



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

Dosimetry and Medical Radiation Physics: IAEA activities in support of alternative technologies in medicine

Division of Human Health

10 June 2020

Session 1.4: Alternative Technologies of Radioactive Sources in Medical Applications

The National Academies of Sciences, Engineering and Medicine

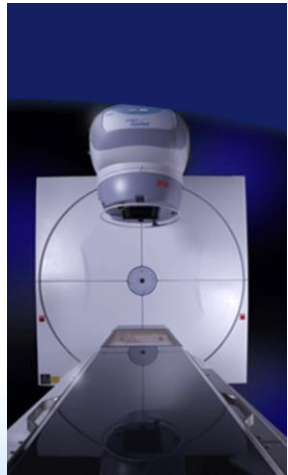
Objective of the Section

To enhance the capability of Member States to implement radiation imaging and treatment modalities safely and effectively through optimized dosimetry and medical physics practice.

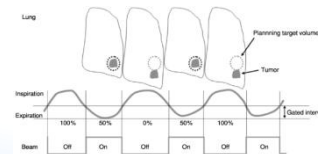
- Clinical medical physics expertise, including education
- Dosimetry Laboratory for MS services (calibrations, comparisons and dosimetry audits)

External beam radiotherapy

Standard



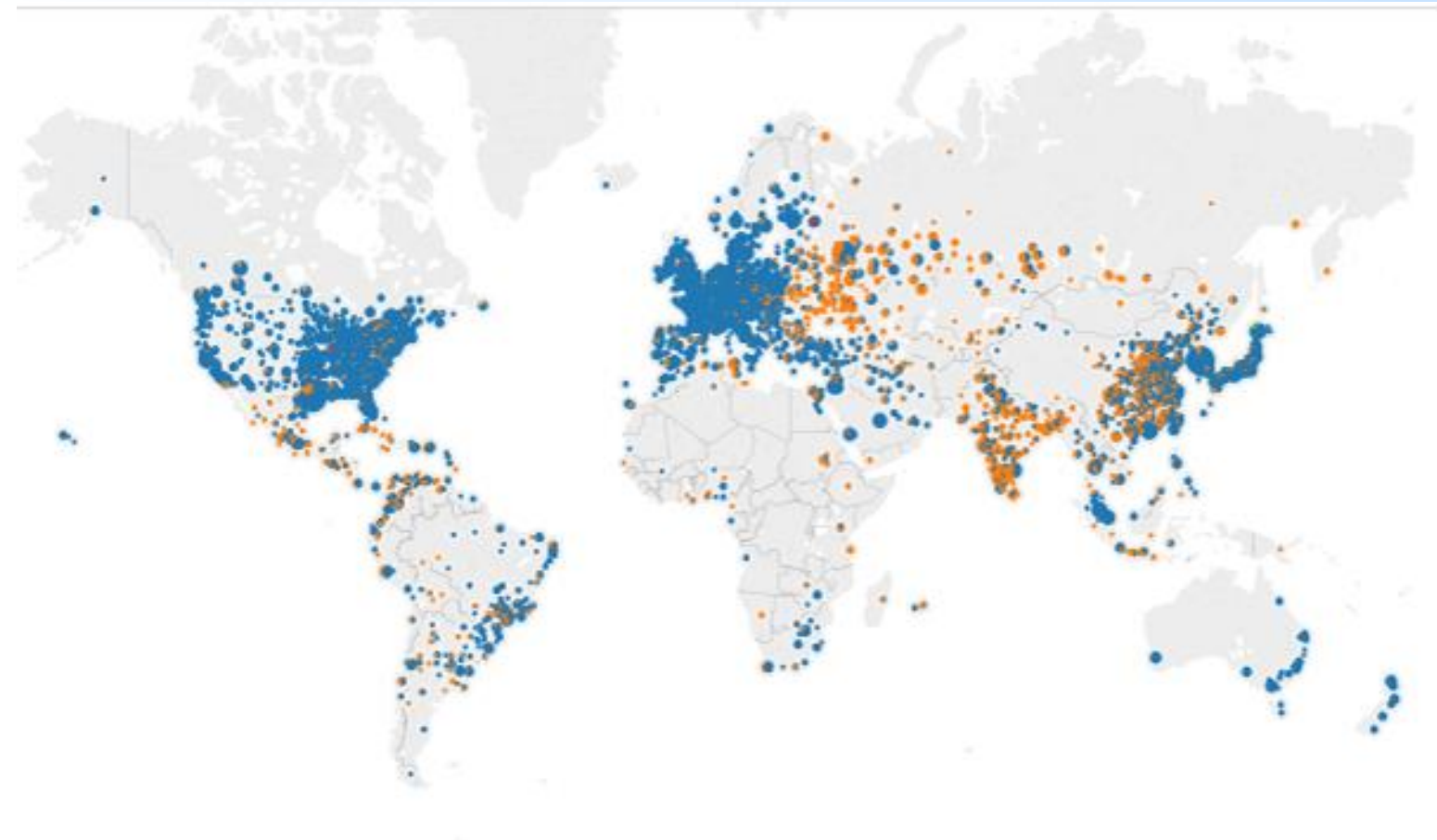
Complex



Advanced

DIRAC 2016

<https://dirac.iaea.org/>



Equipment type

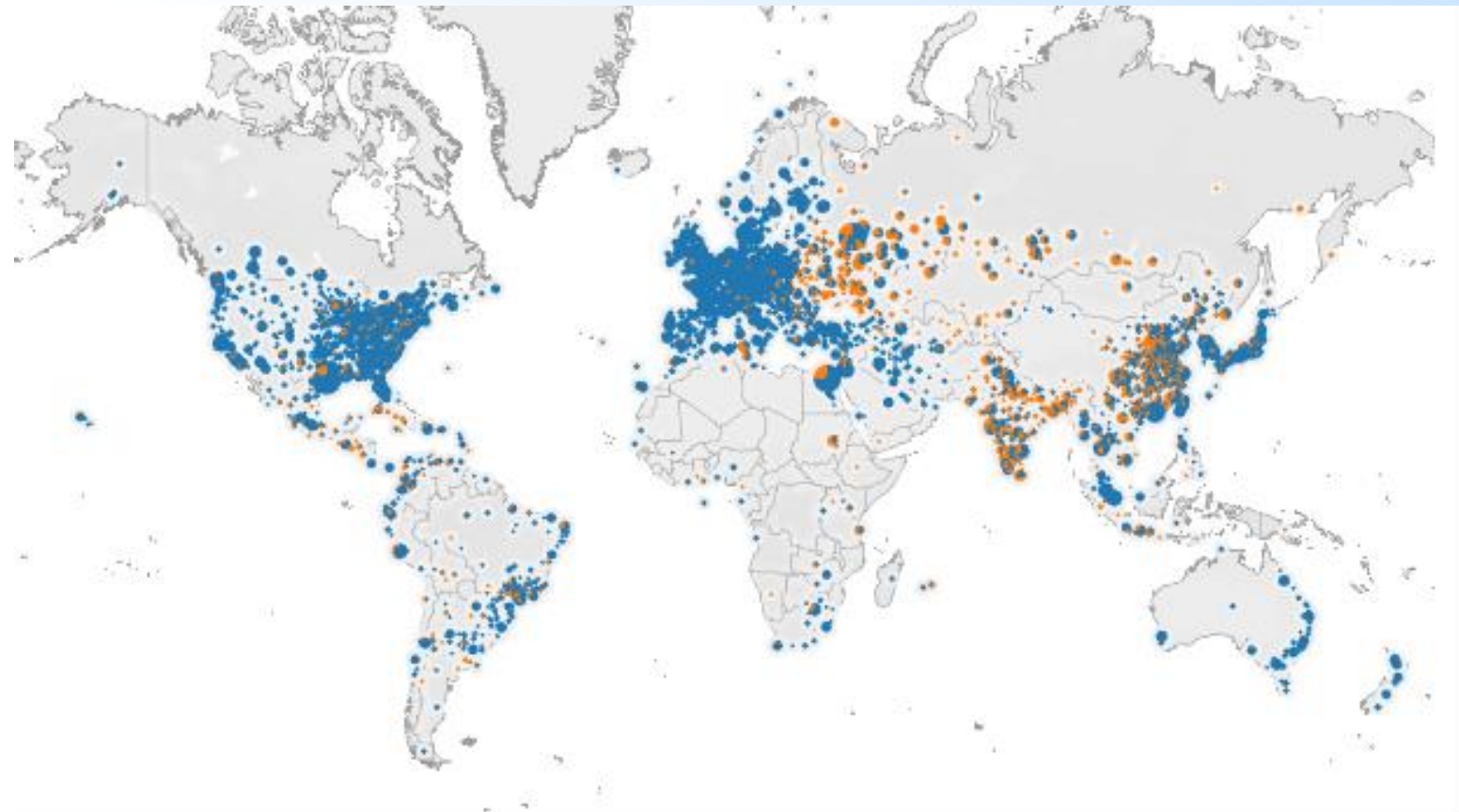
(Updated on : 9/2/2016 2:31:09 AM)

Clinical accelerator	11,324
Radionuclide teletherapy	2,265

■ Clinical accelerator
■ Radionuclide teletherapy

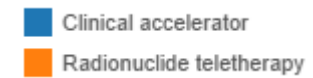
DIRAC 2020

<https://dirac.iaea.org/>



Equipment type

(Updated on : 2020-05-27 13:53:28)



Brachytherapy (standard of care)

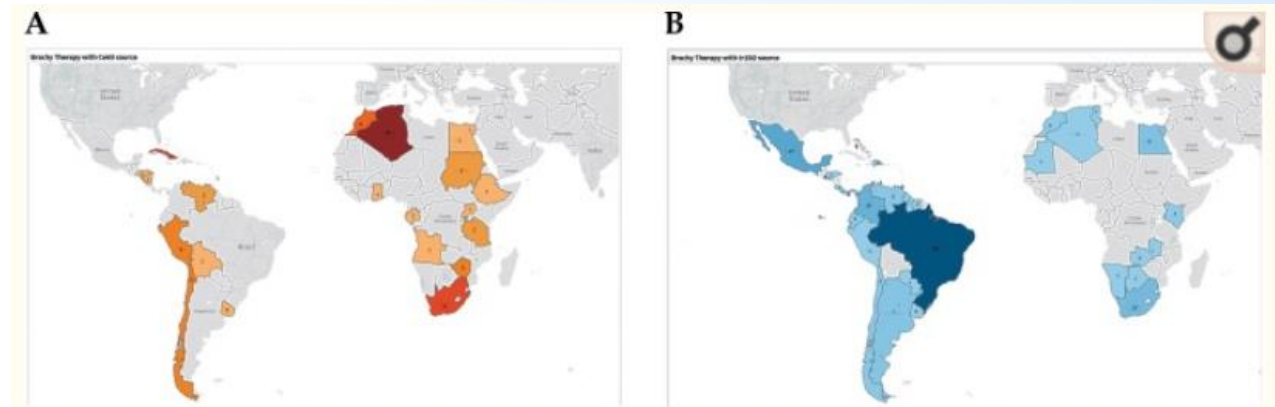
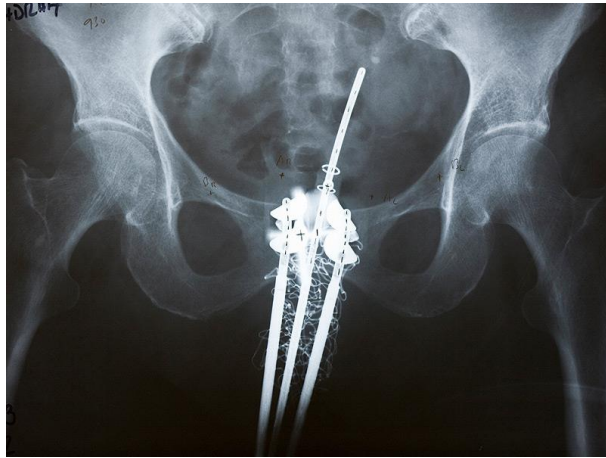


Fig. 2

Geographic representation of high-dose-rate afterloaders for Co-60 (A) and Ir-192 (B) for the Caribbean, Central and South America, and Africa

RBM Vega, et. al. J Contemp Brachytherapy. 2018 Dec; 10(6): 503–509.

DIRAC 2020

Status of Brachytherapy Equipment

127 2 336 1 149 1 812

Countries RT Centers Brach LDR Brach HDR



<https://dirac.iaea.org/>

Calibration Services / Radiation Dosimetry

Dosimetry Laboratory Services

Services	Beams
Calibration of ion chambers: RT, DR, RP levels	X rays (10–300kV), ^{137}Cs , ^{60}Co beams
Calibration of well type ion chambers for brachytherapy (LDR/HDR)	^{137}Cs , ^{60}Co , ^{192}Ir
Comparison of RT level ion chamber calibrations for SSDLs	^{60}Co beams
RPLD audits for RT for SSDLs and hospitals	^{60}Co , h. e. X rays
OSDL audits for RP for SSDLs	^{137}Cs beams
Ref. irradiations of dosimeters for RT, RP	X rays (40–300 kV), ^{137}Cs , ^{60}Co beams



IAEA/WHO dosimetry postal service
for external beam radiotherapy

Calibration service for national dosimetry standards

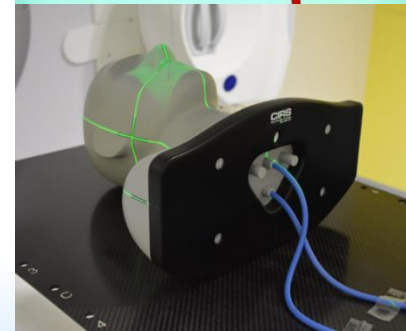


Calibration of a reference mammography
ionisation chamber at the IAEA
Laboratory in Seibersdorf



IAEA audits in radiotherapy

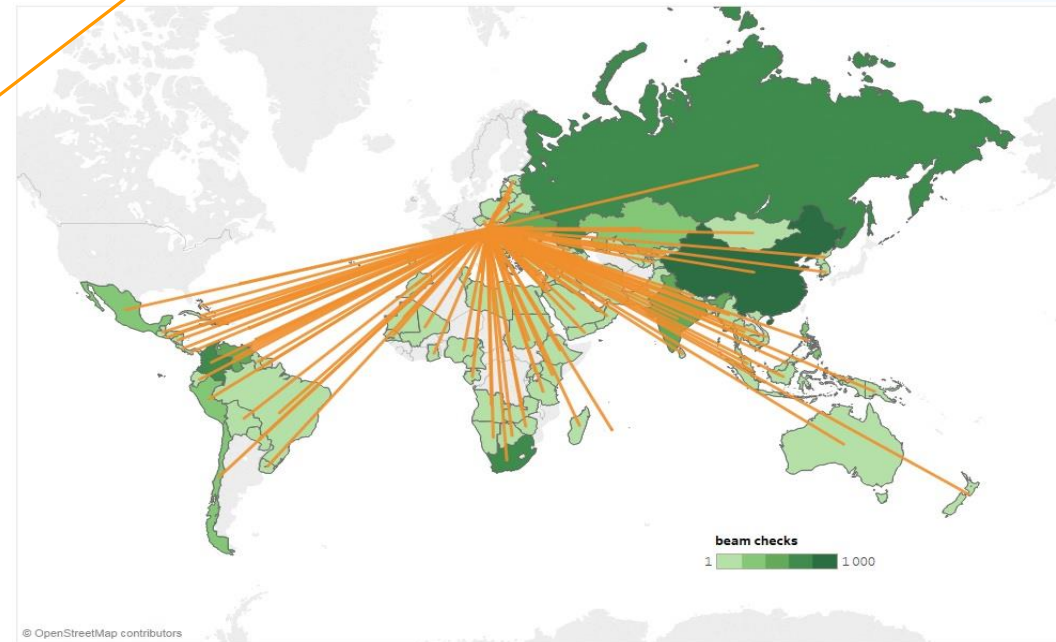
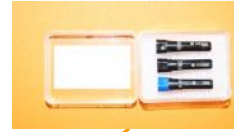
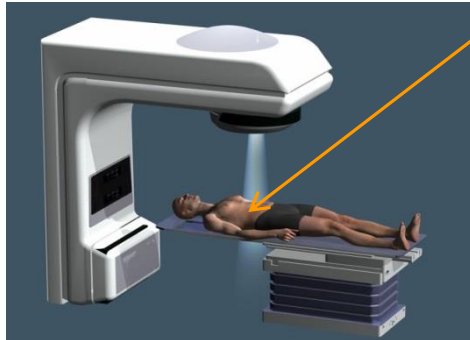
- **Since 1969:**
IAEA/WHO postal dose audits of radiotherapy beam calibration (with TLD)
- **1995-2017:** CRPs to develop various remote audit methodologies
- **Since 2005:**
Quality Assurance Team for Radiation Oncology (QUATRO)
- **Since 2010:**
On-site TPS end-to-end audits
- **Since 2017:**
RPLD-based remote audits
Small field photon beam audit
- **Since 2018:**
On-site IMRT/VMAT end-to-end audits



Dose audits for radiotherapy centres

How is the audit carried out?

Small dosimeters are sent to radiotherapy centres for irradiation to verify the beam output used for patients' treatments.

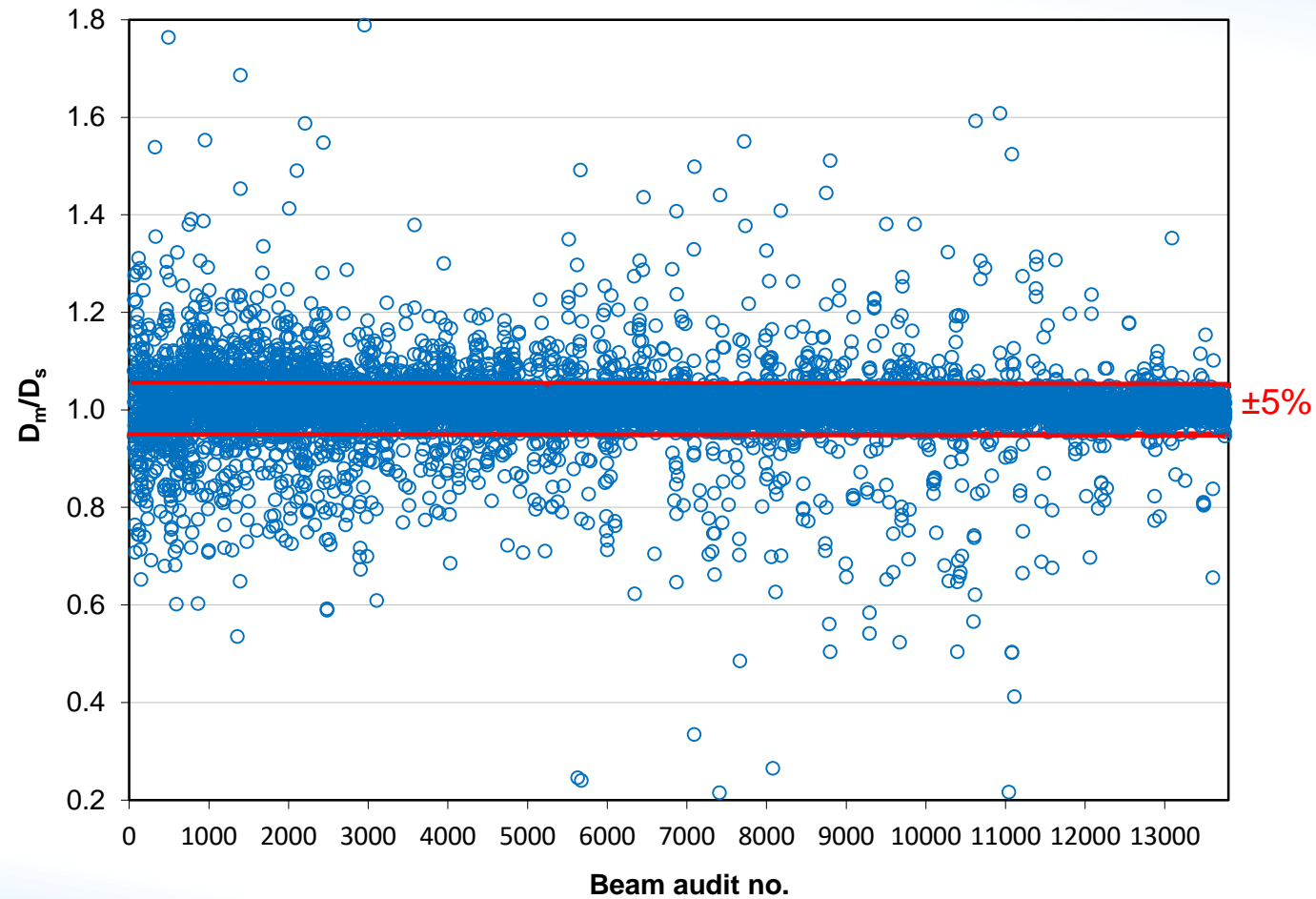


Dose audit service:

- 50 years of the IAEA/WHO postal dose audits (1969–2019)
- >14000 beam checks
- ~2400 radiotherapy centres in 136 Member States

<https://dosimetry-audit-networks.iaea.org/>

IAEA/WHO audit results for Co-60 and high energy X rays



1969 – 2019: 50 years of dosimetry audits

Promotion of Advanced Radiotherapy

Dosimetry Laboratory activities:

- Commissioning of the new linac (2019)
- Commissioning of the new robotic calibration bench (2020)
- Possibilities for research support, education and training



The screenshot shows the IAEA website with a news article. The article title is "How an IAEA Doctoral Coordinated Research Project Empowers Medical Physicists in Advanced Radiotherapy Techniques". The date is January 3, 2020. The author is Elodie Broussard, IAEA Office of Public Information and Communication. The article features a photo of Bertha García Gutiérrez working on a computer. The article text discusses the challenges of finding medical physicists in low- and middle-income countries and how IAEA doctoral coordinated research projects (CRPs) address this. There are also sections for "Related Stories" and "Related Resources".

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International Atomic Energy Agency

Press centre Employment Contact

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Home / News / How an IAEA Doctoral Coordinated Research Project Empowers Medical Physicists in Advanced Radiotherapy Techniques

How an IAEA Doctoral Coordinated Research Project Empowers Medical Physicists in Advanced Radiotherapy Techniques

Elodie Broussard, IAEA Office of Public Information and Communication

JAN 3 2020



Related Stories

- New CRP: Doctoral CRP on Advances in Radiotherapy Techniques (E24022)
- E-learning Tool Helps Boost Medical Physics Expertise in Asia and the Pacific
- Ensuring the Safe Use of Advanced Radiotherapy in Eastern Europe and Central Asia

Related Resources

- Comprehensive cancer control
- Radiation protection in radiotherapy
- Radiotherapy - what patients need to know
- Safe Cancer Treatment With Radiotherapy
- Radiation Protection of Patients (RPOP)

Bertha García Gutiérrez is working to complete a PhD in medical physics through support from an IAEA doctoral coordinated research project. (Photo: C. García)

In low- and middle-income countries there are often too few radiotherapy medical physicists available for cancer care services, and there are even fewer who are qualified to supervise training programmes of new medical physicists and advance research in this field. A series of IAEA doctoral coordinated research projects (CRPs) sets out to address this.

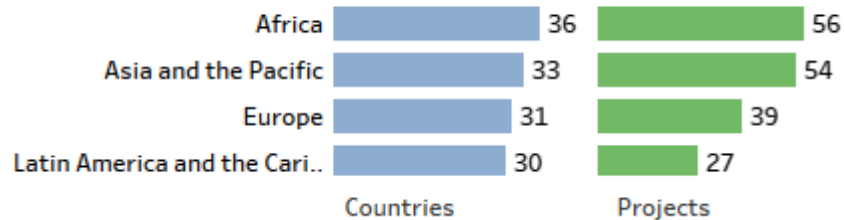
DMRP ARBR 2018/19 cycle active TC projects

174 130 22 2 16 156
 Projects Countries Staff Interregional Regional National

TC Projects

Last Update: 2020-02-16 18:47:02

TC projects by region



TC projects by section

TO is a part of the project team



Symposia, Training Courses and Workshops

LIST OF CO-OPERATING ORGANIZATIONS

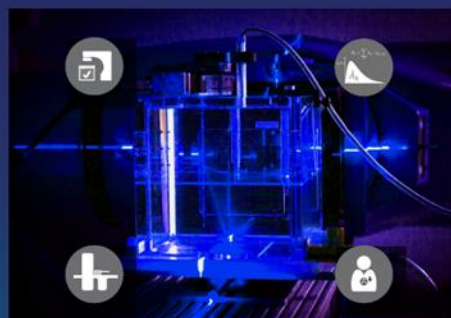
AAPM	American Association of Physicists in Medicine
AFOMP	Asia–Oceania Federation of Organizations for Medical Physics
BIPM	International Bureau of Weights and Measures
EANM	European Association of Nuclear Medicine
EFOMP	European Federation of Organizations for Medical Physics
ESR	European Society of Radiology
ESTRO	European Society for Radiotherapy and Oncology
EURADOS	European Radiation Dosimetry Group
GHG	Global Clinical Trials Radiation Therapy Quality Assurance Harmonization Group
ICRP	International Commission on Radiological Protection
ICRU	International Commission on Radiation Units and Measurements
IOMP	International Organization for Medical Physics
ISO	International Organization for Standardization
MPWB	Medical Physics for World Benefit
SEAFOMP	South East Asian Federation of Organizations for Medical Physics
SNMMI	Society of Nuclear Medicine and Molecular Imaging
UICC	Union for International Cancer Control
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation

International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry

18–21 June 2019 Vienna, Austria
Organized by the International Atomic Energy Agency

50
YEARS
1969–2019
of IAEA/WHO
Dosimetry Audits

IDOS 2019



#IDOS2019

163 435 120 1 619 285 6 240 458 772
Countries Projects Research Contracts Fellows Training Courses Course Participants Expert Missions Experts

Research Contract 120
TC Projects 399
Fellowship Hosts 1 603
Fellowships 1 617
Training Courses 285
Course Participants 6 240
Expert Missions 457
Experts 772

Events

11 48 136
399 73 122
67 75 145
67 108
165 70
Projects Countries



Activities per country

Argentina	359	39
Russian Federati..	350	25
Kazakhstan	313	21
Brazil	264	45
Bosnia and Herze..	246	23
South Africa	241	51
Cuba	223	41
Chile	220	25
Serbia	210	32
Algeria	207	40
Mexico	199	27
Thailand	184	37
Costa Rica	182	20
Belarus	181	28

Events Projects

Country

Search

Institution

Radiation Oncology	159	308	1 323	126	3 311	288
Dosimetry and medical physics	163	435	1 619	285	6 240	458
Nuclear Medicine	161	378	1 340	219	4 545	388

Countries Projects Fellows Training Courses Participants Expert Missions

EventTopic

- ☒ (All)
- ☒ Course Participa...
- ☒ Expert Missions
- ☒ Experts
- ☒ Fellowship Hosts
- ☒ Fellowships
- ☒ Research Contract
- ☒ TC Projects
- ☒ Training Courses

Project Start Year

(Multiple values)

Year of SubStartDate

(All)

SectionName

- ☐ (All)
- ☐ Division of Huma...
- ☒ Dosimetry and m...
- ☒ Nuclear Medicine
- ☐ Nutrition
- ☒ Radiation Oncolo...

Status

- ☒ (All)
- ☒ Active
- ☒ Closed
- ☒ Completed
- ☒ New
- ☒ Planned

Topics

- ☒ Research Contract
- ☒ TC Projects
- ☒ Fellowship Hosts
- ☒ Fellowships
- ☒ Training Courses
- ☒ Course Participan..
- ☒ Expert Missions
- ☒ Experts

UT/ICTP Masters in Medical Physics



UNIVERSITÀ
DEGLI STUDI DI TRIESTE



The Abdus Salam
International Centre
for Theoretical Physics



in collaboration with
REGIONE AUTONOMA FRIULI VENEZIA GIULIA
Azienda Sanitaria Universitaria
Integrata di Trieste





Master of Advanced Studies in Medical Physics
5th cycle Graduation Ceremony 2019



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Thank you!

