IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Building capacity through the IAEA programs

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IAEA: An autonomous international organization within the United Nations system

176 Member States; 2500+ staff from over 100 Member States; HQ in Vienna

- Labs in Seibersdorf, Vienna and Monaco
- Regional offices in Toronto and Tokyo; Liaison offices in New York and Geneva

Mission: to serve the Member States

- assist Member States, in planning & using nuclear science & technology for peaceful purposes
- facilitate transfer of knowledge in a sustainable manner to developing Member States
- develop nuclear safety standards and promote high levels of safety in applications of nuclear energy, and the protection of human health and the environment against ionizing radiation;
- verify through its inspection system that States comply with their commitments to use nuclear material and facilities only for peaceful purposes.

Structure

The IAEA laboratories

Water Resources

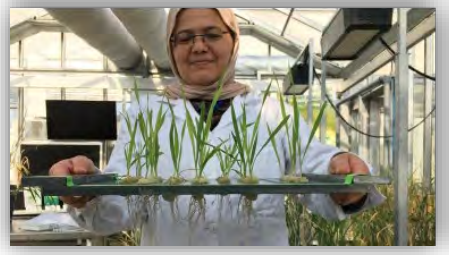
Food & Agriculture

Human Health

Nuclear Science

1. **Insect Pest Control**
2. **Animal Production & Health**
3. **Plant Breeding & Genetics**
4. **Soil and Water Management & Crop Nutrition**
5. **Food Safety and Control**
6. **Dosimetry Laboratory**
7. **Terrestrial Environment**
8. **Nuclear Science and Instrumentation**

Marine Environment



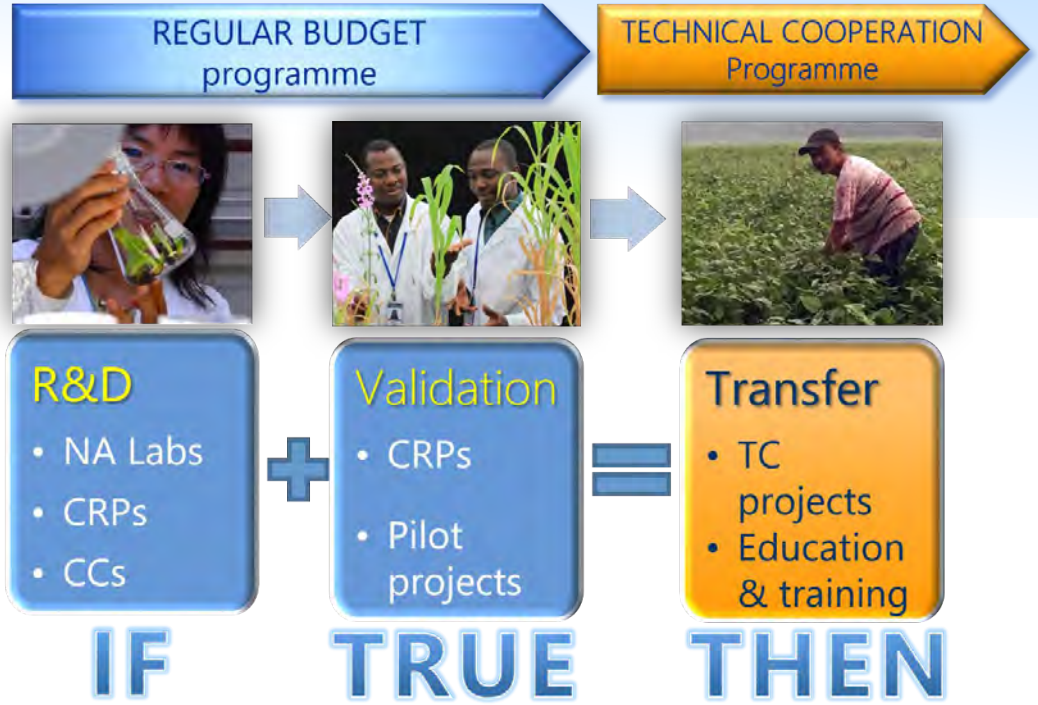
The tools

- Consultancy Meetings: 5 to 10 experts are invited to provide specialized advice and recommendations on particular scientific or other aspects of relevance for the IAEA's programmes and activities.
- Technical Meetings: Technical events with 30-40 participants, aiming at enhancing interaction among experts, share knowledge and expertise, establish scientific collaborations and create topical networks.
- Coordinated Research Projects (CRPs): Networks of 10-15 research institutes from developed and developing countries that work in coordination for 3-5 years to acquire and disseminate new knowledge/technology. Periodic meetings are organized to report progress and plan/coordinate future activities.
- Training Workshops, Courses and dedicated Schools: Events enabling participants to acquire specific knowledge on a given subject of interest. Organized at IAEA labs, ICTP Trieste, or at labs in member states
- Publications of technical documents and guides: Publications of reported results, shared good practices and lessons learned; produced by CRPs or Technical Meetings.
- Collaborating Centres: IAEA Member State institutions/organizations are designated as *IAEA Collaborating Centres (CC)* to cooperate in the implementation of selected programmatic activities of the Agency.
- National, regional, interregional Technical Cooperation (TC) projects: projects to build capacity via Expert Missions, training of personnel, purchase of equipment, assistance in establishing new facilities, …

Primary mechanism for transferring nuclear technology to Member States

IAEA: Areas of work and Capacity Building methodology

sustainable agricultural development	food security and nutrition	cancer diagnosis and treatment modalities
		
		
cleaner water for more people	protecting the environment	Providing expertise for industrial applications



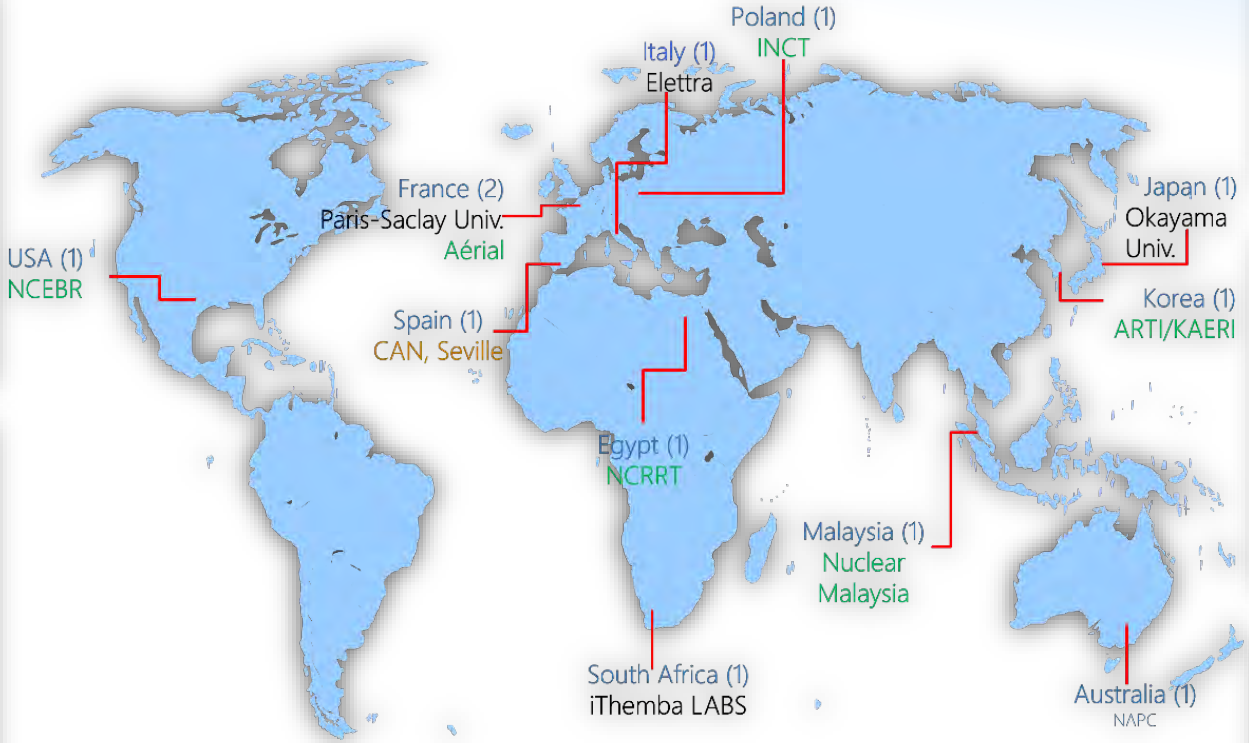
Key Principles for TC Projects

- Contribute to development goals
- Respond to Member States' needs
- Undertake peaceful use of nuclear technology
- Comply to IAEA safety and security rules
- Ensure Member State ownership & shared responsibility
- Ensure non-discrimination of stakeholders

IAEA Collaborating Centres

Elettra Sincrotrone, Trieste, Italy

Synchrotron applications and technologies



iThemba LABS, Cape Town, SAF


Signing ceremony, 9 Nov. 2021

Work plan

- Assistance to developing MSs intending to build synchrotron facilities including training of their scientists & technologists in light sources design and beamline design control systems & detectors.
- Assistance to developing MSs in implementing new methodologies for expanding the application fields of synchrotron and FEL techniques.

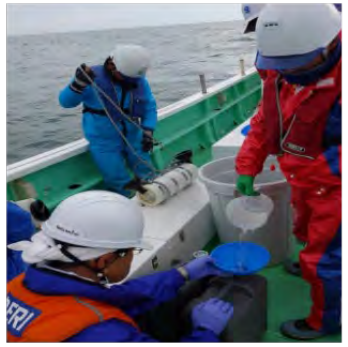
The IAEA Technical Cooperation Programme

Primary mechanism for transferring nuclear technology to Member States, implemented through National, Regional or Interregional TC Projects

- Capacity building
- Networking
- Knowledge sharing
- Partnership building

Fellowships
Scientific visits

Expert assistance

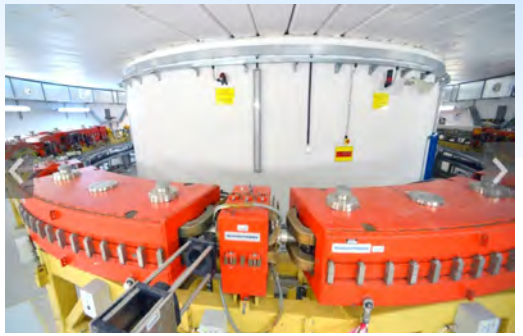


Equipment & materials

Conferences, Symposia

Training courses & workshops

The SESAME Interregional TC Project (2010-2023; ≈2M€)



(SESAME was inaugurated on May 16, 2017, in Jordan)

Over the last decade IAEA has provided extensive support to train staff at SESAME to commission and run the facility. This has included instruments, the training of 66 technical and scientific fellows in beamline technologies, and over 30 expert missions to SESAME to help build capacity in installation/testing of equipment.

IAEA also facilitated the networking of SESAME staff with experts from other synchrotron facilities in Europe, USA and Japan.

In 2018, Training Workshop held in SESAME with remote connection to Elettra, Italy

New Interregional TC project launched:
Expansion of network across all continents.

UZB006: A national TC project

objective — To improve and develop educational processes in nuclear science and applications of nuclear techniques and methods in the economic sector of the Republic of Uzbekistan

outcome — Academic programmes in the field of nuclear science and technologies established at the National University of Uzbekistan (Tashkent) and the Samarkand State University;
=>new lab courses in nuclear spectroscopy, nuclear electronics, accelerator and reactor physics

activities — 6x fellowships (up to 6 months) – 2x scientific visits – 4 expert missions
Procurement of new scientific instruments and analysis software

Similar projects: Cambodia, Botswana, Laos …

The RER6039 Regional TC Project (SEEIIST)

PMO: Ms. Mayumi YAMAMOTO

Developing Human Resources for Setting Up an Ion Beam Therapy Centre within the Joint South East European International Institute for Sustainable Technologies

Forum on New International Research Facilities in South East Europe
ICTP, Trieste, Italy, 25 – 26 January 2018.

Decisions on

- Overall Workplan of TC project
- Capacity building through scientific visits
- Training program (3 Fellowships)
- Next workshops

Training at CNAO (Pavia, Italy) in 5 different topics for 12 months

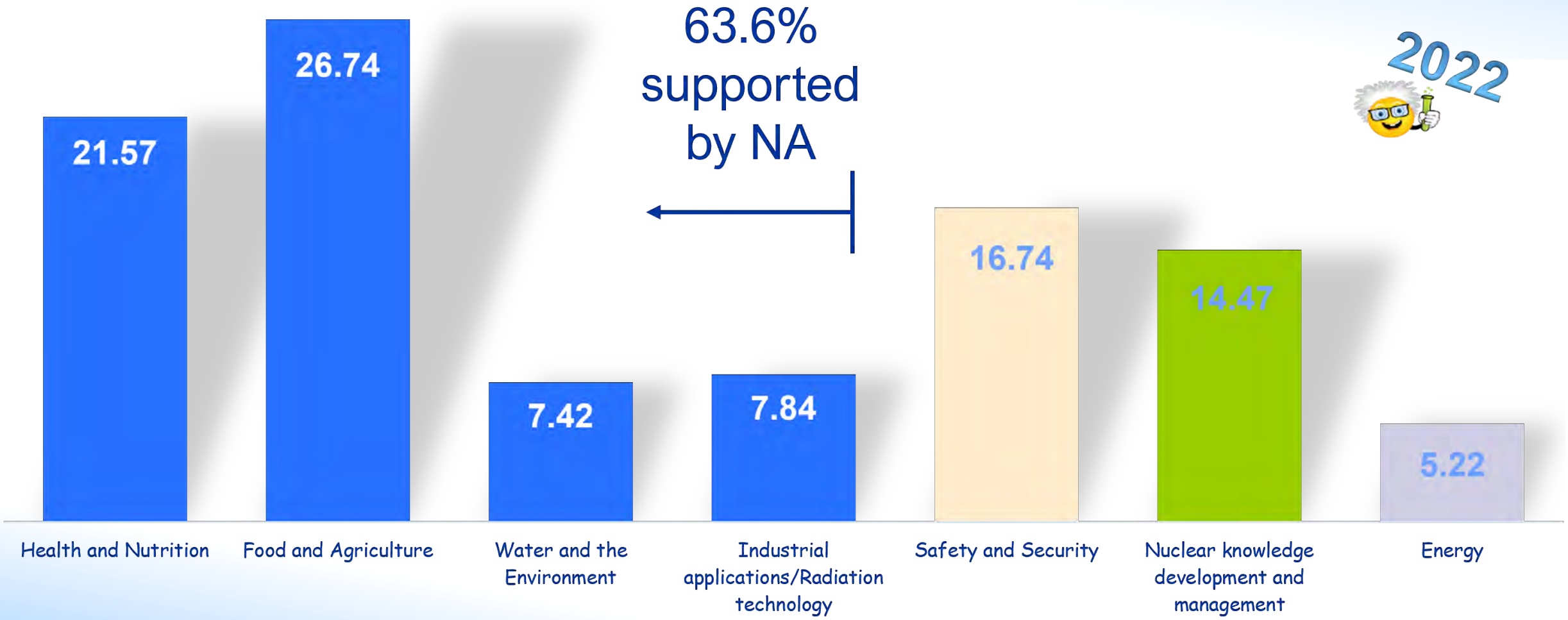
1. Study of Slow Beam Extraction
2. Characterization of a new acquisition system for the Schottky Monitor of the CNAO Synchrotron
3. Development of a monitor for low intensity beams.
4. Development and test of electronics boards
5. Control system development.

Development Objective:

To build critical mass of human resources initially needed for the merits of the emerging hadron tumour therapy and research facility – SEEIIST.

Disbursement at Country Level through IAEA Technical Cooperation Programme

Source: Technical Cooperation Report 2022



G42008: A CRP facilitating experiments with Ion Beam Accelerators

- Transnational access to IBA facilities across the world for researchers without local access to an accelerator
- 11 accelerator laboratories distributed in different geographical areas, where potential users are most expected
- Travel grants to external non-local users after submission of a research proposal and successful evaluation by the IAEA and acceptance by the host laboratory.
- Some support to beam providing labs for consumables

So far

25 Grants to researchers from 22 Member States

The launch of this CRP was decided in a Consultancy Meeting held in March 2018

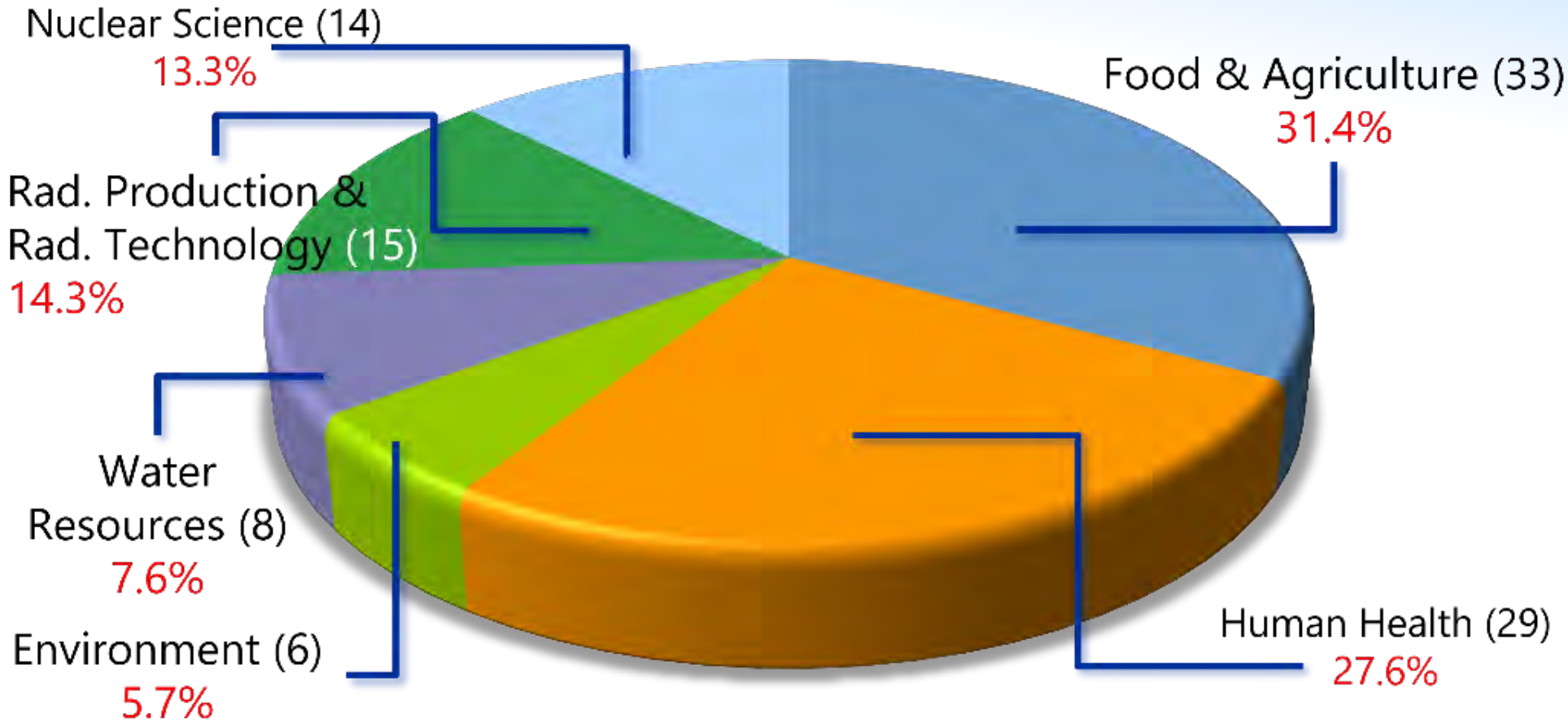
IBA & Nuclear Techniques covered by the CRP

PIXE/PIGE
μ-PIXE
RBS, Channelling
NRA
(ToF)-ERDA,
MeV SIMS,
AMS
Nuclear reaction studies

Variety of topics

Agriculture
Biology
Material studies
Human Health
Ecology
Nuclear Data
Archaeology

Coordinated Research Projects – NA Department (2022)



NACA, 2022 data

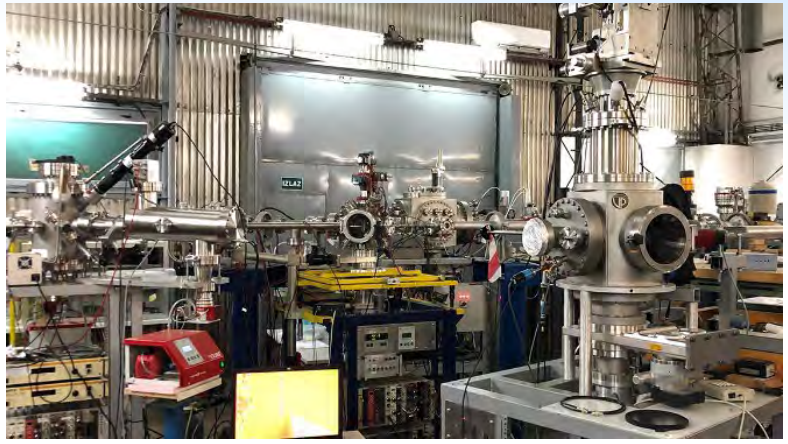
Facilitating access to state-of-the-art accelerator facilities

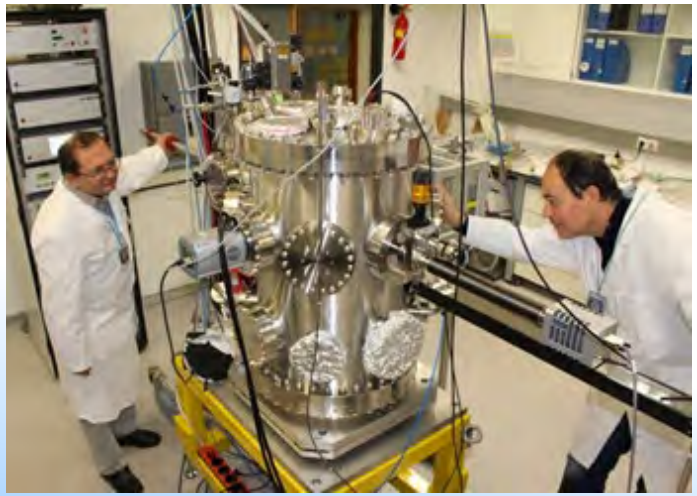
IAEA-RBI agreement; co-shared infrastructure

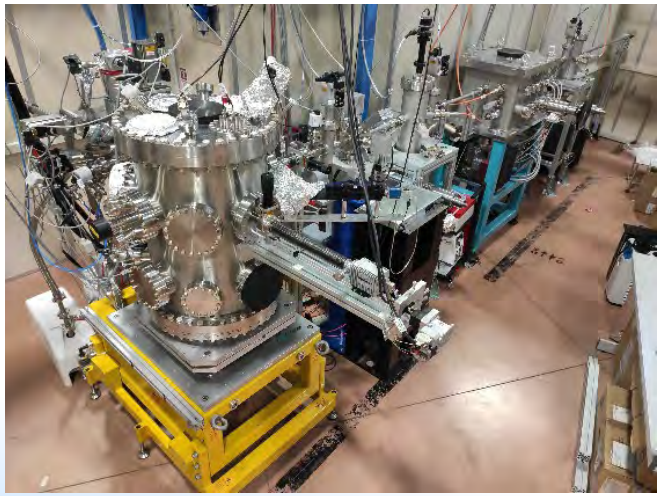
- 20 days of the beam time available for the developing countries
- Annual training workshops, with emphasis on hands-on-training
- New He ion source for dual-beam capability commissioned (fusion research)

IAEA-Elettra agreement; joint XRF beamline

- Dedicated beam-time for users; +20 research groups from +15 MSs annually
- Annual training workshops, with emphasis on hands-on-training
- Recent improvements of the beam line and end-station
- UHVC 'Mirror Facility' for training commissioned at NSIL Seibersdorf







Training young scientists and accelerator operators

Training Workshop: *Hands-on Operation & Maintenance of Electrostatic Accelerators; RBI, Zagreb, 9-13 Dec. 2019*

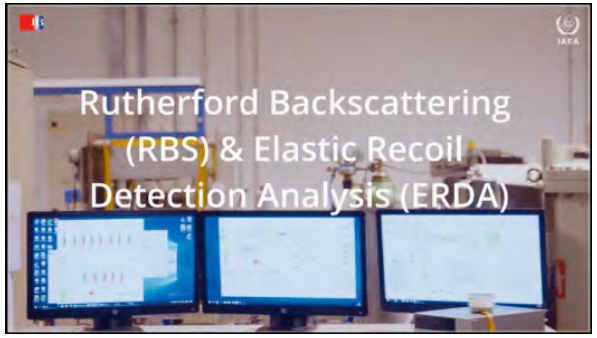
- ✓ Accelerator controls, control software, voltage measurements and stabilization, Dew point measurements, Magnetic hysteresis evaluation, Terminal voltage calibration.
- ✓ Vacuum systems: setting up & measurements, leak detection, RF&DC discharges in gases.
- ✓ Ion sources: beam extraction, beam current measurements, changing source parameters, element selection & optimization, changing Duoplasmatron operation
- ✓ Beam optics: Basic theory, beam focusing & steering, quadrupole alignment, beam brightness & size measurements.

Repeated: iThemba LABS, J'burg, SAF, Dec. 2022, & RBI, Zagreb, Croatia, Oct. 2023

Training Workshop: *Advances in Ion Beam Techniques & Applications (Virtual), RBI, Zagreb, Croatia, 1-5 March 2021*

Intro-lecture (60-90 min) – Demo video (≈20 min.) – Discussion/Questions/Exercises (90 min) – Homework (data analysis)

36 trainees (10 from Africa) – [17 female] – 16 Member States



https://nucleus.iaea.org/sites/accelerators/Pages/IBA-video-demonstrations.aspx

Repeated: RBI, Zagreb, Croatia, Nov. 2022; Next: Jožef Stefan Institute, Ljubljana, Slovenia, Oct. 21-25, 2024;

Planned: CNEA, Bariloche, Argentina, April 2024

Training young scientists and accelerator operators

Joint ICTP-IAEA Workshop on Electrostatic Accelerator Technologies, Basic Instruments and Analytical Techniques 2019

21 - 29 October 2019
Trieste, Italy

Further information:
http://indico.ictp.it/event/8728/

Topics

- Introduction to electrostatic accelerators and their operation
- Ion sources and vacuum systems at electrostatic accelerators
- Ion-beam optics, beam focusing, and monitoring devices
- Introduction to low energy nuclear reactions
- Ion-beam analytical techniques
- Selected ion-beam based applications
- Modern detector technologies
- Basic software for data analysis and accelerator control

IAEA International Atomic Energy Agency

ICTP The Abdus Salam International Centre for Theoretical Physics

http://indico.ictp.it/event/8728/

7 Lecturers

(22 lectures; 4 hrs excercises on PC)

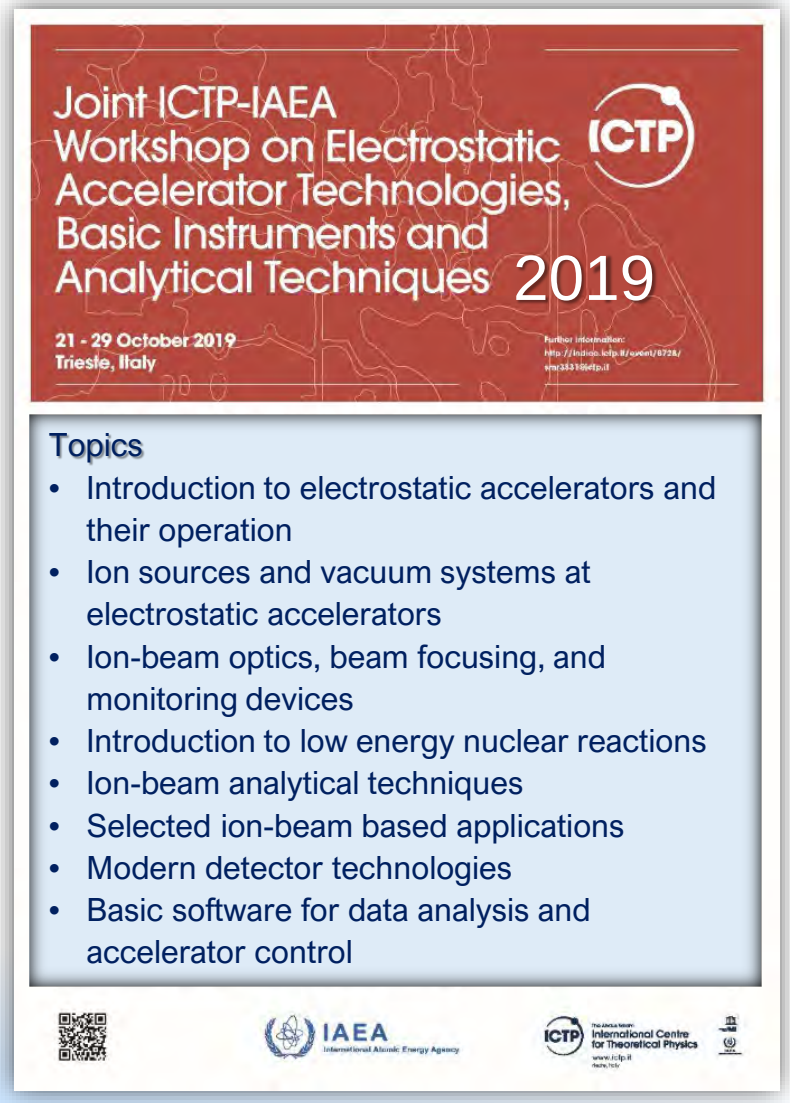
17 Trainees <age>=33; 1/3 females

Argentina (1), Cameroon (1), Egypt (1), Ghana (1), Greece (1), India (3), Iran (2), Lebanon (1), Nepal (1), Senegal (1), South Africa (1), Ukraine (1), Uzbekistan (2)

2 Lab visits (full day)

- Laboratori Nazionali di Legnaro, Italy
- Jozef Stefan Institute, Ljubljana, Croatia

Training young scientists and accelerator operators



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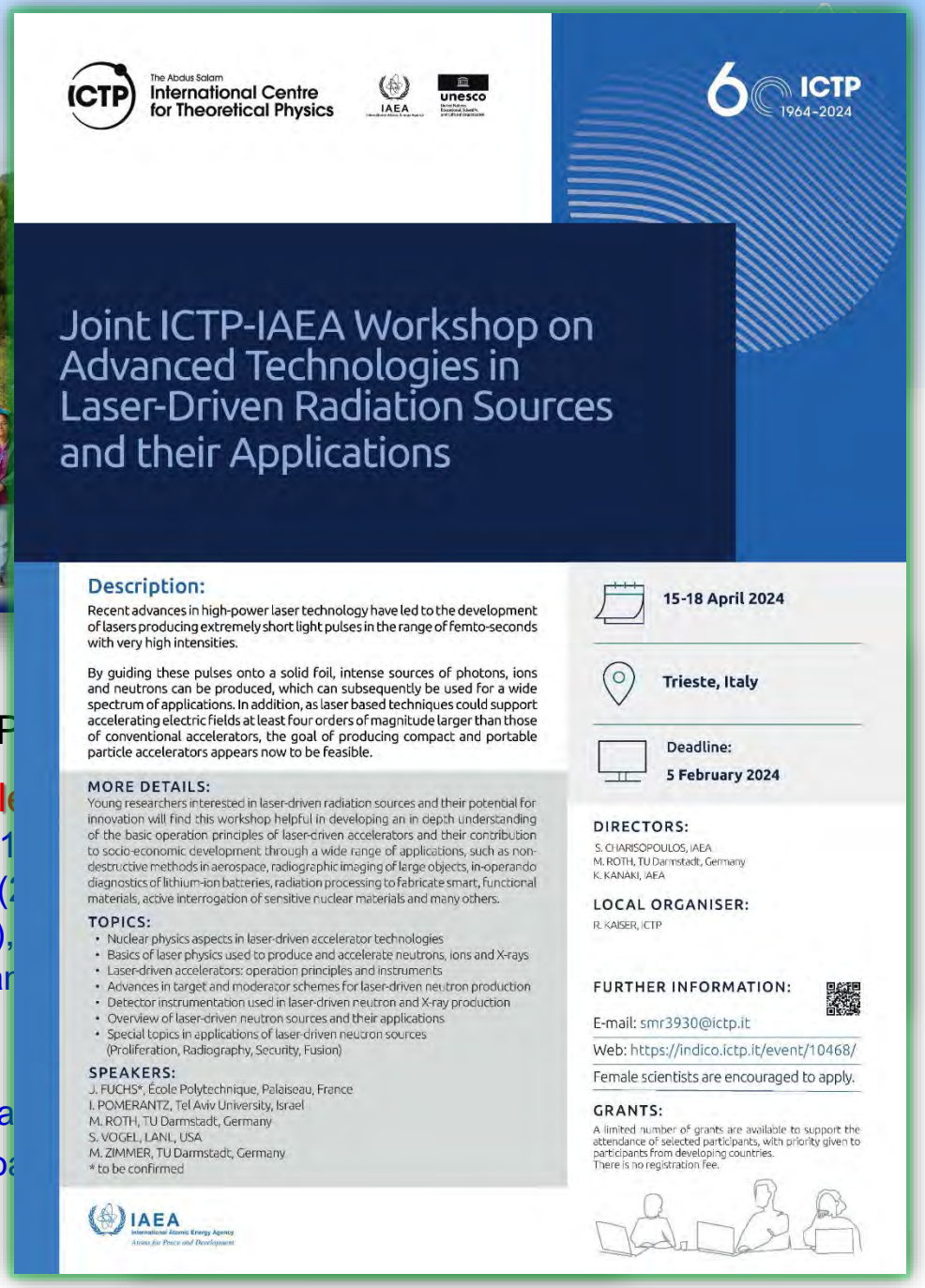
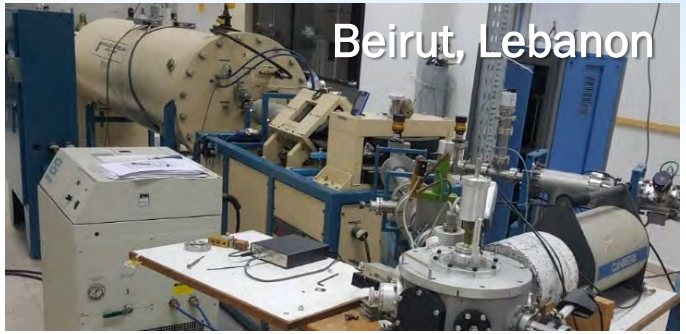
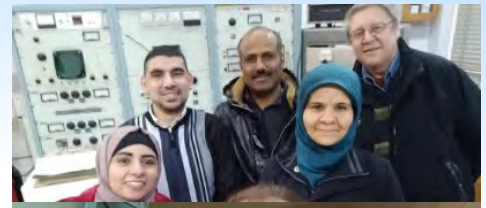


Direct support to accelerator facilities through Technical Cooperation projects

- Feasibility studies
- Technical support in setting up dedicated facilities, beamlines and end-stations
- Technical assistance in maintenance and upgrades
- Technical assistance in equipment procurement
- Training of personnel
- Utilization plans



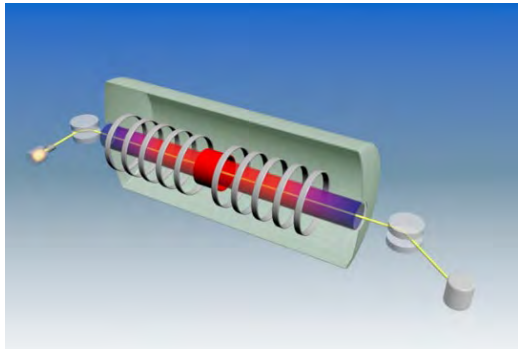


- Algeria
- Egypt
- Ghana
- Nigeria
- South Africa
- Bangladesh
- Croatia
- Greece
- Jordan
- Lebanon
- Mexico
- Slovakia
- Syria
- Thailand

e-learning, publication of technical documents, and project implementation guides

IAEA | Learning Management System
powered by CLP4NET

https://elearning.iaea.org/m2/course/view.php?id=761



Introduction to electrostatic accelerators: from basic principles to operation and maintenance

The electrostatic accelerator
Ion sources
Beam transport
Vacuum
Safety considerations

recommended for students, laboratory staff and users of these facilities

Rays of Hope (RoH): IAEA's key programme to help developing countries fight cancer

- The IAEA has 6 decades of experience in helping countries fight cancer, in cooperation with the World Health Organization (WHO). The assistance provided by the IAEA has enabled many countries to establish and/or strengthen safe, secure and effective radiation medicine (radiotherapy, radiology and nuclear medicine) capabilities.
- More resources required to bridge the enormous shortfall in equipment and highly skilled and well-trained personnel in developing countries.
- **Rays of Hope:** A key programme aiming at forging new partnerships and tapping into diverse funding sources, including from governments, intern. financing institutions and the private sector to ensure maximum reach, impact and sustainability.
- The Rays of Hope initiative (RoH) is aimed at assisting Member States in establishing or expanding their capacities in radiotherapy and multimodality medical imaging.

- Rays of Hope Anchor Centres are cancer centres which have shown resilience through decades of experience working with the IAEA to support their respective region.
- The Anchor Centres will train fellows, organize training courses for healthcare providers, participate in IAEA CRPs, promote networking, and provide experts and mentorship to other radiotherapy & medical imaging centres in their region.

Rays of Hope Anchor Centres:
selected by IAEA through
a designation process

- Formal written expression of interest from MS to the IAEA DG
- Meeting with the IAEA for further discussion of candidacy details.
- Submission of formal application and supporting documentation.
- Committee review by the IAEA
- Detailed bilateral discussions on IAEA support to the Anchor Centre.
- Signing of agreements

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Thank you for your attention

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