advances in Medical Imaging Physics to Enhance Healthcare in Developing Countries” which was held on 01 September - 19 September 2014 in ICTP, Trieste, Italy – The program was very much efficient for the medical physicists as per their professional development. It was a great chance for acquiring updated knowledge regarding the Physical Science and Technology of Diagnostic Radiology, Nuclear Medicine and Radiation Oncology. As a medical physicist from developing country, I was exposed to a higher technical environment and resource persons in the ICTP and this was definitely influenced my intellectual development.

In my institute I actively Involve in supervision of the operation, data analysis, quality control, imaging and instrumentation of the nuclear medicine equipments such as PET/CT, SPECT/CT, SPECT etc. I supervise the PET/CT, SPECT laboratory and Hot lab. I am also member of the Radiation Safety Committee in my Institute. I engage in supervision of the therapy procedure and dose management for therapy patients. I am responsible for ensure radiation protection of patients, workers, patient's attendents and members of the public in my institute. I am also delivering

lectures to post graduates medical in “MD in Nuclear Medicine” course which is held in my institute, under the Bangabandhu Sheikh Mujib Medical University, Dhaka. After paticipating the program in ICTP, my knowledge and skills was updated regarding all of my works and can contribute effectively to meet the demand of my institute. Thus I was benefited both professionally and personally.

Considering all facts I believe that after participating the program, I can contribute in better management of imaging, instrumentation, radionuclide therapy and dosimetry in my institute as a medical physicist. Now a day the world wide need (especially in my country) for skilled Medical Physicist is in much demand with the rapidly developing integrated therapy and imaging technologies. As a number of world renowned professionals were involved with the program, I believe that after attending this program, my knowledge and skills were updated.

ICTP always give the assistance to support professional development to the medical physicists in developing countries. I would like to deliver a great thanks to ICTP for providing me the travel award and really this was great help me for successfully participating the event.

BRAZIL
Thamiris Rosado Reina

Dear Professor Tabakov,

Hi! It's been a week since we have finished the College and I'm already missing the classes!

I am writing to thank you again for the oppotunity to attend to the College and for the fantastic material we received to bring back home. I also would like to tell you that I engaged to an e-Learning 360 hours Course of Specialization for Preceptor in Healthcare in the public company I work for. This 3 weeks at ICTP were not only knowledge enriching, but it was very inspiring for me. Now I want to contribute to the medical physics to develop in Brazil. I am thinking for the next years to create with my colleagues in the Federal University Hospitals all over the country a clinical training following the model of ICPT's mater's program. It is a dream, but maybe someday we can make it comes true. And last, but not least, thank you very much for the first pages book! I'll follow these steps to make my hospital better! It's been very helpful!!

BULGARIA
Todorka Dimitrova

I have participated at the ICTP College on Medical Physics 2016 Teaching Program “Enhancing the Role of Physicists in Clinical Medical Imaging: Procedure Optimization, Quality Assurance, Risk Management, Training”.

The achieved knowledge and practical skills, as well the new contact with people from different countries were very useful in my work. Actually, I am the Director of the Master Program in Medical Radiation Physics and Technics and I am responsible for the Bachelor’s courses in Medical Physics.

Impact on the Education
Due to the good previous contacts with the Nuclear Medicine Department in St George’s University Hospital in Plovdiv, the practical part of the course in Nuclear Medicine is performing there. The students were visiting the gamma-camera division. Recently, they got access also to the newest PET/CT division. This year we have negotiated also to conduct the practical part of the course in Physics and Technics of the Clinical Radiotherapy at the Radiotherapy Clinic of the same hospital. Students get familiar with the LINACs SIEMENS PRIMUS MID and SIEMENS

PRIMUS HE, with the cyberknife M6 of ACCURA and with the modern radiotherapy planning systems and dosimetry equipment.

Since now the Education in Medical Physics for Bachelors was one of the modules of the Engineering Physics where students were following some specialized courses in Medical Physics in the 3th and in the 4th year of their study. Actually, the program is separated as independent specialization in Medical Physics and the new program is starting in 2018/2019 academic year. In the frame of this program two courses in Medical Imaging (theory and practice) will be conducted at the Cathedra of Medical Imaging at the Medical University Plovdiv.

After my training at ICTP College on Medical Physics I have developed a new course in Introduction to Medical Physics for Bachelors. A course in Medical Radiation Physics for Bachelors is in preparation.

In 2018 I have delivered a series of lectures in Medical Physics in the National Technical University of Athens, Greece in the frame of the Erasmus+ EC Program.
Performing all this activities, I found very useful the materials I've got after the College – lectures, presentations, books, as well the EMERALD materials/images (www.emerald2.eu) and the Encyclopaedia/Dictionary EMITEL (www.emitel2.eu).

International collaboration and Medical Physics knowledge popularization
During the ICTP College on Medical Physics Course I met Assoc. Prof. PhD Trang Hoang from Vietnam and the Medical Physicist Jelena Samac from Serbia. I have invited them to be members of the Organizing Committee of the VII International Conference of Young Scientists (YSIC Plovdiv-2017), 15-16 June 2017, House of Scientists, Plovdiv, were several oral and poser presentations in Medical Physics were reported. This was good opportunity to extend our international collaboration. I was initiator and Chair-women of this conference for many years and, since in the 2015 I left the Club of Young Scientists, I continue to support the conference as a Vice Chair-women. After participating at the ICTP College in Medical Physics course and meeting many Medical Physicists from other countries, I got the idea to open Section in Medical Physics at this conference. Additional work is needed to get more people in this field for the VIII YSIC Plovdiv 2019 which is in preparation.

Medical Physicists in Plovdiv are between the first in the world how started in 2013 to celebrate the International day of Medical Physics. This tradition continues as common event between the University of Plovdiv "Paisii Hilendarski", the Medical University of Plovdiv, The Technical University Sofia - Branch Plovdiv and with the strong support of the Union of Scientists in Bulgaria – Plovdiv.

In 2016 and 2017 I started to organize a new kind of conference in Civil Education through Natural Sciences. There also were reported several presentations treating topics in Medical Physics. I permanently invite speakers for public lectures in Medical Physics, as well for our students.

I would like to thank for the knowledge, educational materials, personal contacts and inspiration I got from the ICTP College on Medical Physics.

BURKINA FASO
Konfe Amadou

Dear Prof

This is a short reply about the ICTP College on Medical Physic in Burkina Faso.
In Burkina no medical physicist had any clinical training and the ICTP college on medical Physics allowed us to reinforce the knowledge in many area of Medical Physics.
For exemple the practical exercise during this college was useful for us.

These courses allowed us to propose quality control protocols in nuclear medicine at the yalgado Ouedraogo University Hospital.

Also, in order to strengthen the medical Physics profession Burkina Faso, we have proposed to the ministry of health to train physicists at the ICTP. and today we have one student in training at ICTP.
The material given at this college is very useful because we refer to this material whenever we need to understand an aspect of medical physics.
Also this material makes it possible to fill the lack of practical training in Burkina Faso

Many thanks to you and the ICTP College.

COLOMBIA
Vanessa Peña Marín

Dear Professor Tabakov,

As for the College of Medical Physics in ICTP, this was a great help for me and my colleagues in the university and in the hospital. After my participation in the course I held a conference for the students and professors of the university in which I showed them what I learned, and I gave them to know the resources of emerald. During these two years I know that several have made use of the platform and have used the encyclopedia and resources during the classes. The resources that are in the platform are very illustrative and optimal to give enough clarity to the students in the teaching of medical physics.

In the radiology physics group, we teach these resources to all students who enter the group and are interested in medical physics.

On the other hand, the University and the Secretaría Seccional de Salud de Antioquia perform quality controls on radiodiagnostic equipment every year, the tests performed in these controls and the protocols used were improved according to what was learned during the college.

What has been learned in the ICTP comes not only to the university, but also to the hospital centers where the medical physicists who trained in it work. The courses taught by the ICTP allow all countries to have knowledge of new technologies, protocols and tools that allow medical physicists to improve the conditions of hospital centers through quality assurance programs.

For me and my colleagues at the University, participation in the ICTP College is very helpful, and I thank the organizers for allowing people from our country, like me, to participate in them and make use of the tools that there they learn.

CNINA P.R.
Li Zhou,

Dear Prof. Slavik Tabakov,

The ICTP College on Medical Physics is very useful for me. Through the education in the ICTP College on Medical Physics and our efforts, medical Physics education has been developed promptly in my University and also in my country and have been matured now. We have set up medical technical undergraduate education for years and planning to carry out the project for master and doctor graduate student education in medical technology professional construction, subject development and talents cultivation.

I found the materials you gave me after the College is also very useful. I have used the EMERALD materials/images (www.emerald2.eu) and the Encyclopaedia/Dictionary EMITEL (www.emitel2.eu) , and shared those websites with my colleagues, students in my University. They are so wonderful. Thank you once again.

CROATIA
Katarina Ružić, Doris Segota

Dear prof. Tabakov,

From 2010 the number of medical physicists in University Hospital Centre Zagreb and in other hospitals in Croatia is starting growing and their role is being recognized. Since there was and still is not existing a formal program for education of medical physicists in Croatia, ICTP gave us a great opportunity to bring this knowledge to physicist in Croatia and to their hospitals.

Through all these years we attended courses on physics in radiotherapy, imaging in medical physics. small photon fields, modern radiotherapy techniques... This helped us in our professional growth, broadened our knowledge and improved process in hospitals in which medical physicist are involved - in other words, better service for patients.

In the last two years, we also attended courses on medical physics in radiology (imaging, CT optimization). This gave us a courage and knowledge to start and take part in radiology at UHC Zagreb. Thanks to that, today we have almost full quality control program in radiology.
Taking part in these courses, we had an opportunity to discuss our problems, to talk to professors, to make connections with other physicist.

We were also users of EMITEL and EMERALD project. This college is a great platform for exchanging knowledge, materials and experience. We are thankful for that and hope we will be part of it further in the future.

>>

Dear prof. Tabakov,

I have attended only few days of College on Medical Physics in September 2016 since my instituiton couldn't manage a longer stay but I found it very useful in many ways. My targeted lessons were about CR and DR technology since in my hospital we were replacing film-screen system with digital units. I had a little knowledge about DR detectors and the QC tests that should be performed but no experience with CR systems. Lessons that I attended on ICTP helped me to understand CR and DR systems and to develop QC protocols.

Also, I found EMERALD very useful when preparing lessons for my students. I think College on Medical Physics on ICTP is very useful, helpful and it gives basic knowledge to the medical physicists involved in diagnostic radiology. I am very thankful that I was enabled to attend these lessons and I recommended it to other young medical physicists in my country that started working in diagnostic department.

CUBA
Dayana Ramos Machado

Dear Professor Tabakov,

The ICTP College on Medical Physics gave me the possibility to have a general background of the

medical physics field. Before the college I was working closely linked to the internal dosimetry field and after that experience a huge spectrum that I did not know was opened for me.

Nowadays I work as a member of an advisory group in my country, this group provides national quality control services for diagnostic x ray equipment, as well as other services related to the practice of nuclear medicine, such as the verification of the radiation protection requirements for the safety of patients, occupationally exposed workers and the public members. Part of the mission of this group is also the training of new specialists, so now I use the lectures given in the college and all the materials that were provided to us, in order to improve the national radiation protection course that my group prepare twice every year, this course is the only one in Cuba recognized by the nuclear regulatory authority for the licensing of radiation protection officers. Therefore, the College was very useful to me and to my country in some ways. I really appreciate the opportunity I had, I´m grateful for have been a student of The ICTP College on Medical Physics.

ECUADOR
William V. Ona Rodriguez, Alexcei Pérez Baranovski

Dear Prof. Tabakov

Its really a honor for me to receive this mail from you.
I am Alexcei Pérez, Medical Physicist from Ecuador. I attended to 2012 MP college as a Physicist, and finished last year my master degree in Heidelberg Advanced Methods in Radiotherapy. This visit in Trieste motivated some mates to apply and finished their master degree in Medical Physics in ICTP.

I am working now in some educational projects in Ecuador with other Medical Physicists, and of course I will use the ICTP material, so, in some weeks I will mail you to let you know the progress.

I want to take this opportunitty to consult if IOMP have the possibility to start a collaboration program to develop the medical physics in my country?

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

Dear Professor Tabakov

It's a really pleaseure to receive an email from you. I have met you in Trieste in 2014. I am the first promotion of the Master of Medical Physics in ICTP and it was a beautiful experience in my personal life and profession.

Through the Master's Degree in Medical Physics I made in 2014 at the ICTP I have been able to carry out several activities related to education and teaching in my Home Institution. I have been able to share several talks related to modulated treatments in head and neck and prostate. I have taken care of several students who are doing internships and their bachellor thesis topics. It has been possible to carry out two papers on topics related to research in my Hospital and a project was carried out directly with the IAEA to train all the Radiotherapy staff and purchase a new equipment for quality control for VMAT. Now a last project to perform pediatric radiotherapy in the year 2020 was presented.

ETHIOPIA
Seife Teeferi,

Dear professor ,

Since I am working as diagnostic medical physics , ICTP college on medical physics helps me in various ways. For the last fifteen years , I was the only medical phycisist working in diagnostic areas. During these times getting materials and practices as refeshment were difficult . After joining the 2016 courses , the materials helps helps me to supply that of mine .I used to teach them radiology residents and medical radilogy technology students found in ethiopia .

The practical helps me to do my further research on these areas for which I became associate professor . The practical also helps me to enhance my previous radiation protection activities in the country . I am one of the three persons who have private radiation service in my country . But, because of lack of materials I am involved only through conventional X Rays and dental X Rays. Surprisingly, the hospital for which I am working for (TIKUR ANBESSA SPECIALIZED REFERAL HOSPITAL) has no dosimeters. The hospital has two CT, 128 and 64 sliceexcept those phantom coming with them we do not have dosimeters, 16 and 32 cm diameter phantom for dose analysis .we have also 1.5 tesla MRI. I think you are required to give more practical on MRI areas For hospitals X Rays I am using my own dosimeters for safety assessment and teaching students .

GHANA
Vivian Della Atuwo-Ampoh, Theresa B. Dery

Dear Sir,

Many thanks for the email. I am Vivian Della Atuwo-Ampoh from Ghana and was part of the 2016 College of Medical Physics.

I must confess that the opportunity granted me was a dream come through. I learnt a lot through the basic teachings of Imaging that covered all modalities. I best appreciated the MRI concepts and Sprawls model teaching. The interaction with seasoned and selfless lecturers was really great. I exchanged knowledge and experience with colleagues who were from different countries. The African forum granted by Dr. Slavik Tabakov was special and gave us the opportunity to share pertinent issues.

Back home I disseminated the lecture notes and materials to some colleagues at work and also I have been instrumental in assisting Physics, Radiography and Medical Students during their internship and Rotation. This has been very helpful. At the moment, I have also been instrumental in the establishment of the Medical Imaging Department of the University of Health and Allied Sciences in Ho, Ghana. I have been engaged as a part-time Lecturer.

The college of Medical Physics program is very dynamic and unique I must say and I remain eternally grateful to the organizers and lecturers for such a wonderful opportunity granted us. Many thanks.

>>

Dear Prof Tabakov,

It gives me great joy as I look back at the last four years and what I have achieved through the ICTP College of Medical Physics in 2014. It came at a time where my country wanted to strengthen the clinical, research and educational programs in the radiological sciences to provide effective and efficient health care delivery systems.

The College was hugely required in order to gain competency which was applied in research and training. Through the lecture series with practical exercises and learning experiences in medical imaging, I can say am a trained Medical Physicist. The College assisted me to be well-armed to uphold the highest level of safety assessment in the diagnostic facilities in my country. College

2014 pioneered my confidence, especially for being among the few women Medical Physicist in my country and Ghana being among of the four other countries (Bangladesh, Thailand, Sudan and Cuba) for winning the TAQI BINESH PRIZE for best poster.

Currently, the knowledge acquired through ICTP 2014 has provided educational training through seminars for the medical physics profession in my country. Today, as a PhD candidate, I am grateful to ICTP for giving me the opportunity to take part in the College. I hope others would also benefit from this skilled and innovative programme. The College was very successful and well organized. Thank you to ICTP College of Medical Physics and the facilitators.

GUATEMALA
Roberto Montezuma

Dear Professor Slavik

In the time that I assisted to the college (Enhancing the role of Physicist in Clinical Medical Imaging 2016) I was working as a dosimetrist in the national center for cancer in Guatemala, in the radiotherapy department. For that reason I didn't have knowledge about imaging in medical physics. During the lectures and with the practical sessions I had a brief but very useful knowledge about this branch of the medical physics, that in my country is not developed but is very needed, when I came back to Guatemala I started to teach to the technicians of the radiotherapy department and in the school for technicians in x-ray, some subjects related with the radiation protection, imaging theory and general physics, where were very useful the content of the lectures that I received in the college.

This year I moved to Trieste but this time to the master programme of medical physics (MMP 2018/2019) and I am increasing my knowledge during the classes that I still having, with the idea of to make the training year in nuclear medicine. In summary this college helped me to meet people from many countries and share information with them, to have an very good knowledge about the imaging in medical physics and to decide to apply to the master programme in where now I am.

INDIA
Arun Chougule, Arun Kumar

Dear Slavik,

I have been benefited immensely from ICTP in particular and India in general. My association started with ICTP after I got the Regular Associteship of ICTP in 2014 and subsequently i visited several times and attended many programmes.

I have written an article on "Contribution of ICTP to Medical Physics....'and is published in AFOMP newsletter. I am attaching the article and the newsletter for the ready reference
[see Annex 6]
Arun Chougule

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Dear Prof.Tabakov,

Thank you very much for your mail. It is indeed very nice to receive a mail from you to submit the accomplishments achieved on being an ICTP Medical Physics College participant. Before that I would like to highlight the opportunities ICTP offered to me during my career as a Medical

Physicst. ICTP offered me a fully paid fellowship to participate in their biennial programme: "College on Medical Physics: Imaging and Radiation Protection" held at Trieste, Italy during 1992. Subsequent to that I am fortunate enough to be part of two more ICTP Colleges in 2002 and 2010 respectively. In fact, I still remember the first ICTP College which gave me an opportunity to look outside world of Medical Physics, other than my home country, India.

I am hailing from the southern most state of India, Kerala, where the literacy and health indicators are on par with developed countries. However, the health infrastructure is no way near around the developed countries. Participation in ICTP Medical Physics college helped me to set up radiation acceptance & quality assurance programmes for diagnostic radiology equipment and diagnostic radiology facilities in my state Kerala which were not available earlier, though we had full fledged radiation oncology medical physics activities in the state. Subsequently, Kerala became the first State in India which established a Directorate of Radiation Safety (DRS) under the State Government of Kerala for the monitoring of radiation safety & quality assurance of all diagnostic radiation facilities of Kerala in co-ordination with the national regulator, Atomic Energy Regulatory Board (AERB) of India. During this period, we have formed the medical physics society of the state, Kerala Association of Medical Physicists (KAMP) and I served as the Secretary and Treasurer of KAMP twice. Eventually, KAMP has been converted into the Kerala Chapter of Association of Medical Physicists of India (AMPI) recently.

After a stint of about 12 years service in India, I have been invited by the Ministry of Health, Government of Oman to join as the first Medical Physicist in Ministry of Health (MOH), Sultanate of Oman and to establish the Dept. of Medical Physics & Radiation Protection Service (MP & RPS) for the Ministry which caters all the Medical Physics and Radiation Protection needs of the Ministry in Radiation Oncology, Diagnostic Radiology, Nuclear Medicine, Research and all other areas of radiation use in MOH. Thus I joined the Ministry of Health (MOH), Oman as the first Medical Physicist in 1999. Since 1999, I am working in Muscat, Oman as the Head of Medical Physics in Ministry of Health for almost 20 years now.

I was nominated as Technical Expert by International Atomic Energy Agency (IAEA), Vienna for various scientific activities since 2002 and continuing.

Was Chair of Scientific Sessions in various national and international scientific conferences including World Congresses on Medical Physics.

In conclusion, I am proud to say that the participation in ICTP Medical Physics programmes moulded me as a medical physicist especially at the early days of my career.

INDONESIA
Lukmanda Evan Lubis, Dwi Seno K. Sihono, Eka Djatnika Nugraha

Dear Prof. Tabakov,

I participated in ICTP College on Medical Physics in September 2012, that is before I finished my MSc. I chose academic career in Universitas Indonesia (UI) after I finished, and all the materials given during the three-weeks course came into use in a very handy way. Aside of using the knowledge delivered during the course for teaching and research, I also spread the materials to students with appropriate credentials (so they know it's from the course). It's been five years since I started teaching, so these materials have come across students from five year-classes. Evidently, I found students submitting their assignments using materials (figures, references, statements) from either these ICTP slides or EMERALD/EMITEL entry to support their answers.

Since some of my students have started working, I can tell you that their knowledge eased them in getting through the beginning of their careers. In that context, I have heard comments from senior

clinical physicists that 'physicists graduating from UI nowadays are relatively more knowledgeable' and I believe my participation in ICTP 2012 has a part in it somewhere in the course.

Aside of the above academic impact, the three-weeks experience in Trieste has enabled me to speak out with confidence about the science and beauty of medical physics to the national community. Since 2015 I took active role on the national medical physicist society as one of a few members concentrating in diagnostic and interventional radiology. My primary appointment as lecturer allows me to get numerous talk invitations in the society's activities – again, this is where my knowledge from the 2012 ICTP course has played a significant role in my confidence. Outside the campus and society, I also have some involvements in the activities of our Ministry of Health as well as our National Nuclear Energy Regulatory Agency, mostly in composing regulations and policies regarding radiation sources in healthcare services. The memories and knowledge from 2012 ICTP course are among those experiences enabling me to give thorough inputs and suggestions to our government.

To conclude my remarks, I must let you rest assured that I (I believe I also speak for the others) received nothing but abundant benefits from these ICTP courses. If it is possible, please make sure that these words reaches all those who are involved in making the ICTP College on Medical Physics happen. I can not thank you and everyone enough for this opportunity in 2012. It changed my life, as well as those I influence in my career as academia.

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Dear Prof. Tabakov,

I participated in ICTP College on Medical Physics in 2010. As a lecturer and researcher in Universitas Indonesia, the course is very important and useful. I used the knowledge delivered during the course for my lecture and research. Since 2012 I pursued my PhD in the field of Medical Physics in Department of Radiation Oncology, University Medical Center Mannheim, University of Heidelberg. My research topic is about Image Guided Radiation Therapy using ultrasound.

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Dear Prof Slavik,

about the training of medical physics in trieste, I find it very useful especially for developing countries. for Indonesia itself, this is very useful as it coincides with the regulatory body policy for QA inspection of X ray equipment in hospitals across Indonesia, so we teach almost to all agencies (in this case BATAN conducts training and workshop) and ofcourse we are using www.emerald2.eu for one of reference . thank you for all that is taught and your support to us prof slavik.

IRAQ
Hussien Zahed

Dear Slavik,

I would like to show how we benefited from the participation I had in my country:

1. Once I have returned back home, and according to our education system, I required to show what did I got from this participation and therfore how can I dissaminate the knowlegde I had to other colleagues.

2. I have confirmed to you while I was there in Trieste 2016, I and we were/are realy interested in the QA/QC programs to be conducted in our hospitals, and specifically in our radiology deprtments. This thing was welcome by the heads of our deprtments but the conduction was a bit slow due that this needs some prepartions and almost the tools we lack to persue the work of the QC/QA. For example, tools such dose measurements device.....etc.

3. Personally, I took MSc student htrough him I am dissminating a lot of the QC/QA education in the hospital and X-ray deprtments. This was a good opprtunity to educate the worker there on how to reduce the patients dose and on how to take care of the equipment they are using with limited capabilities. And realy we did reduce the dose somewhere else especially for the high frequent PA chest X-ray projection.

4. We just established a new local DRL for our city for the first time ever for a number of the X-ray projections.

5. We, in the physics department, interested in opening a branch for the medical physics, and the project is on table, this need some preparartions to be issued by our ministry and we did try this year but the time gone of and the deadline passed so we postponde it to the next year.

6. Generally, the interst in the importance of medical physics is becoming realy high and the evidence for this is that are two academic institutes have opened BSc of medical physics branches and they are going on.

JAMAICA
Mitko Voutchkov

The Medical Physics programme in Jamaica was introduced in Jamaica after participation in the ICTP College on Medical Physics in September 2008. With support of programme organisers and lecturers, the University of the West Indies has launched in 2009 a Bachelor of Science Degree programme in Medical Physics, and in 2011 a Master's of Science Degree in Medical Physics. Further support was provided through IAEA TC grants and participation to the "School on Medical Physics for Radiation Therapy: Dosimetry and Treatment Planning for Basic and Advanced Applications" in 2015 at Trieste, Italy. Presently, over 140 students graduated with BSc degree in Medical Physics and some 35 with Master's and PhD degrees in Medical Physics. Among graduates are students from Jamaica, Trinidad and Tobago, St. Lucia, Dominica, Bahamas and Nigeria.

One of the MSc graduates from Jamaica is currently enrolled in the ICTP's Master of Advanced Studies in Medical Physics (MMP) program, which includes a year's clinical residency in hospitals. Jamaica is a leading country in the IAEA regional project RLA6081 "Strengthening Human Capacities of Caribbean Countries in Radiation Medicine" which aims "to expand professional development opportunities, building on an IAEA-supported medical physics programme started in 2011 at the University of the West Indies in Jamaica" (https://www.iaea.org/newscenter/pressreleases/iaea-helps-strengthen-radiation-medicine-in-the-caribbean).

KENIA
Bernard Ochieng

Dear Prof,

Below is my short gratitude note:

I wish to sincerely thank ICTP School of Medical Physics for having empowered me with knowledge and skills that I acquired there. Subsequent to the course that I attended in Trieste, I've been engaged in both diagnostic radiology and radiotherapy physics as follows:

- Help establish three radiotherapy centres namely Texas Cancer Centre, Equra Health Kenya (where I currently work) and Kenyatta University Hospital (where my consultancy for the institution is ongoing in Radiotherapy and PET/Cyclotron Project). I've played the role of both Medical Physicist and Head of Radiotherapy Division.
- Contributed to the curriculum development for the BSc (Radiography) at Jomo Kenyatta University, MSc (Medical Physics) at the Technical University of Kenya and MMed (Radiation Oncology) at the University of Nairobi.
- I'm anticipating to initiate similar programmes in the next one year at Kenyatta University Hospital when the institution facilitates the same.
- I've found the Emerald notes and images very useful in teaching at some of the Universities above. I can't forget to mention Prof Sprawls' MRI book which I've since a course book. I thank him once more for the complementary copy.

The seeds you planted are growing. May you endevour to plant and nurture more.

MALAYSIA
Anis Suhana Ahmad Sabri, Nurmazaina Md Ariffin

Dear Prof

As a participant in ICTP College of Medical Physics 2014, i found the course is very useful and informative as a learning center for all young medical physicist from developing countries to share our knowledge and experiences with the guide from IAEA expert and speakers.

The material provided during the course also is very useful for me and my colleagues as it can be applied in our daily work. We also use www.emerald2.eu as our reference.

2014 College of Medical Physics student is my changing point in becoming knowledgeable medical physicist that is valuable for my institution. Thank a lot for having me in the program. I'm very grateful and appreciate the opportunities.

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Dear Prof,

Thank you to you and ICTP College on Medical Physics for giving me an opportunity to attend the course and gain knowledge and experience from all the beneficial good lecture giving during the session. Until now, I still remember your lecture on the introduction of electronic learning materials on Emerald2 and EMITEL. It was a very useful source of information that I always used as reference to get better understanding of the concept apply in medical physics. From this Emerald2 and EMITEL also we try to apply the concept, since currently we are in the stage of finalizing our quality control methodology in radiology equipment especially in CR and DR system. This method will be used by medical physicist in Malaysia in verifying the quality control of radiology equipment in their hospital.

Beside that, I always used this reference as our continuous medical education program in my department. This is the platform for us to discuss and fill in the gap of knowledge between the medical physicist in the department. The presentation material is so attractive so we can get better understanding on the topic discussed. In addition, material from Prof Sprawl also helpful.

In 2016, MOH Malaysia are in the beginning of developing new quality assurance program (QAP)

to supersedes the current QAP which are outdated. After the ICTP courses in September 2016 and with the long discussion on diagnostic reference level (DRL) during the session, I suggest that Malaysian DRL which develop in 2013 to be as part of QAP indicator, since both are in medical exposure. We manage to relate DRL for CT scanner and fluoroscopy cases into the QAP Manual. This Manual now still in trial stage at hospital level before this manual are fully implemented.

All the learning material given by ICTP during the courses also I share with my colleagues. Once again, thank you for giving me an opportunity to attend courses organized by the ICTP. Hopefully this kind of courses still continue to give changes to interested participant from all over the world.

North MACEDONIA
Dushko Lukarski

Dear Sir/Madam,

I was participant at the ICTP College of Medical Physics in 2010. The College provided very useful education in the field of Imaging QC and RP. I was introduced to the basics of different modalities of imaging in medicine by lectures and lecturers of very high quality. Not only that they improved my personal knowledge of the subject, but provided me with valuable resources for dissemination of these information (EMERALD, EMIT, EMITEL and Sprawls Educational Foundation).

I used the experience to improve the radiotherapy practice at my home institution, the University Clinic of Radiotherapy and Oncology in Skopje, Macedonia, and to conduct series of lectures on the subject for my younger colleagues.

Even today I use the resources provided by the College in preparing the lectures and practical exercises of the young students in Radiation Technology Therapy at the Medical Faculty in Skopje. Also, the contacts with my fellow colleagues made at the College are still kept today and on several occasions I was able to discuss professional issues with my friends from different centers around the world.

I thank you for the opportunity to participate at this College and wish you a successful future in introducing young medical physicist to the world of medical imaging.

MONGOLIA
Bilguuntur Otgonpurev, Lkhagvasuren Bold

Dear Slavik

We have only 5 medical physicists in whole country. 4 of us are radiotherapy specialties and only I am diagnostic and nuclear medicine specialty.

There is not academic preparation of medical physics at the moment. All we have graduated as a nuclear physics and specialized on radiotherapy and nuclear medicine medical physics through IAEA's fellowship programme in duration 2 months to 1 year in abroad.

For me, I have participated College on Medical Physics which was Enhancing the Role of Physicists in Clinical Medical Imaging: Procedure Optimization, quality Assurance, Risk Management, and Training, from 5 September 2016 to 23 September 2016 by full grant.

It was valuable opportunity for me. Because of new SPECT/CT, X-ray machine and Diagnostic CT

and MRI had being installed at my institute that time. I was responsible for procurement, room preparation and installation of that equipment. There was nobody to teach me how to do calibration, commissioning and QA of diagnostic equipment. Medical imaging physic is very wide subject. Therefore it was deal to learn myself from handbooks.

I done calibration, commissioning and QA of newly installed diagnostic equipment successfully using my knowledge that gained from 3 weeks course at ICTP.
I was sharing my gained knowledge to the other radiotherapy medical physicists and radiology resident students.

Therefore, one of my colleagues contributed ICTP Collage on medical physics materials through presented at Annual Radiology Congress in 2016 which was “Radiation Protection Principles and Quality assurance in Diagnostic Radiology”.

Also, full grand was very good chance to participate that wonderful course. Because of people of developing country like as Mongolia is not possible to pay for training in abroad. I am very much appreciating with support of ICTP. Moreover 2 radiotherapy medical physicists had participated to ICTP medical physics course.

In my opinion, ICTP Collage on medical physics was help to strengthening radiotherapy and diagnostic radiology field in Mongolia. Due to introduction of new technology, we need to improve our knowledge continuously.

I hope that ICTP always will be help to successful development of Mongolian medical physics in the future.

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

Hello Dear Tabakov

This is Mr. Bold from Mongolia. I am the first trainee in this program

This program still giving its benefit to Mongolians. I am still delivering information and teaching your lectures to diagnostic resident doctors who are being trained in the National Cancer Center

I have met several times with Ministry of health to organize nationwide diagnostic equipment's QA program but they still could not due to financial problem

But thanks to you we still have that knowledge to pay realy big attention on QA of diagnostic equipments and I am still delivering to new doctors so hope the system will change in Mongolia

MOROCCO
Mohammed Bougtib, Farida Bentayeb

Dear Tabakov;

I bring to your knowledge that the ICTP helped me a lot in the field of medical physics, because I was a student in master of the medical physics of trieste, and it was a good experience for me where I took a lot of things in medical physics, and during the period of my master degree I attended colleges in medical physics which made me much help in the field of medical physics.

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Dear Prof. Slavik Tabakov,
Dear Organizers of the ICTP College on Medical Physics,

Taking this opportunity, I have the pleasure and honor to congratulate the ICTP College on Medical Physics organizing committee. This college has been very useful for me, my university and my country.

I would like to congratulate and thank the entire organizing team, all the professors and specialists, and the local ICTP organization team, who look after to hold it each two years, for thirty years now! I greet you all without exception and wish you to continue and provide this interesting training that people in the field, from developing countries, can benefit and push to develop this discipline in their countries.

The ICTP College on Medical Physics has been very useful for me and for my country. Indeed, in 2006: it was my starting point in the domain! 12 years ago! This college was so interesting that I also attended, during other sessions, when I was an ICTP associate member.

Attending this interesting scientific event helped me to establish, in 2007 and for the first time in Morocco, training on medical dosimetry (university degree in medical dosimetry, Bachelor's degree of Science). Several promotions have been formed (20 students per promotion). The laureates work as dosimetrists in hospitals. Some of them continued a master's degree and are now medical physicists and others have obtained the defended their Ph.D thesis's.

I note that the EMERALD's online learning materials, as well as Sprawls Educational Foundation courses and the multilingual dictionary have been very beneficial to our students. I also had the opportunity and the honor to participate in the multilingual dictionary of the EMITEL international encyclopedia.

Following the establishment of medical dosimetry training in my country, a research team in medical physics was formed in our laboratory. Thesis work was done in collaboration with Italian specialists and a Brazilian professor whom I had the chance to meet, during the ICTP College on Medical Physics in 2006, Some Ph.D students of my team have benefited, through internships through ICTP's scientific programs, to develop their Ph.D thesis. Certain treatment techniques in radiotherapy were developed during these courses and are applied and appreciated in Moroccan oncology centers. Some works have been published in international journals and proceedings of international congresses. Our team's activities are axed on radiology and mammography, radiotherapy and nuclear medicine (imaging and dosimetry).

MEXICO
Eva Medel-Baez

Dear Prof. Tabakov,

It is a pleasure to stay in touch with you and with all the Medical Physics College. I attended the MP College in 2014 and I could summarize my achievements as follows:

1. Right after the College, I applied for an IAEA grant in order to receive founds for dosimetry equipment, phantoms and experts visits. That grant was accepted within the MEX6010 Technical Cooperation Project for the 2018-2019 period. During this year I expect to receive the equipment and some fellowships for Mexican radiologists are planned to take place by the end of this year.

2. By the end of 2016 and with the help of a Belgian dosimetry company, I borrowed a diagnostic dosimetry kit and I started a dosimetry review of CT, mammo, radiography and c-arms withing the center I work at and with the help of one master student and the vendor manuals. By mid 2017, all

the diagnostic equipment at my hospital was verified according to the vendor's recommendations and/or AAPM guidelines, and we prepared a based line report of the operation conditions for each machine.

3. In Juanuary 2017 we received an IAEA expert from MD Anderson Cancer Center with whom we followed the QA/QC of a CT and mammography equipment. We had group sessions and we involved radiologists and medical physicists from the academia to the seminars with the expert. This year we expect to receive another IAEA expert to work with us in the set up of a QA/QC program for our hemodynamics department.

4. Recently this year and after knowing the IAEA project was accepted for implementation, IMSS hospitals in the state of Puebla has accepted I perform an evaluation of their 52 diagnostic machines installed. I started with a personal interview with the radiation safety officer, I prepared a questionnaire involving installation time of the equipment, radiation safety aspects, operation licence, level of training of the operators, QA/QC programs existence, radiation levels, dose registry in their personal dosimeters, and estimated dose in each practice. The current scenario is not encouraging, but I am still performing my site visits since it is evident that there is a lot to do in this regard. The second stage of this visits will take place by the end of this month and we will start performing dosimetry tests. For this part I am involving my master students to prepare reports and perform research on the vendor's recommendations in case are not available at each facility. We look forward to fiish this evaluation and to extent our radiation protection program to other states in Mexico.

5. I have started a collaboration with different centers in south Mexico to carry out a remote CT dosimetry verification based on the design of a low cost CT phantom for dose and image quality assessment.We are in the CT phantom design phase, and in the characterization process of OSLD dosimeters for CT beam quality. I expect our first CT phantom prototype would be ready in a couple of months so we can send it to different centers to be irradiated at certain conditions, we would receive back the image they obtained and we would read the CT dose stored in the OSL detector; those centers that are out of certain tolerance levers we expect to visit them and perform CTDI verification on site.

6. BUAP University in Puebla, Mexico; is interested in exploring the possibility of setting up an SSDL dedicated to the calibration of diagnostic dosimetry detectors since there is not such standard in Mexico. I do collaborate with BUAP University in setting up a diagnostic radiology consulting program for low income medical centers in Puebla.

I thank you very much for following up our progress.

MONTENEGRO
Melisa Nurkovic

Dear Prof.Tabakov,

At that time, 2014, I was one of the Master in medical physics student at ICTP. Even that it was a little bit difficult to follow our school obligations regarding the exams and the College, it helped me before all, in the field of Magnetic resonance exam (which was immediately after the College), to pass well, and with more understanding! Generally, the Course was very useful for me during all my 2 years study in Italy. Also, practical session in Informatics laboratory were very useful, especially about DR image parameters.

Related to the given course material, I found it very useful, and often I use it, especially the Encyclopedia.

In connection with the achievement on this field in my Institution, I hope, with above mention new facilities, and new equipment, we will improve medical Imaging physics in our Radiotherapy department. Just to remind that I am involved only in work on Radiotherapy.

NAMIBIA
Vera Uushona-Mikka

Good day Sir,

Thank you for the email. The 2016 ICTP college on Medical Physics was very beneficially to Namibia. The notably achievement is the development of quality control procedures for diagnostic radiology. computed tomography and mammography. Unfortunately there is still no academic programme in medical physics in Namibia, however several undergraduate physics students at the university has done projects in medical physics as part of their research.

NEPAL
Ram Yadav, Matrika Prasad Adhikari, Kanchan P. Adhikari

Dear Respected Sir,

It is my pleasure to write about benefits from college on medical physics course conducted by ICTP for Nepalese medical physicists. when I flipped my profession from teaching physics at Tribhuvan University to medical physicists at department of radiation oncology of Bhaktpur Cancer Hospital in 2006, I was facing problems to understand medical imaging. how it is formed? How it is used for QA, Dosimetry and planning? But when I participated in college on medical physics course at ICTP in 2013, most confusion of CT , MR and X-ray images were cleared.

Now I am working as a senior medical physicists in radiation oncology department of BP Koirala Memorial Cancer Hospital since 2011. Now I am effectively use medical images in radiation treatment planning without any confusion.

Finally I would like to thank you, ICTP for continuation of college on medical physics till now. I also recommend to include QA and QC of nuclear medicine equipment in college on medical physics because this is still new for us to learn and implement in our institute.

>>

Dear Prof. Slavik

I Started My Carrier as an assistant Professor of Physics after completion of M.Sc.I taught general Physics for six years. Then I shifted to work as an Instructor of Radiation Physics in 2002 in a deemed university. There i started to teach Radiation Physics,Radio-biology, Radiation Protection and many radiation related equipment which were almost unknown to me.

It is very sad to share that there was not a single book of radiation Physics in the library, however i was able to find a book of Christensen and Bushong which was a big achievement at that time.I started lobbing with administration to buy books and fortunately we get few textbooks in next year. However i did not have any special knowledge and training about Medical Physics and radiation Physics, hence it was a big challenge at that time .

However i accepted the challenge and collect enough confidence that if I have books I can do it.

The feeling at that time was like being lost in ocean. Luckily in Sep. 2006 i got chance to Participate the college on Medical Physics .We stayed there in ICTP from 4-25 September. The classes were very useful and have made a permanent impact in my Carrier.

I got huge collection of ready made power points ,that i could use for teaching with full confidence and without any guilt. I was so happy and confident. I have not felt any difficulty for teaching any topics after that. The beauty of the course is that we were provided with World standard material and Power point Presentation by International experts and almost all topics were covered such as Cancer, Radio diagnosis, Nuclear medicine and Some topics in Radiotherapy and Radiobiology. Many a times i felt regret of leaving the main stream of Physics and college and coming to join the aliens the doctors and technologist. Of course The Radiologist and Technologist also used to behave like aliens to me and never supportive. However the continuity is very important and skill of communication and constant effort make a person to create a space . I did that.

The other benefit of the course is that getting chance to visit a foreign country for training is considered a big achievement among the colleagues and they start to see me as a special person and lucky one to go abroad for training. Their perspective towards me was changed and started to respect me. This happens in Developing world.

This opportunity of training in ICTP really helped me to continue my carrier in the field of Medical Physics, otherwise i would have left this field long back.

In 2007 i got a fellowship to do Diploma in Radiological Physics in India and now i have been working as a Senior Medical Physicist in B.P.Koirala Memorial Cancer Hospital , Chitwan Nepal and Asst Professor of Medical Physics in "Chitwan Medical College" and still continuing my teaching profession too.

I got chance to Participate the College on Medical Physics in 2016 also and updated my knowledge.I am Still using the material of ICTP and have been known as a good teacher of Medical Physics and continuing my carrier as a happy professional Medical Physicist.

I would like to express my heartfelt thanks to ICTP for conducting such course and my Respected teachers Prof Perry, Prof Anna, Prof Slavik Prof Franko, Paula, Vidimiri , Donald Frey, Giannini, Meghzifene, cionini for their contribution and big thanks to Professor Bertochhi for his support to the course.

I feel the need of the continuation of the course which support the Medical Physicists from Developing world for Continue Medical education and upgrading and updating the Recent development in this field and providing them a platform to share and care each other.

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It is a privilege to write about International Center for Theoretical Physics (ICTP) College as Secretary General of Nepalese Association of Medical Physicist (NAMP). I was one of the participants of the ICTP College on Medical Physics from 30 August to 22 September, 2004. It was my first trip abroad and hence remains very special to me. I do still retain distinct memories of participants attending that college. Until now, almost all (eight medical physicists) of Nepal have visited ICTP College on Medical Physics.

At that time, ICTP College on Medical Physics was a hope and an opportunity for physicists from Low and Middle Income Countries like Nepal, for upgrading their knowledge. At that time, most of the medical physicists working in Nepal did not have formal degree of medical physics. Most of them with master in physics degree. Hence, ICTP College on Medical Physics as well as e-learning materials of the projects EMERALD, EMIT and Sprawls Educational Foundation happen to be important tool for upgrading the knowledge and competency in the field of medical physics.

In Nepal, almost all medical physicists are working in radiation therapy, hence college on medical physics is the only place where they can learn diagnostic & imaging part. I am myself a going example of that. Before attending the college on medical physics, I was working only in Radiotherapy. In Nepal, there is still lack of QA program, commissioning and acceptance test in diagnostic radiology. After attending the college, I have started my work in the field of diagnostic radiology and have published my articles in different journals besides completing my PhD in radiation protection.

During my research, I have used lot of e-learning materials of the projects EMERALD, EMIT and using it. It has helped me a lot to do quality control tests in diagnostic radiology.

ICTP College on Medical Physics has provided lot of resources to Nepalese medical physicists. We are still using these learning materials in our PG program in MD radiology and MD Radiation Therapy, B.Sc & M.Sc (Medical Imaging Technology). Nepal has also participated ICTP visiting Scholar Program VS-439, Dr. Anna Benini form ICTP College on Medical Physicist had visited Nepal several times. We had done some research in radiation protection in interventional radiology at Gangalal Heart Center, Kathmandu.

ICTP College on Medical Physics has opened a door to the medical physicists working in Nepal to understand recent development in medical physics and helped to promote contacts for future work in the field of medical physics. Now, we are still in contact and commutating with ICTP College of Medical Physics academician for development of medical physics in Nepal.

Nepal has benefited a lot through ICTP college on Medical Physics e-learning materials of the projects EMERALD, EMIT and Sprawls Educational Foundation. Finally, I would like to thank ICTP College on Medical Physics for providing an opportunity to develop medical physics field in Nepal through education and training.

NIGERIA
Omuvwie Bernard Evwierhurhoma, Abdulkadir Muhammad

Dear Sir,

I am very pleased to be a graduate of the ICTP College on Medical Physics in Trieste and it has enabled me to create more awareness of the various medical physics e-learning resources among undergraduates and graduates from my university and others in Nigeria.

I have facilitated industrial training, internship, research assistance for upcoming physicist and this has led them to pursue their career in the medical physics profession and even with a medical physics library being set up in my hospital.

>>>>>>>>>>>>>>>>>>>>>>>>>>>>

Personally, the ICTP college and sprawls materials have greatly influenced my medical imaging teaching techniques and confidence.

I have now adopted the rich class room approach with a lot of visual display and consequently, it has positively improved the understanding and appreciation of imaging principles by my students as it has reflected in their general attitude as well as performance.

I say a big thank you to the organizers and I will continue to build upon what I have learned from the college.

PAKISTAN
Muhammad Asif, Sajid Bashir, Kashif Islam

Dear Slavik Tabakov,

The ICTP College on Medical Physics was a very good platform that delivered comprehensive knowledge covering all aspects of radiological imaging physics.

This College helped me in many ways, this give me basic medical physics knowledge. College gave me chance to discuss medical physics problems with world's renowned medical physicist. It helped me to establish quality control program in radiology department. It make me a better teacher to teach physics to radiology residents at my institution.

After attending this college the knowledge management of medical physics was very easy for me. The EMITEL & EMERALD CD answered my questions like a teacher and I gain a lot of Medical Physics Knowledge and confidence through these learning resources.

Thank You

>>

Dear Professor

In 2016, I have attended the College in Medical Physics at ICTP and found it extremely useful despite some deficiencies. The faculty delivered the lectures in a clear and concise way that made the material easy to understand. This was particularly important for those people who were working in nuclear medicine departments only and have no previous experience in diagnostic radiological physics.

The lectures materials I brought from ICTP have been found very useful. The quality of presentation content reflect the endeavors made by the faculty. I have been using these presentations frequently to prepare my lectures to medical physicists, radiology and nuclear medicine residents. Particularly I am thankful to Prof. Perry Sprawls, Prof. Slavik Tabakov, Prof. Oshinski and Prof. Anna Benini for sharing their professional experience with us in class.

From the college in medical physics, I got the idea of holding the summer college in medical physics in Pakistan. This week long activity will be held under the umbrella of Nathiagali Summer College in Islamabad on (23-29) July, 2018. This activity has been endorsed by AAPM. Just for the sake of information, Nathiagali summer college was first organized by Prof. Abdus-Salam in Pakistan back in 1976.

Lastly, I will say this activity provides opportunities to medical physicists from developing counties to learn directly from renowned faculty about latest developments in their field of interest and, therefore, this activity should continue. I appreciate the efforts made by the college organizers and the faculty in making this event a success. In future, I offer my services for this college if the organizers deem necessary.

>>

Dear Prof. Slavik Tabakov,

As a medical physicist, I have been using ICTP materials from time to time for the preparation of slides while talking to colleagues (technologists, radiologist) working in nuclear medicine and radiology. In radiation training of workers, we especially used the experiences of Trieste Hospital

training conducted while our course. I also wrote about my experiences at college on medical physics in a national publication of Pakistan Organization of Medical Physicists.

The knowledge ascertained from ICTP college has been utilized for technical procurement of cancer hospital. Being part of technical procurement for computerized radiography, the assistance was taken from your presentations on computerized tomography and sprawls educational materials directly because the images were directly relevant and related to radiology. I must appreciate endeavors made by ICTP in regards to EMERALD, EMIT and Sprawls educational foundation.

Being part of a new hospital, it was very easy for us to implement radiation protection strategies from the very beginning. The hotlab environment is monitored online through area monitor, a fume hood is installed for radiation safety and patients have been advised to inform about any medical conditions in their first visit to medical doctors, and for this, graphical signboards are installed in radiology and nuclear medicine departments.

In short, the knowledge obtained from the ICTP college on medical physics improved the quality of our work. Therefore, I am highly thankful and would request to keep it improving according to the requirements of the time. I am thankful for remembering us even after six years and appreciate your patience with this feedback.

PERU
Yazmyn Paraguay

Dear Prof. Tabakov
Sorry for the delay in responding to your email, but I was on vacation throughout the month of July until yesterday.
I hope it is not too late to respond to your request.
so I will be very brief and I will comment on the following:

The first time I attended a College on Medical Physics was in 2006 , was just beginning to make my internship in Medical Physics at the Dos de Mayo Hospital for what I learned during that time was very important since the knowledge learned in that course as well as in others served as the basis for this hospital to be a reference hospital for ionizing radiation.

The second time I attended a College on Medical Physics, I was already a professor at a university in my country, so the information given in EMERALD and the Encyclopaedia / Dictionary EMITEL are indispensable as reference material for students, even for professionals who request information in the regulatory office of my country.

RUSSIA
Pavel Kazantsev, Alexandra Kamp (Zvereva)

Dear Prof. Tabakov,

thank you for the invitation to present developments in Russian medical physics achieved after our participation in the College on Medical Physics in Trieste - and apologies for the late answer!

My colleagues and me participated in 2010 CMP session; since then, many things have changed for all of us individually - as well as for the whole russian medical physics community. Although there are very few medical physicists working in radiology departments in Russia, radiotherapy medical physicists need to know the fundamentals of medical imaging as well.

I can honestly say that CMP became for us a kind of a "train the trainers" event, and the knowledge obtained there we used later as lecturers in medical physics training courses organized by the Association of Medical Physicists in Russia. Materials distributed during the CMP, especially EMERALD data and presentations of P. Sprawls, were particularly useful for preparation of lectures for trainees. During the last several years, training courses for russian-speaking medical physicists are organized several times annually, and although I personally am not involved there anymore, the presentations prepared based on the materials and information from CMP are still in use. I believe, that our participation in CMP ultimately helped to improve the average level of medical physics in clinics of the former USSR.

Personally for me, CMP was not only a great training opportunity but a place where I met friends and even some future colleagues and I hope that next generations of young medical physicist will also benefit from participation in College on Medical Physics!
Thank you and best regards

>>

Dear Professor Tabakov,

I am pleased to inform you about the achievements made in Russia in the last years through the education of several medical physicists, including me, in the ICTP College on Medical Physics in Trieste. During the last eight years, since my colleagues and I had an opportunity to attend the College, a lot has changed in medical physics in Russia in general, as well as in our individual careers in particular. The greatest achievement, in my opinion, has been made in the educational sphere. Thanks also to the Association of Medical Physicists in Russia (AMPR), educational and training courses for medical physicists are organized on a regular basis, so the general level of education of medical physicists in Russia is gradually increasing.

The ICTP College on Medical Physics and its excellent lecturers, besides improving our own level of knowledge in the field, helped us to disseminate this knowledge further to other medical physicists in the country through our teaching activities. The materials provided at the College were of a great use while preparing our own lectures and other educational materials that are still in use at the courses organized by the AMPR. From time to time, I still come back to the e-learning materials provided – the last time recently while preparing for my PhD defense.

Thank you for your efforts in educating medical physicists around the world and for the great networking opportunities for young medical physicists at the ICTP College on Medical Physics.

SENEGAL
Adji Yaram Diop

Dear Dr. Tabakov

I had been in the ICTP College on Medical Physics. I had an internship like medical physicist but in radiotherapy. Now i am student in the Master of Advanced Studies in Medical Physics at ICTP.

My participation in the college was very useful for me and my hospital, because there are no medical physicist in medical imaging in my country. The college helped us to understand a lot of thing in medical imaging, radiation protection...

I shared all the materials that i get in the college to the others medical physcist in my country. They are 3 and all works in radiotherapy, so the materials are very helpful for them mostly doing the quality control for the CT simulator, because they don't have strong knowledge in that area.
They plane to start some control in medical imaging (in CT)and they have now not all but some

materials.

SERBIA
Jelena Samac

Dear professor Tabakov,

As a participant of Colledge on medical physics in 2016, I had a chance to obtain new knowladge in areas of diagnostic radiology, magnetic resonance, radiation protection and, most important for me, in nuclear medicine physics. Lectures by professor Tippnis were wery good, consise, and full with usefull information, otherwise hard to find in books. What I found most usefull was the practical session in Catinara Hospital with prof. deDenaro, in nuclear medicine department.

Using the knowladge and learning materials form these sessions, I was able to implement a QA/QC programme for planar gamma camera and SPECT in my nuclear medicine department in Clinical Centre if Vojvodina, Novi Sad as part of my residency project, that I compleeted last month. There is an iniciative to make my residency paper a national quideline for conventional imaging in nuclear medicine in Serbia.

The materials in EMERALD base provided good practical examples and images. The last, but not least important thing I would like to mention about Colladge on Medical Physics are the colegues, some of which I call my friend today, I have meet, particularly from neighbouring Croatia, who have helped me finish my residency project, either by letting me borrow some QC equipment (not owned by any hopital in Serbia) or by organizing fellowship visit in their hospital.

I hope many more medical physicist will have the same opportunity to attend Colledge on Medical physics in future, as I consider it to be one of the most important post-graduation educational activity working as a medical physicist in diagnostic imaging.

SLOVENIA
Petra Tomše, Luka Jensterle

Dear prof. Tabakov,

Both, my colleague Luka Jensterle and I were fortunate to have an opportunity to attend the ICTP College on Medical Physics at the begining of our work at University Medical Centre Ljubljana. Our background education in Physics/Electrical Engineering did not at the time of our studies cover any subjects of Medical Physics, therefore the ICTP College was the most welcome source of knowledge an excellent starting point for us.

Through the education at the College our institution as well as the country gained professionals with basic knowledge of the topics which have later been introduced to the Medical Physics master program at the University of Ljubljana, but was at the time not possible to achieve elsewhere. We also appreciate the EMERALD materials and EMITEL dictionary which we use when looking for specific information in our work about quality control, dosimetry, radiation protection, or when educating younger collegaues.

SRI LANKA
Indika Pathirana

Hi Professor Tabakov,

In 2014 I have completed my MPhil at Kings College London, department of Physics (X-ray Physics) and current working as a researcher (Cardiac MRI) at Stephenson Cardiac Imaging Center in Foothills hospital, Calgary Alberta. Meanwhile I am supporting to develop Medical Physics course unit at University of Sri Jayewardenepura, Sri Lanka.

ICTP course helped me a lot to complete my research at King's and to develop course for the undergraduate in Sri Lanka. To me it was very successful course and still I am using those materials as a guideline for my current studies.

Thank you very much and have a wonderful day!

SUDAN
Almubarak Mubarak Yousif

Dear director of ICTP College on medical physics

I am writing this email to express my gratitude for the opportunity to participate in one of the valuable activities organized by Ictp College on medical physics on December 2014(Advances in Medical Imaging Physics to enhance healthcare in developing country). This activity had good impact in our project to optimize the radiation dose for patients, workers and public in radiology departments. To achieve the goal of this project Our quality control department in ministry of health conducted Qc On an annual basis for all the radiology facilities in Khartoum state and measure the radiation dose rate in control area, supervisor area and public area around the departments to ensure that the design fulfill the regulator requirement

One of our future goals to provide regular training for radiologist and technicians because always we thinking they are the first responder and responsible for operation work in radiology department.

Finally your cooperation and your ability to motivate others have resulted in significant improvement in my career as medical physicist specialist. Your usual support and cooperation for the development of the professional is greatly appreciated.

TANZANIA
Wilbroad Muhogora

I have participated in ICTP's Colleges of Medical Physics as ICTP Regular Associate (1999, 2000, 2002) and as ICTP's Simons Associate (2014). Through this involvement and also with IAEA connection, a number of studies related to optimization of patient dose and image quality diagnostic radiology in Tanzania have been performed.

I have also co-supervised three (3) MSc students in medical physics related research topics in radiotherapy and diagnostic radiology at University of Dar es Salaam in Tanzania. I have also co-supervised two (2) M.Sc students at the Faculty of Health Sciences, University of Johannesburg and 1 student at Stellenbosch University, Cape Town both Universities being in South Africa in radiation protection related topics in diagnostic radiology.

Such collaborative work with students have resulted to over 20 papers published in peer review journals mainly on imaging physics, medical physics and radiation protection. I am regularly recruited by IAEA to train participants in IAEA's training programme on radiation protection of patients in diagnostic radiology in the African region as an external expert. I have also served as an external reviewer in a number of journals such *Tanzania Journal of Science, Journal of Medical*

Physics of India, Peadrics Journal, International Journal of Medicine and Medical Sciences , Medical Science Monitor Journal, Journal of Digital Imaging, Journal of Public Health and Epidemiology.

I am currently serving as a Science Committee Member of the International Organization for Medical Physics. I believe such achievements have been largely been contributed by the knowledge obtained through the ICTP's College of Medical Physics.

THAILAND
Thunyarat Chusin,

Dear president of IOMP,

Thank you again for giving an opportunity to me and Thai medical physicists to attend the ICTP College on Medical Physics for many years. For me, I got valuable knowledge as well as education materials through the college. I use it for teaching and training numerous students in Naresuan University and staff who work for radiology such as radiographer and medical physicist in Thailand. I do research and publish articles based on this knowledge as well. Subsequently, I achieved my goal to be an assistant professor. My students got a good job in hospitals that serves for lacking of radiographer in Thailand. The staff improved their profession on healthcare services. In addition, I and my classmates in the college stay in touch and hope that we will have collaboration in the near future.

TURKEY
Bilal Kovan, Recep Kandimir

Dear Mr Tabakov

First of all, the ICTP College on Medical Physics was very useful in improving my professional knowledge. I was following this course for a long time. It was possible to participate in this course with the support of both ICTP and EFOMP in 2016.

Theoretical and practical applications of the course given by lecturers in terms of medical physics have opened my horizon. In particular, my theoretical and practical knowledge about radiology physics and radiation protection information was higly developed by means of the lectures given by Anna Benini.

Thanks to "Medical Physics e-Learning" lectur given by Mr. Slavik Tabakov', I have been able to follow the developments of medical physics in electronic environment. The EMITEL web page is an important reference to professional terms. I am taking advantage of EMERALD / EMIT web page intensively while teaching. I have benefited greatly from both web pages when preparing my graduate thesis.

I have started scientific studies in our clinic with the support of the information and web pages. After returning from the COMP course, I began to my PhD education by taking advantage of the knowledge and experience I gained via on the course. After that time, I follow developments from EFOMP and ICTP's web pages. I follow EFOMP and ICTP scientific events with interest.

>>

Dear Sir,

I would like to inform you about myself shortly. I am currently continuing my doctorate in the field

of medical physics and working in the department of radiation oncology.

The ICTP College on Medical Physics was very useful for me. The times I spent on the course was an unforgettable moment for me. Besides acquiring friends from many different countries, I got valuable information on medical imaging. It was also very important to meet very valuable scientists from different countries like you. During the course, resources such as books and presentations were presented to us.

Especially the EMERALD materials/images and the Encyclopaedia / Dictionary EMITEL were very good for me. If there is a question that I am still curious about, it is among the sources that I refer to.

UGANDA
Alen Musisi

Dear prof

I reference to your first mail, the ICTP College on Medical Physics training have helped me in a number of ways;
1. I gained more substantial knowledge about the field especially in QA/QC that I have used at my place of work (mengo hospital)
2. I have trained two new young physicists based in the same hospital.
3. I have presented my ICTP experiences and knowledge gained in a number of conferences in my country
4. I work as an assistant lecturer also (teaching radiographers), the information I received from ICTP helped me improved my lecturer notes and kept them up to date.
5. The training boasted my CV that impacted on my admission decision to a MSC. Medical Physics at University Sains Malaysia which I am currently finalising.
6. Me and other colleagues in Uganda are planning to design a curriculum for BSc. Medical Physics which we hope to be accredited by the end of 2019. This was all because of motivation i got from ICTP training.

VIETNAM
Soai Dang Quoc, Anh Mai

Dear Professors,

I would like to thank Professors very much for your continuous supports !

Thanks to the knowledge from Advance Medical Physics Course, I have done following in my hospital:

I. About research

1. Research, analyze the dose results calculated with AAA algorithm in Eclipse software of new treatment planning system.
2. Compare the difference between dose results calculated with Analytical Anisotropic Algorithm (AAA), dose results calculated with PCB algorithm in Eclipse Software, and measurement dose

II. About my job
1. I have contributed to the implementation IMRT treatment, consulted to buy QA IMRT equipment in my hospital. Now we are using IMRT technique for head - neck treatment and we

have Scandidos 4D for QA IMRT plan.
2. Edited QA LINAC protocol in my hospital follow IAEA_TRS398
3. Calcualted radiation safety to repair Nuclear Medicine Department.

III. About tranning
2016: I was supervisor of one student of Master of Physics course in Hanoi University of Science. His thesis is "the quality control for LINAC use in Medicine"
2017: I was supervisor of one student from School of Nuclear Engineering and Enviromental Physics of Hanoi University of Science. His thesis is "Compare Fields in Field Technique with Dynamic Wedge Technique Using in Whole Brain Treatment in Hanoi Oncology Hospital"
2018: I am teaching for a college, Who is working in Oncology Hospital of Thanh Hoa province. The course is "Medical Physicist in Nuclear Medicine".
I hope that I will be the better medical physicsit in future
Many thanks Professors

>>>>>>>>>>>>>>>>>>>>>>>>

Dear ICTP,

I'm a medical physicist. Now I'm working in Radiation and Radiosurgery department, 108 hospital, Hanoi, Vietnam. I joined a course about Medical Imaging Protect from ICTP. And then, I backed my country and used something which I learned for my work. I have seen my work have improved many time about quantity and quality. I think that it's useful. And if you can, you will continue courses like that.

I usually update new informations from EMERALD. Especial about the physic of Radiotherapy. it's useful so much. i am going on continue update these information from yours.

Thank you so much about knowledge you provide us.

ZAMBIA
Nkonde Kangwa, Mwansa Kawesha

Dear Prof. Slavik,

The course had helped improve our quality assurance check on radiology equipment, especially CT and Mammography. We had used the EMERALD course to teach physicists from the regulatory authorities basic QA test in CT.

The skills obtained during the month long training in Medical Physics held at ICTP in 2014, has contributed to my performance and generally improved overall healthcare in the Ministry of Health- Zambia, in terms of stringent QA program for CT and Mammography. It also propelled me to start collecting data to set up DRLs for Nuclear medicine.

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

Dear Prof Tabakov,

Following my participation in the 2016 ICTP College on Medical Physics, I have had the opportunity to use the knowledge I gained at the Cancer Diseases Hospital in Lusaka, Zambia. With a better understanding of Medical Imaging Quality Control and Safety, I was better able to support the Medical Physics Team in Zambia with the monitoring of the hospital's Medical Imaging devices. Recently, a staff training programme has been introduced in my country and some

Medical Physicists have been tasked with educating the trainees in the Physics of Medical Imaging, Radiobiology and Safety in Medical Imaging. I hope to share the e-learning materials with these new trainees, as they embark on becoming the first Radiologists trained in Zambia.

I sincerely thank you for the valuable knowledge that you have shared with me.

ZIMBABWE
E. Mhukayesango

Zimbabwe has had a chance to participate in the ICTP College on Medical Physics and as such I had the opportunity to attend one of the courses in 2014. The meeting was really interactive and had the chance to meet various experts from around the world. After the course, the following was realised:

a. provision of the relevant material necessary in the dispatch of duties in diagnostic radiology
b. Appreciated the role of the Medical Physicist in diagnostic radiology.
c. Safety concerns for staff, the patient, the public and the environment.
d. The trade off between image quality and exposure to the patient.
e. Appreciated the role of quality assurance in medical imaging.
f. The role of dosimetry in x rays imaging.

Through the items listed above, the impact to the hospital has been in the following areas:

a. Quality assurance on imaging equipment.

There has been a marked increase in the frequency of quality assurance activities on imaging equipment especially x-ray units. In the past, some of the QA equipment was not yet available or underutilized. In addition, record keeping of all quality activities has been improved markedly.

b. Safety concerns for staff, the public and the patient.

From the material obtained from the course, the hospital Medical Physicist in conjunction with the Radiation safety team have developed comprehensive safety procedures, especially for the x ray machines and CT scanners.

c. Image quality

From the activities of the course, imaging protocols have been updated in order to give the optimal image quality for minimum exposure to the patient, staff and the public.

g. Dosimetry in x- ray and CT scanners.

The course material also highlighted the necessary equipment, procedures in making dose measurements in x ray imaging. Thus our department managed to source out the necessary equipment necessary to perform the required dosimetry.

Course material such as the one from website of Sprawls had been beneficial in providing theoretical and practical knowlegde on the use other imaging modalities such as ultrasound and MRI. The material from EMERALD materials/image and Encyclopaedia/Dictionary EMITEL is also used in the routine Medical Physics work.

ANNEX 5 and 6

5. Letters of Gratitude from:

-International Organization for Medical Physics

-Asia-Oceania Federation of Organizations for Medical Physics

-Federacion de Radioprotecction de America Latina y El Caribe

-Federation of African Medical Physics Organizations

-European Federation of Organizations for Medical Physics

6. Papers about the History and Impact of the ICTP College on Medical Physics

International Organization for Medical Physics

INTERNATIONAL ORGANIZATION FOR MEDICAL PHYSICS

Member of the International Union of Physical and Engineering Sciences in Medicine

(Union Member of the International Council for Science)

http://www.iomp.org

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Professor Fernando Quevedo
Director ICTP, Trieste, Italy

Address to ICTP, celebrating 30 years College on Medical Physics

31 May 2018

Dear Professor Quevedo, Distinguished ICTP Board members,

The International Organisation for Medical Physics (IOMP) is the umbrella of all medical physics societies in the world, with about 27,000 members in 86 countries. Medical Physics is often invisible in healthcare, but contemporary medicine is impossible without medical physicists – the professionals who deal with the development and effective and safe use of many types of medical equipment, including various imaging modalities, linear accelerators and others, which form the backbone of diagnostic imaging and radiotherapy in healthcare.

The Abdus Salam International Centre for Theoretical Physics (ICTP) supports our profession for many years. In 2018 the regular ICTP International College on Medical Physics celebrates its 30th anniversary. Over the years this College has educated more than 1000 students from around 100 Low-and-Middle-Income (LMI) countries.

These ICTP activities are vital for the training of medical physicists in developing countries, who not only undergo education and training in the ICTP, but also receive full sets of teaching materials, which help them to later organise similar courses in their countries. Now about 80% of all medical physicists in LMI countries are linked to the training in ICTP and benefit directly or indirectly from it. This is of high importance for the healthcare delivery in the developing countries.

IOMP is immensely grateful to ICTP for this support for the medical physics profession and its activities in developing countries. We strongly believe that ICTP will continue its support for our profession!

With sincere gratitude and best wishes

Prof. Slavik Tabakov, President IOMP

Asia-Oceania Federation of Organization
for Medical Physics
www.afomp.org

16 July 2018

Dear ICTP Board,

Congratulations to ICTP Board for great contribution by ICTP of the International Medical Physics College.

For more than 30 years the ICTP College on Medical Physics in Trieste is educating young medical physicists from low-and-middle-income (LMI) countries. The students are now more than 1,000 and most of them work directly in the healthcare application of medical physics, or in teaching other students on this very important subject. I know that many of these colleagues are from the Region of AFOMP

On behalf of the Asia-Oceania Federation of Organization for Medical Physics (AFOMP), it is my great pleasure and honor to express the gratitude of the colleagues of this part of the world for the education in the ICTP College on Medical Physics

For these great achievements I want to specially thank all colleagues from the ICTP Board and Prof. Slavik Tavakov, Past Immediate President of IOMP.

I believe that this outstanding international achievement will continue and will grow in the future.

With gratitude and best wishes,

Tae Suk Suh, PhD

President

Asia-Oceania Federation of Organizations for Medical Physics (AFOMP)

Federación de Radioprotección de América Latina y El Caribe

Creada el 26 de noviembre de 1993

Abdus Salam International Centre for Theoretical Physics (ICTP)
ICTP, Trieste, Italy

16 July 2018

Dear Board of the ICTP

On behalf of the Radiation Protection Federation of Latin America and Caribbean, I wish to express our appreciation and gratitude to the very efficient work of ICTP College on Medical Physics related to the Education and Training of medical physicists from the Latin America region. The excellence of the ICTP College medical physics program has been the differential for the capacitation of the health professionals from our region. Besides, the ICTP College on Medical Physics has been the most expected opportunity to students in countries that do not have medical physics courses in place.

As result of the outstanding contribution of the ICTP College in the past decades, the region had gained more qualified professionals working with competence in different areas of healthcare and thereby improving the quality of the health services in Latin America.

We hope that this important collaboration can be further strengthened in the future

With gratitude and my highest consideration

Simone Kodlulovich Renha
Presidente
Federación de Radioprotección de
América Latina y El Caribe

presidenciafralc@gmail.com

https://fampo-africa.org

FEDERATION OF AFRICAN MEDICAL PHYSICS ORGANIZATIONS

Member of the International Organization for Medical Physics (IOMP)

Reference: FAMPO/EC/2018/ ICTP/001. **Date: 20th July, 2018**

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APPRECIATION NOTE TO THE BOARD OF ICTP COLLEGE ON MEDICAL PHYSICS

The Executive Committee and the entire membership of the above named Federation (FAMPO) in the nooks and crannies of our region wishes to Congratulate the Board of the ICTP College on Medical Physics on the occasion of her 30th Year Anniversary.

Our members from the different countries have benefited immensely from the multitudes of innovative courses that have been mounted by the College year-in year-out and this has greatly impacted and deepened the medical physics practice in our various health establishments in the region.

It's indeed a landmark achievement that has been accomplished over these years and we want to plead from the African continent that innovative funding mechanisms should be deployed to make the programmes being constantly developed by this unique body, sustainable and even grow in leaps and bounds.

Once again, we felicitate with our indefatigable patron – Prof. Slavik Tabakov – and all the other board members on this epoch making milestone and fervently and sincerely pray that the activities of the College shall be further strengthened and sustainably maintained in the coming years.

Kindest regards.

Taofeeq A. IGE (PhD)

President

Federation of African Medical Physics Organizations (FAMPO)

The European Federation of Organisations for Medical Physics
Registered Office: Fairmount House, 230 Tadcaster Road, York, YO24 1ES, UK
www.efomp.org

25 July 2018

APPRECIATION NOTE TO THE BOARD OF ICTP COLLEGE ON MEDICAL PHYSICS

Since more than 30 years, the ICTP College on Medical Physics is promoting education and training of young medical physicists from low-and-middle-income countries. Among them, also many young colleagues from eastern Europe have benefited from these events.

Making bridges between different part of the world is among the most important achievements which have been accomplished over these years by the ICTP College on Medical Physics.

On behalf of the European Federation of Organisations for Medical Physics (EFOMP), it is my great pleasure and honour to Congratulate the Board of the ICTP College on Medical Physics on the occasion of its 30th Year Anniversary.

We believe that the activities of the College shall be maintained and further strengthened in the coming years, with the collaboration of all the National and Regional Organisations related to medical physics.

Kindest regards

Marco Brambilla (PhD)
President
European Federation of Organisations for Medical Physics

THE IMPACT OF THE ICTP COLLEGE ON MEDICAL PHYSICS FOR THE ESTABLISHMENT OF MEDICAL PHYSICS IN DEVELOPING COUNTRIES

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Abstract- The regular College on Medical Physics at ICTP (the Abdus Salam International Centre for Theoretical Physics), Trieste, Italy, has been a strong support for the development of medical physics in developing countries. Additionally ICTP has participated in several medical physics education/training projects and has hosted several International Conferences in this field. Recent feedback assessment shows significant (66%) increase of participants knowledge. During its more than 20 years history the college has educated more than 1000 young medical physics colleagues from developing countries.

Keywords- Education, training, developing countries.

INTRODUCTION

The International College on Medical Physics (CMP) at ICTP (the Abdus Salam International Centre for Theoretical Physics) in Trieste, Italy has operated for more than 20 years. Although ICTP does not have a permanent Research Activity in the field of Medical Physics, a very vigorous training and Conference activity takes place. It started with an International Conference on the Applications of Physics to Medicine and Biology in 1982 (organised by Giorgio Alberi). Another successful Conference and several Workshops were organised in the following years, demonstrating the need for Medical Physics education for the developing countries. This convinced ICTP to expand their training activities with Medical Physics. The first College on Medical Physics took place in 1988 (a 4 week activity with the participation of 68 scientists from developing countries). The regular series of Colleges begun in 1992 and continues to run on a regular basis (usually bi-annually). During the period the ICTP has educated more than a 1000 young medical physicists mainly from developing countries. From the beginning corner stones for the ICTP involvement in Medical Physics were Luciano Bertocchi (then Deputy Director of ICTP) and Anna Benini (then IAEA Officer). Additionally, a number of prominent professionals were engaged with the College on Medical Physics, including John Cameron (USA), Sergio Mascarenhas (Brazil), Perry Sprawls (USA) and Slavik Tabakov (UK). The current Co-Directors include also Franco Milano (Italy) and George D Frey (USA), while the Hospital training is organised by Mario De Denaro.

MEDICAL PHYSICS COLLEGES AT ICTP

The transfer of knowledge and experience to the developing countries is a major objective of the College. Each participant receives a full set of lecturing materials, including Power Point slides, e-Learning materials, access to web sites, etc. These have triggered tens of Medical Physics activities and courses in the developing countries and helped hundreds of colleagues from these countries to practice the profession. Due to this reason CMP is always one of the most over-subscribed training activities of the ICTP – see Figure 1.

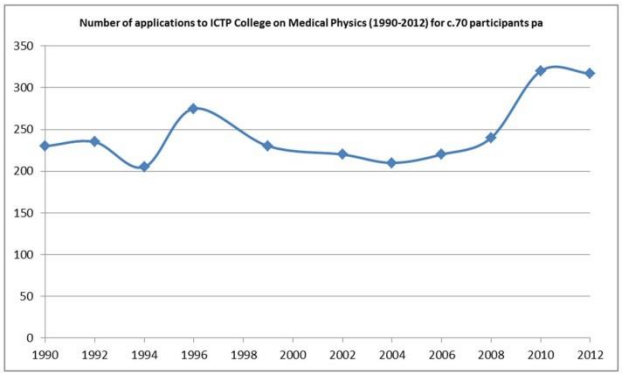

Figure 1. Applications to ICTP College on Medical Physic

CMP usually accepts colleagues from 30 to 40 developing countries. It is known that in general, physicists from these countries have good educational foundations in general physics. The College builds on

this foundation by providing education on the recent advances in medical physics. Participants of previous Colleges on Medical Physics have demonstrated its great value as they have formed a significant medical physics infrastructure in their countries.

ACTIVITIES AND EFFECTIVENESS OF THE ICTP COLLEGE ON MEDICAL PHYSICS

Some areas of Applied Physics in medicine (especially Radiotherapy physics) are covered by specific courses provided by various institutions, organizations, and agencies, however there are not sufficient courses, available elsewhere, which cover Physics of Medical Imaging. Additionally very few of those include training on the practical application and optimization. Because of this the CMP emphasis during the last decade is on Medical Imaging Physics.

The effectiveness of the 2010 and 2012 Colleges (both with focus on Digital Imaging) was assessed with 3 Questionnaires – collecting feedback on the College Organisation, syllabus, knowledge transfer and suggestions. The results of these questionnaires showed significant effectiveness in increasing the knowledge of participants. In brief while the student's estimate of their knowledge prior to the College was with a mean of 45%, after the College it was with a mean of 75%. This regular feedback is also used for modifying the programme for each following College. This approach to improve the Curriculum with the active participation of the students has been one of the successes of CMP.

The increased interest of ICTP in Medical Physics led to its inclusion in several international projects. Most notable are EMERALD, EMIT and EMITEL. The first two developed e-Learning training materials in physics of: X-ray Diagnostic Radiology, Nuclear Medicine, Radiotherapy, MRI and Ultrasound Imaging. EMERALD was not only the first e-learning in medical physics, but introduced one of the first ever e-books. Currently each participant receives a free set of these materials. In connection with these training materials ICTP hosted three International Conferences (in 1998, 2003 and 2008) – these were the first international Conferences on medical physics training. The importance of the above projects can be judged by the fact that in December 2004 the EMIT project received the inaugural European Union "Leonardo da Vinci" award.

The Conference in 2008, related to project EMITEL, introduced the first e-Encyclopaedia of Medical Physics (currently used by some 9000 colleagues each month). This Conference established a good relationship of ICTP with IOMP (also a partner in EMITEL). Recently IOMP supported other medical physics activities of the ICTP.

Apart from the regular CMP in Trieste, ICTP initiated similar courses in other countries. The first Regional College on Medical Physics was conducted in Mumbai, India during November 2007. The first week was devoted to The Physics and Technology of Medical Imaging and the second week to The Physics and Technology of Radiation Therapy. Perry Sprawls and S.D.Sharma were the Academic Directors and the College was also supported by the ICTP, and the Bhabha Atomic Research Centre (BARC), Mumbai, India. Additional co-sponsors were the American Association of Physicists in Medicine (AAPM) and the Association of Medical Physicists in India (AMPI).

ICTP operates under the aegis of UNESCO and IAEA and naturally alongside the CMP, hosts many IAEA Workshops and Symposia. In 2005 ICTP was the Co-Organiser of the World Conference "Physics and Sustainable Development" in Durban, South Africa, where one of the main directions for applied physics in the XXI century was voted to be Physics in Medicine.

ICTP also supports Medical Physics research in a similar way to other scientific areas. This is through two programs for individuals: The Associate Members and the Programme of Research and Training in Italian Laboratories. Associate Members are scientists from developing countries who are given the opportunity of spending periods of up to three months, three times during their appointment, to use the Centre's facilities and to conduct research. So far some 50 scientists have been appointed as Associate members in medical physics.

The programme of Research and Training in Italian Laboratories - TRIL - gives the opportunity to experimental scientists to spend periods of time up to one year joining a group in an Italian laboratory. In the area of Medical Physics 48 Italian laboratories offer this opportunity, and a total of 97 scientists were trained so far.

CONCLUSION

During its long history the College on Medical Physics at ICTP has introduced successful educational models and has helped many colleagues from less developed countries to begin/stabilise their medical physics activities. Many colleagues from these countries see ICTP as one of their first encounters with the profession and IOMP has always shown high appreciation and support for this international impact of the ICTP for the developing countries.

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50 YEARS ICTP AND ITS ACTIVITIES IN THE FIELD OF MEDICAL PHYSICS

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Abstract – ICTP (the Abdus Salam International Centre for Theoretical Physics) is an unique institution aiming to support the development of science knowledge in developing countries. It has supported the medical physics profession for more than 30 years. Many of the medical physicists from the developing countries have undergo training in the regular ICTP College on Medical Physics (starting from 1983). Last year ICTP initiated a regular School of Medical Physics (Radiotherapy) and an MSc Programme on Medical Physics. Acknowledging this support for the profession IOMP presented ICTP with its Plaque of Gratitude on the occasion of the ICTP Golden Jubilee this year.

This year ICTP (the Abdus Salam International Centre for Theoretical Physics) celebrates its Golden Anniversary. This international research institute for physical and mathematical sciences operates under a tripartite agreement between the Italian Government, United Nations Educational, Scientific and Cultural Organization (UNESCO), and International Atomic Energy Agency (IAEA). ICTP was founded in 1964 by Mohammad Abdus Salam, a Nobel Laureate in Physics of Pakistani nationality. The Centre buildings are in Trieste, Italy. The mission of ICTP is: To foster the growth of advanced studies and research in physical and mathematical sciences, especially in support of excellence in developing countries; To develop high-level scientific programmes keeping in mind the needs of developing countries, and provide an international forum of scientific contact for scientists from all countries; To conduct research at the highest international standards and maintain a conducive environment of scientific inquiry for the entire ICTP community. The Centre is an institution that is run by scientists for scientists. It regularly hosts meetings with Nobel Award winners and encourages research and teaching in physics.

By coincidence Abdus Salam was connected with medical physics through his Nobel Award in 1979, when he receives the Nobel in Physics (for the electroweak theory), together with Godfrey Hounsfield and Allan Cormack, receiving Nobel in Medicine (for the X-ray Computed Tomography).

Nobel Award winners 1979, including Abdus Salam (third from right), Godfrey Hounsfield and Alan Cormac (first and third from left) – image courtesy to ICTP Archives

The medical physics activities in ICTP had been initiated soon after - at the beginning of 1980-ties by Prof. Giorgio Alberi (ICTP) and a group of medical physicists including Anna Benini, John Cameron and Sergio Mascarenhas, and have been firmly supported by Prof. Luciano Bertocchi, Deputy Director of ICTP.

The first medical physics activity in ICTP took place in 1982 - an International Conference on the Applications of Physics to Medicine and Biology in 1982 (organised by Giorgio Alberi). Another successful conference and several workshops were organised in the following years, revealing the need of medical physics education for the Third World countries. On this background ICTP expanded their training activities in medical physics. This way the first College on Medical Physics took place in 1988. The regular series of Colleges begun in 1992 and since this time it runs on a regular basis (usually bi-annually).

From the beginning corner stones for the ICTP involvement in Medical Physics were Luciano Bertocchi (then Deputy Director of ICTP) and Anna Benini (then IAEA Officer). Additionally, a number of prominent professionals were engaged with the College on Medical Physics, including John Cameron (USA), Sergio Mascarenhas (Brazil), Perry Sprawls (USA) and Slavik Tabakov (UK). The current Co-Directors include also Franco Milano (Italy), George D Frey (USA) and Mario De Denaro (Italy).

ICTP International College on Medical Physics – students and Co-Directors, September 2010

The transfer of knowledge and experience to the developing countries is a major objective of the College. Each participant receives a full set of lecturing materials, including Power Point slides, e-Learning materials, access to web sites, etc. These have triggered tens of Medical Physics activities and courses in the developing countries and helped hundreds of colleagues from these countries to practice the profession. Due to this reason the College is always one of the most over-subscribed training activities of the ICTP. Some students from the College also take part in research activities organised by ICTP, namely as Associate Members and as participants in the Programme of Research and Training in Italian Laboratories (TRIL).

Alongside the College (focussing on Medical Imaging and Radiation Protection), ICTP hosts many other medical physics workshops, courses and conference, mainly related to IAEA activities. During 2005 ICTP was Co-organiser of the High-level UNESCO-led Conference in Durban "Physics and Sustainable Development". One of the decisions of this Conference was to identify areas of special interest for applied physics during the XXI century – one of these areas was agreed as "Physics and Medicine".

ICTP also took active part in the International projects EMERALD, EMIT and EMITEL, developing new e-learning and training materials in medical physics, as well as the first Medical Physics Encyclopaedia EMITEL. This way the first International Conferences for Medical Physics Training were held in ICTP, Trieste (1998, 2003, 2008).

EMITEL Medical Physics Encyclopaedia Conference, ICTP, November 2008
(the photo includes members of EMITEL project Consortium and Network, as well as Past and Present Presidents of IOMP and 21 National Medical Physics Societies and Regional Federations)

Inauguration of the new MSc course in Medical Physics, February 2014
(the photo includes the students, the Course Directors and Board, the EFOMP President,
the Head of the IAEA Human Health Division, the Rector of University of Trieste and the Director of ICTP)

ICTP also Co-organised medical physics activities outside Trieste – e.g. the Medical Physics College in Mumbai India (2007) and the Radiotherapy School in Guatemala (2013)

During 2013-2014 the ICTP medical physics activities expanded by organising a dedicated Master Programme in Medical Physics (led by Renata Longo and Renato Padovani). This MSc operates as a joint programme (in English) with the University of Trieste and is specially directed to students from developing countries. From the beginning IOMP supported this MSc programme, which attracted significant interest (for 2014 the programme received 440 application from developing countries).

Another new activity, initiated by Renato Padovani in 2013, is the new Radiotherapy School, headed by M DeDenaro, G Hartmann, M R Malisan and R Padovani. From 2015 the School will be a regular medical physics activity in between the years of the Medical Physics College. The School will include as Co-Directors also C Orton (IOMP), G Hartmann (EFOMP) and Y Pipman (AAPM).

From its foundation ICTP has been a pivot for the dissemination and development of various fields of physics in the world and in particular – in the developing countries. The medical physics activities organised by ICTP have helped thousands of young medical physicists from developing countries to firmly enter the profession and further spread the knowledge in their countries and regions. The International Organization for Medical Physics (IOMP) congratulates sincerely ICTP with its 50th anniversary and expresses its high appreciation and gratitude to the Centre as one of the strongest supporters of the medical physics profession.

Presenting an IOMP Plaque to ICTP Director Prof. Fernando Quevedo
at the 50th Anniversary ICTP Conference, 7 Oct 2014

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ANNEX

The International College on Medical Physics (2014) included also a Poster session where students described the professional development and education/training activities in their countries. These Poster sessions, initiated 10 years ago are now an important part of the College, aiming exchange information and expertise between students, as well as helping the focus of the international activities supporting the global development of the profession.

The 2014 College had a focus on Africa and included a number of colleagues from the continent (some suggested by FAMPO – the Federation of African Medical Physics Organisations, a Regional Federation of IOMP). The best posters and presentations received the Binesh Award and an ICTP Diploma. Here below is a list of all Posters presented. The Award-winners authors have been asked to submit short paper for publication at the Medical Physics International. Here we include the presentations from Ghana and Bangladesh.

List of Poster presentations at ICTP College on Medical Physics (Advances in Medical Imaging Physics to Enhance Healthcare in the Developing Countries): 1/09/2014 – 19/09/2014

Medical physics in Vietnam, *Trinh Thi Mai*

Status of medical Physics In The United Republic of Tanzania, *W.E. Muhogora*

Overview of Medical Physics in Iran, *Afsaneh Lahooti; Hossein Aslian*

Medical Physics in Zimbabwe, *Edwin Mhukayesango*

Medical Physics in Indonesia: 'Nuclear for Welfare', *Eka Djatnika Nugraha*

Medical Physic Profession Uganda, *Musisi Alen*

Medical Physics Professional Status in Nepal, *Ram Narayan Yadav*

Academic Education, Clinical Training and Professional Recognition of Medical Physicist in Argentina, *Ruggeri Ricardo Miguel*

Present Status of Medical Physics in Bangladesh, *Hasin Anupama Azhari, M. N. Hossain*

Medical Physics Status in Cuba; Current Situation and Future Deveplopment, *Haydee Maria Linares*

Status of Medical Physics Education and Training in India, *Yalavarthy K. Phaneendra*

Development of Radiation Protection and Medical Imaging in Malaysia, *Anis Suhana Ahmad Sabri, Noor Zaimah Zainol Abidin*

Medical Physics Education in Turkey and the Statistical Distribution of CT, MRI and Mammography Devices, *Kandemir Recep*

Medical Physics in Ghana, *E. K. Sosu, F. Hasford, T. B Dery, E.W. Fiagbedzi, Y. Serfor-Armah, A W K Kyere*

Advances in Medical Imaging Physics to Enhance Health care in Developing Countries -Eritrea, *T. H. Teclehaimanot*

Medical Physics Education, Training and Professional Status in Brazil, *MARTINS Juliana Cristina, SANTOS Josilene Cerqueira, REINA Thamiris*

Medical Physics at Institute of Nuclear Physics in Tashkent, Uzbekistan, *JURAEVA Nozima*

Medical Physics Development in Serbia, *CEKLIC Sandra*

Education and Clinical Training of Medical Physics in Thailand, *Kitiwat KHAMWAN, Thunyarat CHUSIN*

Control of Unwarranted Radiation Exposures in Medical Applications – Sri Lanka, *Gunaratna Mudiyanselage, Nadeera Hemamali*

Medical Physics Applications and Actions in Mexico, *Medel Baez Eva*

Medical Physics in the Philippines, *Taguba Dona May Opiniano, Margallo Victor Angelo Caballero*

Advance in Medical Imaging in Zambia, *Nkonde Kangwa Alex*

Inclusion of Medical Physicists in Radiology – Venezuela, *Yanez Sanchez Miguel Angel*

Medical Physics in the Sudan: Continuous Development and Innovation, *Ahmed Murtada Ahmed*

Status and Progress of Ethiopia in Medical Physics, *Gebre Mesay Geletu, Yacob Alemiye Mamo*

Medical Physics Development in Nigeria: Personnel and Equipment, *AKPOCHAFOR Michael Onoriode, ARAGBAYE Adebola, EVWIERHURHOMA Omuvwie Bernard, ISIAKA Babatunde*

Awards were distributed to the Posters/Presentations from the following countries: Bangladesh, Cuba, Ghana, Sudan, Thailand

AFOMP Newsletter

Publisher :Dr.Tae-Suk Suh
Editor : Dr.Arun Chougule
Advisor : Dr. Yimin Hu
Dr. Howell Round
http://www.afomp.org

Asia-Oceania Federation of Organizations for Medical Physics

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Vol.8 No.02– December 2016

From the desk of editor

Let me "***wish you all very happy, healthy and prosperous New Year 2017***". I am happy to bring out the December 2016 issue of AFOMP newsletter, the 7th newsletter after I took over as Editor AFOMP newsletter in December 2013. In last three years with support of all of you, I have tried to improve the contents and quality of articles/material in the newsletter. I take the opportunity to thank all the contributors for making the newsletter more useful.

In this issue of newsletter we have New Year message from AFOMP President Prof. Tae-Suk-Suh, an article by Prof. Franco Milano on "**Role of Medical Physicist Organization in Nuclear and Radiological Emergencies"** in addition a very informative article title "**Enhancing Medical Physics Education with Collaborative Teaching-** ***Mission, Model, and Materials***" from Prof. Perry Sprawls, article from Prof. Arun Chougule titled "**Contribution of ICTP to Medical Physics for Developing Countries "**and Dr. Eva Bezak's article "**Applications of Timepix Radiation Detector in Radiation Therapy"**

Hope you will find the newsletter readable and useful. I look forward for your valuable feedback for improving the newsletter as there is scope for it.

Once again I wish you very happy New Year 2017 and look forward to have you in Jaipur, Pink City of India for 17th AOCMP during 4th-7th November 2017 (www.aocmp-ampicon2017.org)

With good wishes to all

Prof. Arun Chougule
Editor, AFOMP Newsletter
Vice President, AFOMP

Prof. Dr.Arun Chougule

INSIDE THIS ISSUE

Contribution of ICTP to Medical Physics for Developing Countries

Prof. Arun Chougule, Ph. D
Senior Professor & Head Radiological Physics, SMS Medical College & Hospitals, Jaipur, India
Dean, Faculty of Paramedical Sciences, RUHS, President AMPI & Vice President AFOMP

The Abdus Salam International Centre for Theoretical Physics (ICTP) is putting efforts to advance scientific expertise in the developing world for last more than 50 years through cutting edge research, education and training [www.ictp.it]. Although its name contains "theoretical physics", in fact its programmes covers many areas, both of fundamental and applied physical and mathematical sciences.

Today many of the ICTP alumni serve in very high positions as professors, chairpersons of academic departments, directors of research centers in nations throughout the developing world. Many of them have been recognized in their own countries and internationally for their contributions to science and science policy. My association with ICTP started in 2004 as Regular Associate [RA] and I visited ICTP since then as RA and participant in many activities of ICTP. I am immensely benefitted through ICTP activities and widened my horizon in the field of Medical Physics. I own a lot to ICTP for what I am today. I have no hesitation to put on record that the impact of ICTP extends well beyond the Centre's facilities to virtually every corner of the Earth.

To create imprints in future we must know history also and therefore I will talk little about the historical inception of ICTP. ICTP was created in 1964 by the late Nobel Laureate Prof. Abdus Salam with ambitious objectives, few dozen visitors and little money, and has grown consistently through the years and now permanently located in Trieste, Italy. The foundation stone of ICTP was placed on 18 June 1964 and the building was completed in 1968 and since then ICTP has served as a major force in stemming the scientific brain drain from the developing world. Today this institution is truly run by scientists for scientists towards fulfilling the dream and mission its founder Prof. Abdus Salam to Foster the growth of advanced studies and research in physical and mathematical sciences, especially in support of excellence in developing countries. Develop high-level scientific programmes keeping in mind the needs of developing countries, and provide an international forum of scientific contact for scientists from all countries. Conduct research at the highest international standards and maintain a conducive environment of scientific inquiry for the entire ICTP community.

Today ICTP is governed by tripartite agreement between UNESCO, IAEA and Italy. ICTP works with a network of about 400 Italian laboratories to help scientists from developing countries for advanced scientific training in a laboratory setting. ICTP has established several joint master's and doctoral programs with Italian universities to expand educational opportunities for developing world scientists.

ICTP celebrated its 50 years of success in international scientific cooperation and the promotion of scientific excellence in the developing world during 6 - 9 October 2014. In these 50 years, ICTP has provided scientists from developing countries with countless opportunities to conduct research and to study the latest advances in physics and mathematics. More than 250 distinguished scientists, ministers and others attended the anniversary celebration. Through the adoption of the universal language of science, ICTP has demonstrated the importance of a global approach to address the problems of our time. During its 50 years, ICTP has benefited more 130,000 scientists, although the real impact goes beyond any measurable quantity.

ICTP conducting research at the highest international standards in the area of

1. High Energy, Cosmology and Astroparticle Physics (HECAP),
2. Condensed Matter and Statistical Physics (CMSP),
3. Mathematics (MATH),
4. Earth System Physics (ESP),
5. Applied Physics (AP),
6. Quantitative Life Sciences (QLS) and
7. New Research Areas.

In addition the scientific sections are also responsible for organizing high-level training courses, workshops, conferences and topical meetings throughout the year. These broad seven research area groups are divided into various topics of research. ***Medical Physics is categorized as a part of topic of research in Applied Physics (AP) research group***

ICTP provides Postgraduate Diploma Programme in High Energy Physics, Condensed Matter Physics, Mathematics and Earth System Physics and degree in various subjects in collaboration with various institutes/universities as follows:

PhD in Physics and Mathematics (with SISSA, Politecnico di Torino)

PhD in Earth Science and Fluid Mechanics (with Univ. Trieste, OGS)

Laurea Magistralis in Physics (with Univ. Trieste)

Masters' in Economics (with Collegio Carlo Alberto)

Masters' in Physics of Complex Systems (with SISSA)

Masters' in Medical Physics (with Univ. Trieste)

Masters' in High Performance Computing (with SISSA)

To strengthen the scientific capability of young scientists and researchers from developing countries ICTP provides **Sandwich Training Educational Programme (STEP)** in Atomic and Nuclear Physics, Nuclear, Isotopes and Laser Techniques, **Synchrotron Radiation and Applications and Medical Radiation Physics.**

The following figures and statistics is sufficient to show contribution of ICTP to science in last 50 years More than 130,000 scientists from 184 countries visited ICTP between 1970 to 2014. Among them, 20 % of ICTP visiting scientists are women. ICTP have 30 staff scientists, 9 staff associates, 78 post docs and long term visitors and 36 consultants making them as a great research hub and place of attraction for scientists all over the world.

For research support, ICTP library holdings include 69,000 books, 267 journal subscriptions and 3246 e-journals.

ICTP organizes more than 60 conferences/ workshops each year.

ICTP welcomes 4,000 to 5,000 scientists from about 130 countries each year.

ICTP attracts an additional 1,000-2,000 scientist in a year through hosted activities.

ICTP has collaboration with more than 400 Italian Research Laboratories, which provide opportunities to scientists from developing countries to work in Italian Research Laboratories through ICTP-TRIL programme.

During the last one year [2015] ICTP beneficiaries are

191 ICTP Associate members from 49 countries, Highest from India (30)

62 TRIL fellows from 29 countries, Highest from India (12)

5670 visitors from 144 nations

51 training activities ON Campus, 21 in Developing countries

11 days average length of visit for conference participants

60 days average for research visitors

58 Postdocs ON Campus (47% from Developing countries)

238 students enrolled in Pre-PhD Educational Programmes

344 scientists engaged in career development programmes

Course participants by research area: CMSP-1259, AP-1039, HECAP-939, ESP-833, MATH-531,

QLS-141.

21 regional training activities in developing countries

458 participants from India, Highest number in Asia however, Iran is the second one with 283 participants.

1362 female visitors (24%), highest number is from Asia-411, Africa- 173, Latin America- 155, and Eastern Europe 112.

For any research institute the well-established library services is the key in addition to laboratories/ equipment's. To fulfill the needs of the scientists mostly from developing countries where access to international journals is practically nonexistence, ICTP has provide the facility in terms of Marie Curie library. **The library of ICTP collections comprise approx. 70,000 print books and over 3,000 current electronic periodicals, about 200 of which are also received in print. Catalogued e-books are a few hundreds and growing. Several thousand digital documents of different types are in the archives.** ICTP's popular book "One Hundred Reasons to be a Scientist "is translated and available in Urdu, English, Italian, Portuguese, Chinese & Marathi. Further the Marie Curie Library helps libraries in Developing Countries through the donation of scientific books and providing service of e Journals to scientists in least developed countries with current scientific literature.

Further ICTP provides many opportunities to develop scientific career through various schemes and programmes of ICTP such as Associate and Federation schemes and **Training and Research in Italian Laboratories (TRIL)** fellowships. **ICTP's Associate programmes** are especially designed for the promising young scientists who are at early stages of their career. These Associate programmes of ICTP enables individual young scientists from developing country to groom into a good researcher while maintaining a long term formal contact with active participation in scientific activities of ICTP. There is Junior, Regular and Senior Associate programmes which are six years appointment with three time's visit of ICTP, Trieste. The **TRIL Programme offers scientists from developing countries the opportunity to undertake training and research in an Italian laboratory in different branches of the physical sciences which includes Medical Physics.** As per agreement of ICTP with IAEA financial support is provided by the IAEA for research in Atomic and nuclear physics, nuclear isotope and laser techniques, **Synchrotron radiation and medical radiation physics**. The **ICTP- OPEC** Fund for International Development (OFID) provides fellowships for research and training opportunities to PhD students in developing countries

-:Contd:-

ICTP provides training and skills to scientists from developing countries. Each year ICTP organizes about 60 (Schools/Colleges/Conferences/Workshops etc.) either on its Trieste premises, or at outside venues, usually in a developing or emerging country. These activities are known as ICTP's Scientific Calendar. Topics for activities are not restricted to theory. The activities are selected on the basis of scientific novelty and impact on the international community, with special emphasis on bringing together scientists from South and North, basic training for younger scientists, and hands-on training for computer-intensive subjects. Scientists and students from all countries that are members of the United Nations, UNESCO or IAEA may attend an ICTP activity.

ICTP activities have no registration fees. A limited number of grants are available to support the attendance of selected participants, with priority given to participants working in a developing country and who are at the early stages of their career.

Medical Physics at ICTP:

Presently the ICTP activities in the area of Medical Physics cover training courses/schools (often in cooperation with the IAEA); they often include practical at the Trieste Hospital and in the ICTP info labs. In addition TRIL and Step-sandwich programme (joint PhD with a home university) are available in medical physics and **ICTP master in medical physics** At ICTP the training activities in **medical physics began in 1983** with efforts of Anna Benini, Sergio Mascarenhas and others with following series of activities in subsequent years

Workshop in Medical Physics, 17 Oct – 4 Nov **1983**

1st workshop on quality control in medical physics x-ray diagnostic equipment 13-18 May **1985**

2nd workshop on quality control in medical physics x-ray diagnostic equipment 14-19 April **1986**

1st Training course in dosimetry and diagnostic radiology, 16-25 March **1994**

2nd training course in dosimetry and diagnostic radiology, 23-27 Oct **1995**

Looking to need of expanding the Medical Physics activity at ICTP so as to start and strengthen the medical physics in developing countries the **series of college on medical physics [CMP] began in 1988 with untiring and devoted efforts by Anna B**enini, John Cameron, Perry Sprawls, Luciano Bertocchi , Slavik Tabakov, Franco Milano and others. To cover selected topics of medical physics the duration was kept of the 3-4 weeks with 50 – 70 participants each [largest participation and longest duration activity as compared to other activities of ICTP] mainly devoted to imaging, radioprotection and dosimetry. Since the

beginning of CMP in 1988 it is regularly conducted every alternate year. The details are as follows

1. Colleges in Medical Physics [CMP] 10 Oct – 4 Nov, **1988**
2. Colleges in Medical Physics [CMP] 10 Sept.-28 Sept, **1990**
3. **Colleges in Medical Physics [CMP]** 31 Aug –18 Sept **1992**
4. **Colleges in Medical Physics [CMP]** 5 Sept - 23 Sept **1994**
5. **Colleges in Medical Physics [CMP]** 9 Sept -27 Sept **1996**
6. **Colleges in Medical Physics [CMP]** 20 Sept- 15 Oct **1999**
7. **Colleges in Medical Physics [CMP]** 2 Sept -27 Sept **2002**
8. **Colleges in Medical Physics [CMP]** 30 Aug– 22 Sept **2004**
9. **Colleges in Medical Physics [CMP]** 4 Sept – 29 Sept **2006**
10. **Colleges in Medical Physics [CMP]** 1 Sept -19 Sept **2008**
11. **Colleges in Medical Physics [CMP]** 13 Sept– 1 Oct **2010**
12. **Colleges in Medical Physics [CMP]** 10 Sept– 28 Sept **2012**
13. **Colleges in Medical Physics [CMP]** 1 Sept– 19 Sept **2014**
14. **Colleges in Medical Physics [CMP]** 5 Sept -- 23 Sept **2016**

In addition to CMP, ICTP in collaboration and support of IAEA has started conducting advanced schools since 2007 regularly for benefit of medical physicists working in developing counties

Joint ICTP-IAEA advanced schools biomedical applications of high-energy beams: 12- 16 Feb. **2007**

2. Joint ICTP-IAEA advanced school nuclear data : medical applications: 12 – 23 Nov **2007**
3. Joint ICTP-IAEA advanced school imaging in advanced radiotherapy techniques: 20-24 Oct **2008**
4. Joint ICTP-IAEA advanced school quality assurance in radiotherapy with emphasis on 3-D treatment planning and conformal radiotherapy: 24 Nov-5 Dec **2008**
5. Joint ICTP-IAEA advanced school Dosimetry and diagnostic radiology and its clinical Implementation: 11 -15 May **2009**
6. Joint ICTP-IAEA advanced school Internal dosimetry for medical physicists specializing in nuclear medicine: 12-16 April **2010**
7. Joint ICTP-IAEA Advanced radiotherapy techniques with emphasis on imaging and treatment planning: 4-8 April **2011**
8. Joint ICTP-IAEA Advanced course on Mammography 3-7 Oct **2011**

9. Joint ICTP-IAEA advanced school Monte Carlo radiation transport and associated data needs for medical applications: 17- 28 Oct **2011**
10. Joint ICTP-IAEA Training course on radiation protection for patients: 1- 5 Oct. **2012**
11. Joint ICTP-IAEA International training workshop on transitioning from 2d to 3d conformal radiotherapy and IMRT: 10-14 Dec, **2012**
12. Joint ICTP-IAEA advanced training in radiation protection of patients 16-27 Sept **2013**
13. Joint ICTP-IAEA workshop on nuclear data for science and technology: medical applications 30 Sept-2 Oct **2013**
14. Joint ICTP-IAEA workshop on accuracy requirements and uncertainty in radiation therapy, 9-13 Dec. **2013**
15. Joint ICTP-IAEA workshop on determination of uncertainties of measurements in medical radiation dosimetry 9-13 June **2014**
16. Joint ICTP-IAEA Meeting on training in patient safety in radiotherapy 4- 28 Nov **2014**
17. Joint ICTP-IAEA Workshop on Monte Carlo radiation transport and associated data needs for medical applications 16-20 Nov **2015**
18. Joint ICTP-IAEA Workshop on Computed Tomography: Quality Control, Dosimetry and Optimization 2-13 May **2016**
19. Joint ICTP-IAEAWorkshop on Internal Dosimetry for Medical Physicists Specializing in Nuclear Medicine 21-25 Nov **2016**

ICTP also conducting Training Course on Medical Physics for Radiation Therapy: Dosimetry and Treatment Planning for Basic and Advanced Applications since 2013 and has conducted two programmes first during: 25 November – 6 December **2013** and **second** during 13 -24 April **2015.** The **third course** in this series will be organized during 27 March 2017 - 7 April 2017 with theme "**School of Medical Physics for Radiation Therapy: Dosimetry and Treatment Planning for Basic and Advanced Applications**".

In the Golden anniversary year of ICTP in 2014, ICTP took a big step forward and started two degree courses **Masters of Advanced Studies in Medical Physics with University of Trieste** and Masters in High Performance Computing with SISSA for promoting the students from developing countries and low developed countries. This noble step of ICTP of providing degree course of Masters of Advanced Studies in Medical Physics to participants from developing countries in collaboration with University of Trieste

will definitely help the poor cancer patients from the poorer parts of the world. The first batch of these course awarded degrees in 2016.

ICTP/IAEA Sandwich Training Educational Programme (STEP) in Medical Radiation Physics provides a platform to PhD students to work at ICTP during their PhD in developing countries, having an opportunity to visit ICTP thrice in 6 year study period to carry out research work.

ICTP organizes about 60 School/Colleges/Conferences/Workshops/Meetings every year. In regard to Medical Physics, ICTP hosting 3 to 4 scientific events in the form of Schools, Colleges, Conferences and Workshops, details are available in the scientific calendar year [www.ictp.it]. Since 2014 ICTP and IAEA are organising joint activities largely funded by IAEA and a glimpse of few past and future joint ICTP-IAEA scientific events in Medical Physics are listed below

* Joint ICTP-IAEA Meeting on Training in Patient Safety in Radiotherapy: Nov 2014
* College in Medical Physics (Advances in Medical Imaging Physics to Enhance Healthcare in the Developing Countries): Sept 2014
* School on Medical Physics for Radiation Therapy: Dosimetry and Treatment Planning for Basic and Advanced Applications: Apr 2015
* Joint ICTP-IAEA Workshop on Advances in X-ray Instrumentation for Cultural Heritage Applications: July 2015
* IAEA International School on Radiation Emergency Management: Sept 2015
* Joint ICTP-IAEA Workshop on Transitioning from 2-D Brachytherapy to 3-D High-Dose-Rate Brachytherapy: Nov 2015
* Joint ICTP-IAEA Workshop on Computed Tomography: Quality Control, Dosimetry and Optimization: May 2016
* College on Medical Physics: Enhancing the Role of Physicists in Clinical Medical Imaging: Procedure Optimization, quality Assurance, Risk Management, Training: Sept 2016
* URSI-ICTP School on Radio Physics: Mar 2017
* School of Medical Physics for Radiation Therapy: Dosimetry and Treatment Planning for Basic and Advanced Applications: Mar 2017
* Joint ICTP-IAEA International Workshop on the Implementation of Image Guided Radiotherapy (IGRT): 2017

In nutshell the contribution of ICTP for growth of Medical physics in developing countries is remarkable and appreciate from my core of my heart. Certainty, these few but firm efforts of ICTP for the upliftment of Medical Physics has helped in the advancement of Medical Physics for shaping the future of modern healthcare in developing countries. In today's era, Medical Physics profession is becoming more demanding with greater skills so as to bring hard core translational research from bench to bed which is made possible by ICTP through several short/long term programmes on hands on training and educational sessions. The scientific programmes of ICTP best suited for serving the purpose. ICTP should look forward to focus more on these kinds of training and educational programmes for the upliftment of Medical Physics, in turn which will result in better medical care of patients around the world.

As President AMPI and Vice President AFOMP I hope and wish that the efforts, initiates taken by ICTP for Medical physics growth are taken to the doors of needy, to improvement of quality of human life in this part of world.

Picture of College of Medical Physics [CMP2016] ICTP participants with Prof. Slavik Tabakov President IOMP and Prof. Arun Chougule Vice President AFOMP in UNESCO Room ,ICTP

MEDICAL PHYSICS AND ENGINEERING

EDUCATION AND TRAINING

PART I

Editors:
Slavik Tabakov, Perry Sprawls, Anchali Krisanachinda, Cornelius Lewis

2011

The book MEDICAL PHYSICS AND ENGINEERING EDUCATION AND TRAINING (PART I) includes papers from many colleagues and aims to support the exchange of expertise and to provide additional guidance for establishing and updating of educational/training courses in Medical Physics and Engineering. To support this aim the book will be distributed as a free e-book through www.emerald2.eu (through link in MEP various links and resources).

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Information about specific papers and permit to use data from these can be obtained from the respective authors.

Printed by the Abdus Salam International Centre for Theoretical Physics, ICTP, Trieste, Italy, 2011

ISBN 92-95003-44-6

CONTENT :

Medical Physics at ICTP – The Abdus Salam International Centre for Theoretical Physics, Trieste (from 1982 to 2010)

Luciano Bertocchi, Prof., Past Vice Director of ICTP (bertocch@ictp.it)

Although at Abdus Salam ICTP there is no permanent Research Activity in the field of Medical Physics, a very vigorous training activity takes place here in the period covering the 30 years from 1982 to 2011. It started with an International Conference in the year 1982 and the most recent one is the College on Medical Physics in September 2010. It is therefore proper to review this activity in some detail.

In the year 1982, due to the initiative and the enthusiasm of the late Giorgio Alberi, the ICTP hosted an International Conference on the Applications of Physics to Medicine and Biology, which saw the participation of 177 scientists. It was followed in 1983 by the Second International Conference on the Applications of Physics to Medicine and Biology, which had an even larger participation: 259 scientists. At this time Giorgio Alberi was already severely ill, but he insisted on being present at the Conference. He left us a few weeks later.

The success of these conferences, and the need of developing Medical Physics also in Third World countries, convinced ICTP that it was the right time to expand its training activities to include the field of Medical Physics. A first workshop on Medical Physics was organized in the same year, 1983, where the number of scientists from developing countries had already reached the figure of 33.

Two more short workshops on Quality Control in Medical Physics X-Ray Diagnostic Equipment followed in 1985 and 1986, organized by Dr. Anna Benini.

But it was only in the year 1988, with the expansion of the training activities of the ICTP to include a large number of scientific areas that a full-fledged College in Medical Physics, of a 4-week duration and

with the participation of 68 scientists from developing countries, was organized. Since the beginning, the topics were addressed to Medical Imaging, Quality Control and Radioprotection. This College started a regular series of Colleges, in 1992 and 1994. The key names in these first Colleges are the ones of John Cameron (USA), Sergio Mascarenhas (Brazil) and Anna Benini (Italy and IAEA), who organized and directed the Colleges.

In the years in between the Colleges, other International Conferences were held, as "Giorgio Alberi Memorials"; during these Conferences, special prizes for the best research papers were awarded to scientists from developing countries.

Special attention should be given to the two International Conferences on the Applications of Physics to Medicine and Biology, held in 1992 and 1996. The one of 1992, devoted to the Advanced Detectors for Medical Imaging, was held in the week immediately after the College, giving the opportunity to the scientists from the Third World who had attended the College, to participate in an International Conference; the one of 1996 was also held in conjunction with the College on Medical Physics, and at the same time it hosted the Conference of the EFOMP (European Federation of the Organizations of Medical Physics) and of the AIFB (Italian Association of BioMedical Physics). This modality of having an International Conference linked to a training College was continued later in 2004, and repeated also for the next College in 2008.

The year 1994 saw the involvement of the International Atomic Energy Agency (IAEA) in the activities of the ICTP in Medical Physics; Anna Benini (who had, in the meantime, joined the Agency) organized together with the IAEA a Training Course on Dosimetry and Dose Reduction Techniques in Diagnostic Radiology. (This involvement of the IAEA continued also in the subsequent years, and especially in the College of 1999, which was held in conjunction with a Workshop on Nuclear Data for Medical Applications).

The College of 1996 (held in conjunction with the V-th International Conference) saw for the first time the presence of Perry Sprawls (USA)

among the College Co-Directors; Professor Sprawls was to be a central figure in the subsequent Colleges. He is a scientist with a deep knowledge of all the aspects of Medical Imaging and an excellent organizer; but he is also a person of an unusual dedication to the promotion of Medical Physics. In all the Colleges he Co-directed (in 1999, 2002, 2004, 2006, 2008, and 2010) he donated to every participant in the Colleges a copy of each of his two books, on Medical Imaging and on MRI.

The activities of the Centre entered in a new dimension around the end of the century, when ICTP joined the EMERALD/EMIT project (led by S Tabakov). **EMERALD** - **E**uropean **ME**dical **RA**diation **L**earning **D**evelopment -, followed later by **EMIT** - **E**uropean **M**edical **I**maging **T**echnology Training - are two web based education and training packages, covering diagnostic radiology, nuclear medicine, magnetic resonance tomography, ultrasound and radiotheraphy. The importance of this project can be judged by the fact that in December 2004 the EMIT project received the first ever European Union "Leonardo da Vinci" award. This project continued with the EMITEL(led by S Tabakov), which developed Medical Physics Reference Materials – the first Medical Physics e-Encyclopaedia and Multilingual Dictionary (this project also included ICTP as a collaborator).

The materials of EMERALD/EMIT project, developed by a consortium that included ICTP, were used as training material in all Colleges held in after 1999, and each participant received a free copy of the CD's containing these materials. For these Colleges the team of College Co-Directors consisted of Perry Sprawls (USA), Slavik Tabakov (UK) and Anna Benini (Italy and Denmark), joined later by Franco Milano (Italy) and George D Frey (USA).

To discuss the EMERALD and EMIT project, two preparatory International conferences in Medical Physics Training were organized at the ICTP in 1998 and in 2003. In 2008 ICTP also hosted of the EMITEL e-Encyclopaedia International Conference.

The Colleges in 1999, 2002, 2004 were mainly devoted to Medical Imaging and to Radiation Protection; the 2004 College was followed by the Fourth International Workshop on Medical Applications of Synchrotron Radiation (in collaboration with the Trieste Synchrotron Radiation facility ELETTRA), and again the participants of the College had the opportunity of attending an International Conference. This International Workshop was followed in 2005 and 2006 by three specialized workshops on Synchrotron Radiation Imaging. The 2006 College included also a fourth week on Radiation Therapy organized by Franco Milano (Italy) with help from IAEA.

During the last several years IAEA launched a vigorous programme of cooperation with the ICTP, organizing a number of Joint Workshops and Schools. Several of them were in the area of Medical Physics. This way, six joint training activities have taken place so far:
2007 – a 1 week Workshop on Biomedical Applications of High Energy Ion Beams, and a 1 week Workshop on Nuclear Data for Science and Technology: Medical Applications
2008 – a 1 week Joint ICTP-IAEA Activity on Imaging in Advanced Radiotherapy Techniques, and a 2 weeks Joint ICTP-IAEA School on Quality Assurance in Radiotherapy with Emphasis on 3D Treatment Planning and Conformal Radiotherapy;
2009 - a 1 week Joint ICTP/IAEA Advanced School on Dosimetry in Diagnostic Radiology and its Clinical Implementation, and a 1 week Joint ICTP-IAEA Advanced School on Internal Dosimetry for Medical Physicists Specializing in Nuclear Medicine, etc.
The ICTP/IAEA programme is to continue in future - 3 more activities are planned for 2011. These are more specialized Schools, often complemented with practicals at the Trieste Hospital, through a cooperation agreement signed between the ICTP and the Hospital.

Also in 2007 ICTP took steps for exporting some of its activities. As a result the first Regional College on Medical Physics was conducted in Mumbai, India from November 12-23, 2007. The first week was devoted to The Physics and Technology of Medical Imaging and the second week to The Physics and Technology of Radiation Therapy with Dr Perry Sprawls and Dr S. D. Sharma as Academic Directors.

The College was sponsored and funded by the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, and the Bhabha Atomic Research Centre (BARC), Government of India, Mumbai, India. Additional co-sponsors were the American Association of Physicists in Medicine (AAPM) and the Association of Medical Physicists in India (AMPI).

The Medical Physics Colleges during 2008 and 2010 were three weeks long and attracted some 300 applicants each. These continued the focus on Medical Imaging and Radiation Protection but with the added emphasis on the rapid growth of digital technology and its applications in medicine. These Colleges and the plans for the future Medical Physics Colleges included special practical training sessions at the Ospedali Reuniti di Trieste – Dept. Medical Physics (led by Dr Mario Dedenaro).

Since 2004 the Colleges include sessions to help the participants become more effective educators when they return to their countries. This is achieved through a Workshop with presentations from most countries taking part in the current College, plus classes on the learning and teaching process and the use of available educational resources, many of which are provided to the participants.

What has been described above is the 30 years experience of ICTP in the field of Medical Physics, in the form of "collective" teaching activities (Colleges, Conferences, Workshops, etc). However in all scientific areas (including Medical Physics) ICTP operates two other "individual" modalities: The Associate Members, and The Programme of Research and Training in Italian Laboratories (TRIL).

Associate Members are scientists from developing countries who are given the opportunity of spending periods of up to three months, three times during their appointment, to use the Centre's facilities and to conduct research (in the case of Medical Physics also joining research groups in Trieste, at the local hospitals or at the Synchrotron Facility ELETTRA). Currently more than 40 scientists have been appointed as Associate members in the field of Medical Physics.

The programme of Research and Training in Italian Laboratories (TRIL) gives experimental scientists the possibility to spend periods of time (up to one year) joining a group in an associate Scientific laboratory in Italy. 48 Italian laboratories offer this opportunity in the field of Medical Physics, and a total of 97 scientists were trained with 155 grants (some of the scientists received more than one grant).

The extent of what the ICTP has achieved in these 30 years in the field of Medical Physics can also be understood through a few figures: over 2000 scientists have taken part in the activities of the Centre (most from developing countries); more than 700 scientists have been trained through various modalities; each Medical Physics College includes young specialists from around 40 developing countries; many of these attendees have later started specific Medical Physics activities and courses in their own countries.

AFTERWORD

A substantial part of this book was ready for print in 2006 when the EMITEL Encyclopaedia project started. To keep the tight deadlines for this huge Encyclopaedia+Dictionary project (which included all book Editors) we had to temporarily freeze the book. Immediately after completion of EMITEL the development of the book continued. Many of the papers were updated to reflect the changes during the period, but some remained as information from 2006. This will be updated in the future part II of this book. In it we shall publish new papers about the current development of education and training. Apart from continuing the papers from Asia, Europe and Africa, part II shall include more papers from America, as well as specific papers from the countries with most experience in the field. Part II will also include more papers related to Medical Engineering.

Very important news arrived after completion of the book – our professions were included in the International Standard Classification of Occupations (ISCO-08). This excellent achievement will result in the official recognition of medical physicists and medical engineers in many countries, where such recognition does not yet exist. This will lead to the development of new University programmes (both at postgraduate MSc level and at undergraduate BSc level) and of new training courses (at lower and higher level). This will be extremely important for the development of the profession as a future stand-alone entity and will be reflected in the book part II. In this connection I shall be grateful to colleagues who would send me information on the new developments of Medical Physics and Engineering Education and Training in their countries/projects at: slavik.tabakov@emerald2.co.uk

Slavik Tabakov

Chair Education and Training Committee of IUPESM

Directors and participants of ICTP College on Medical Physics (2018) present the Gratitude Folder with a printout of this e-book to ICTP Deputy Director Prof. S Scandolo