ENLIGHT:

Education &Training

Manjit Dosanjh

CERN&ENLIGHT

www.cern.ch/enlight

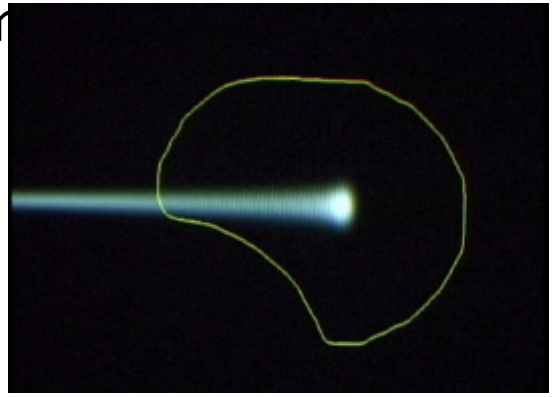
ENLIGHT was launched 15 years ago

- ENLIGHT was launched in February 2002 at CERN
- Idea germinated in 2001 in MedAustron meeting where PIMMS was presented

Organisers: Manjit Dosanjh & Hans Hoffmann

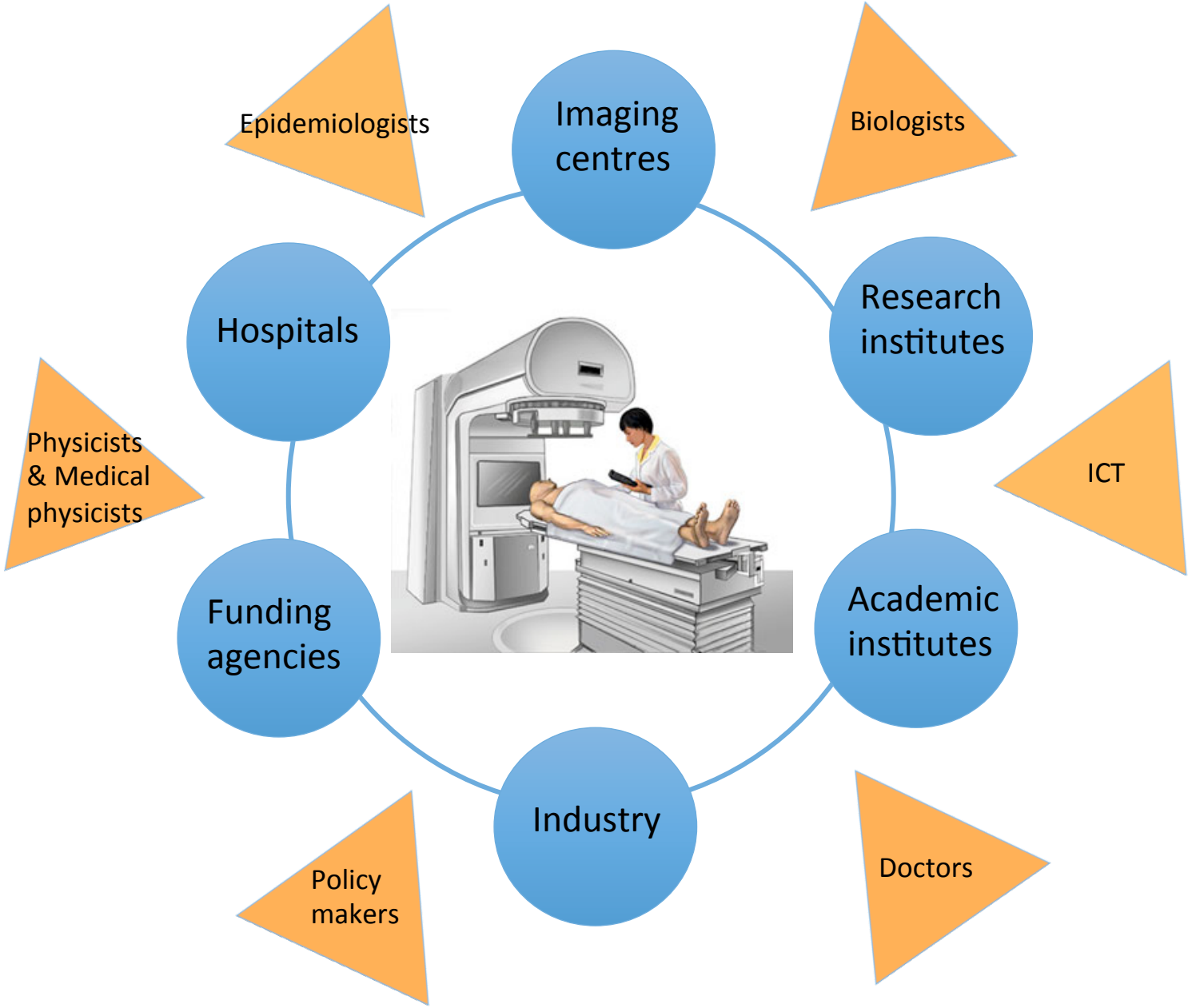
ENLIGHT was established to collaborate .....

- Create common multidisciplinary platform
- Cancer treatment
- Identify challenges
- Share knowledge
- Share best practices
- Harmonise data
- Provide training, education
- Innovate to improve
- Lobbying for funding
- Raising awareness



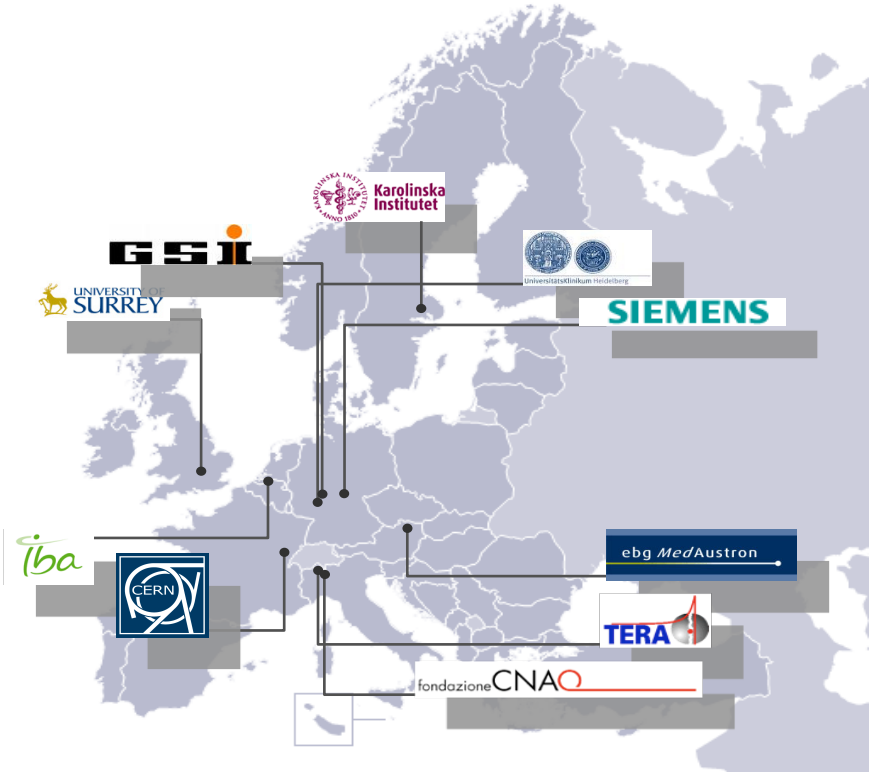
Leveraging Physics collaboration
philosophy into a multidisciplinary medical environment

ENLIGHT is an open collaborative network



PARTNER – a success story

- Particle Training Network for European Hadrontherapy
- 10 academic institutes, research centres, 2 leading companies
- 29 young researchers

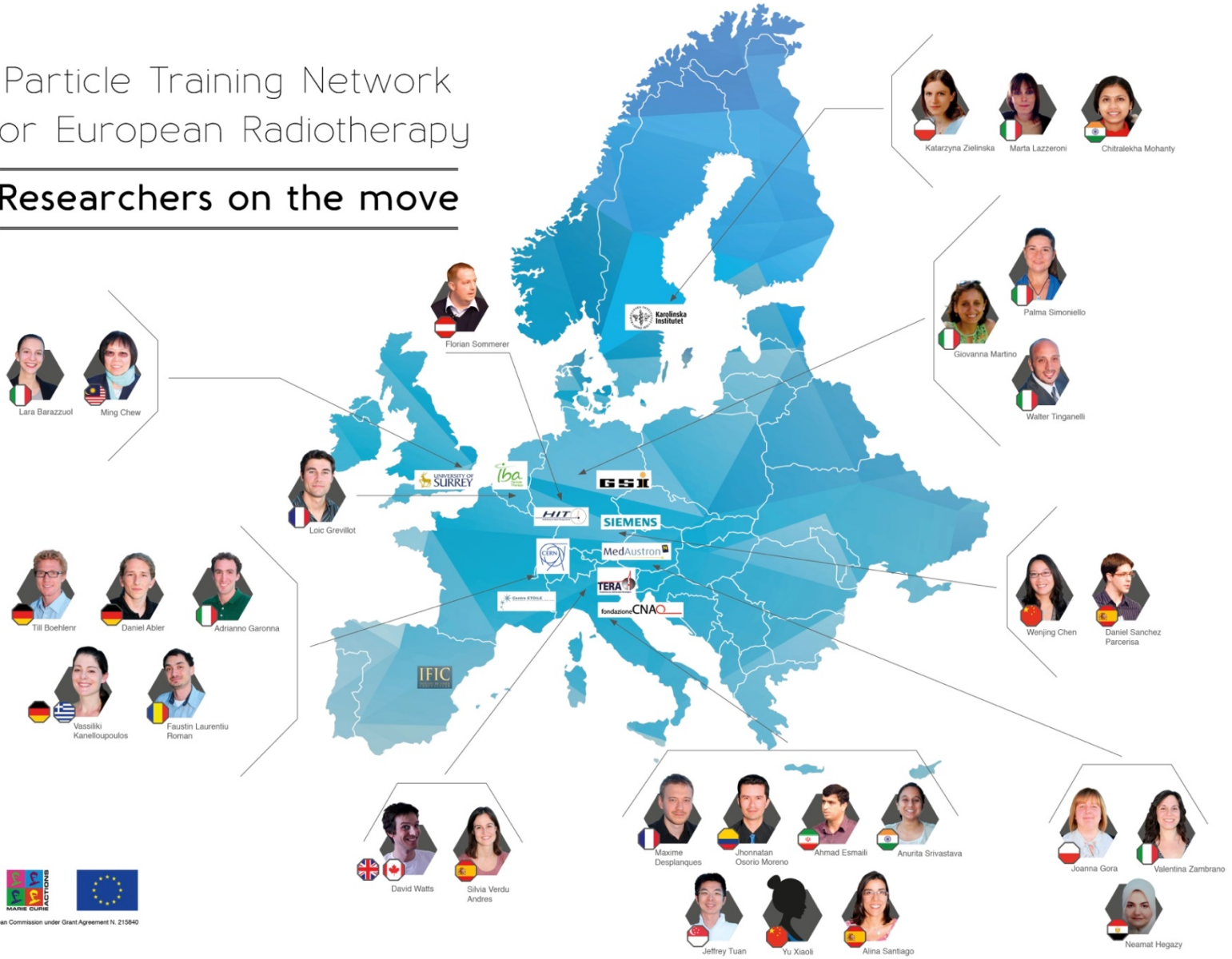


Outcome :

- Now working around the World
- Open access PARTNER-JRR

Particle Training Network for European Radiotherapy

Researchers on the move

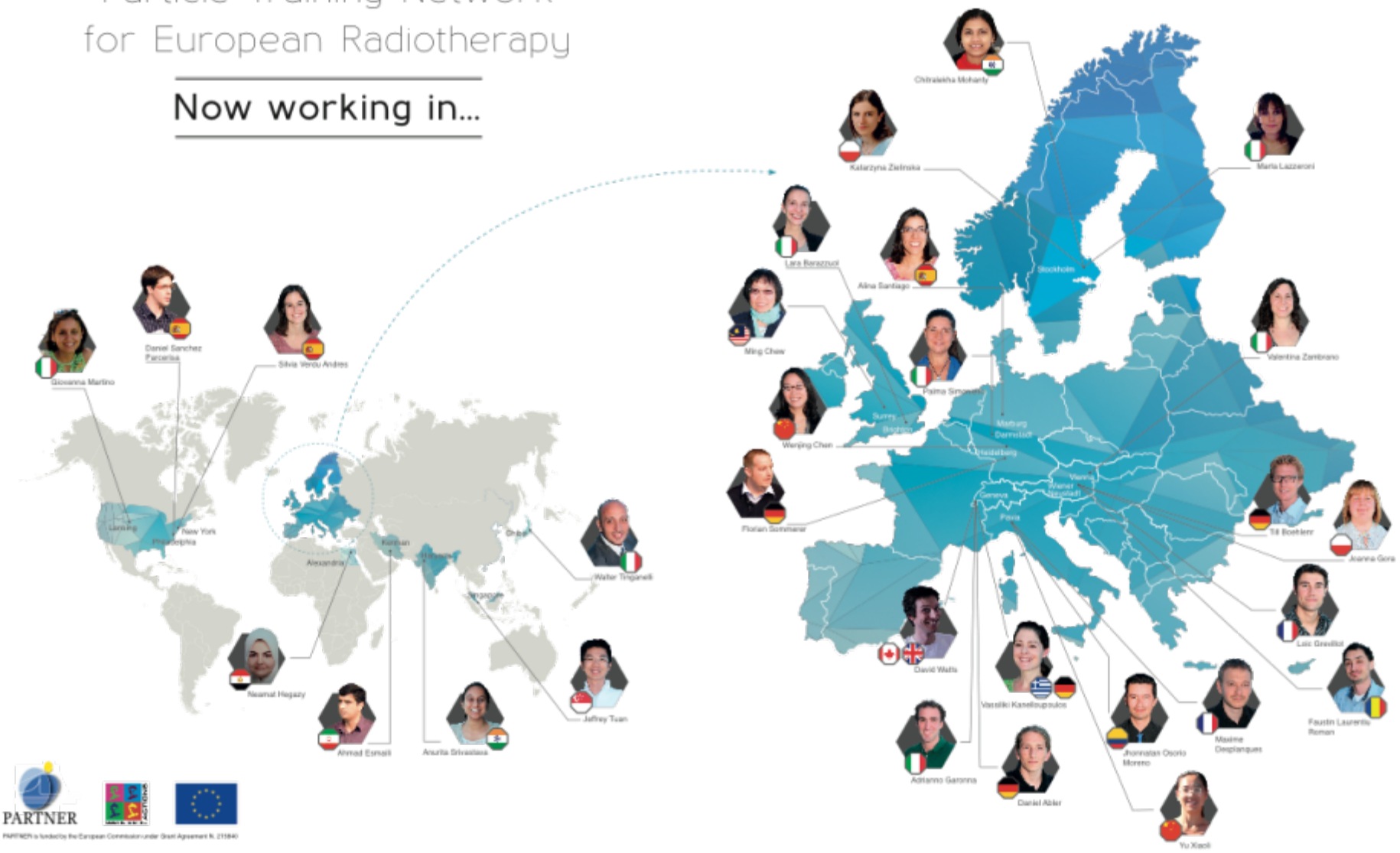


PARTNER

PARTNER is funded by the European Commission under Grant Agreement N. 215840

Particle Training Network for European Radiotherapy

Now working in...



PARTNER

PARTNER is funded by the European Commission under Grant Agreement N. 215840

ENTERVISION

- Training Network for medical imaging
- 10 academic institutes, research centres, IBA leader PT
- 12 Early Stage Researchers
- 3 Experienced Researchers

Outcome :

- 11 PhDs
- Over 30 posters, 50 oral presentations and 35 publications
- Patent for prompt gamma camera
- Frontiers in Oncology: Special Issue with 11 articles written by Entervision researchers in an open-access journal

http://journal.frontiersin.org/researchtopic/3520/charged-particles-in-oncology

15 THINGS in 15 YEARS!

700 members from all continents

25+ countries

15 annual meetings

50 traini… …es

5 EU projects

45 Marie Cur… …ers

2 dedicated issues in open-… …ournals

One global multidisciplinary network

200+ journal publications

500+ posters an… …nces

4 Physics for Health conferences

10+ vi… … animations

8 ENLIGHT Highlights

2 …opean Researchers' Nights

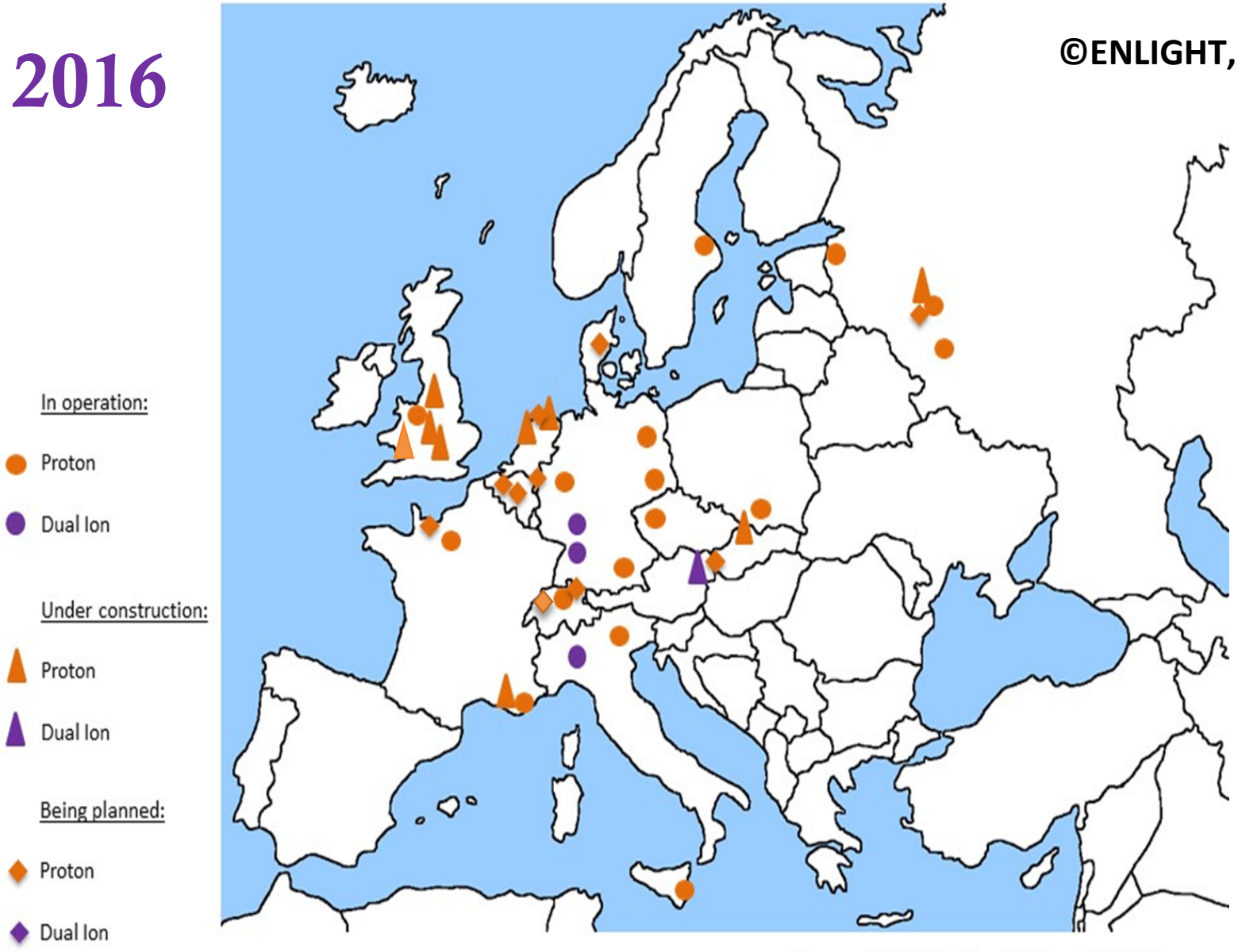
50 outreach articles/news

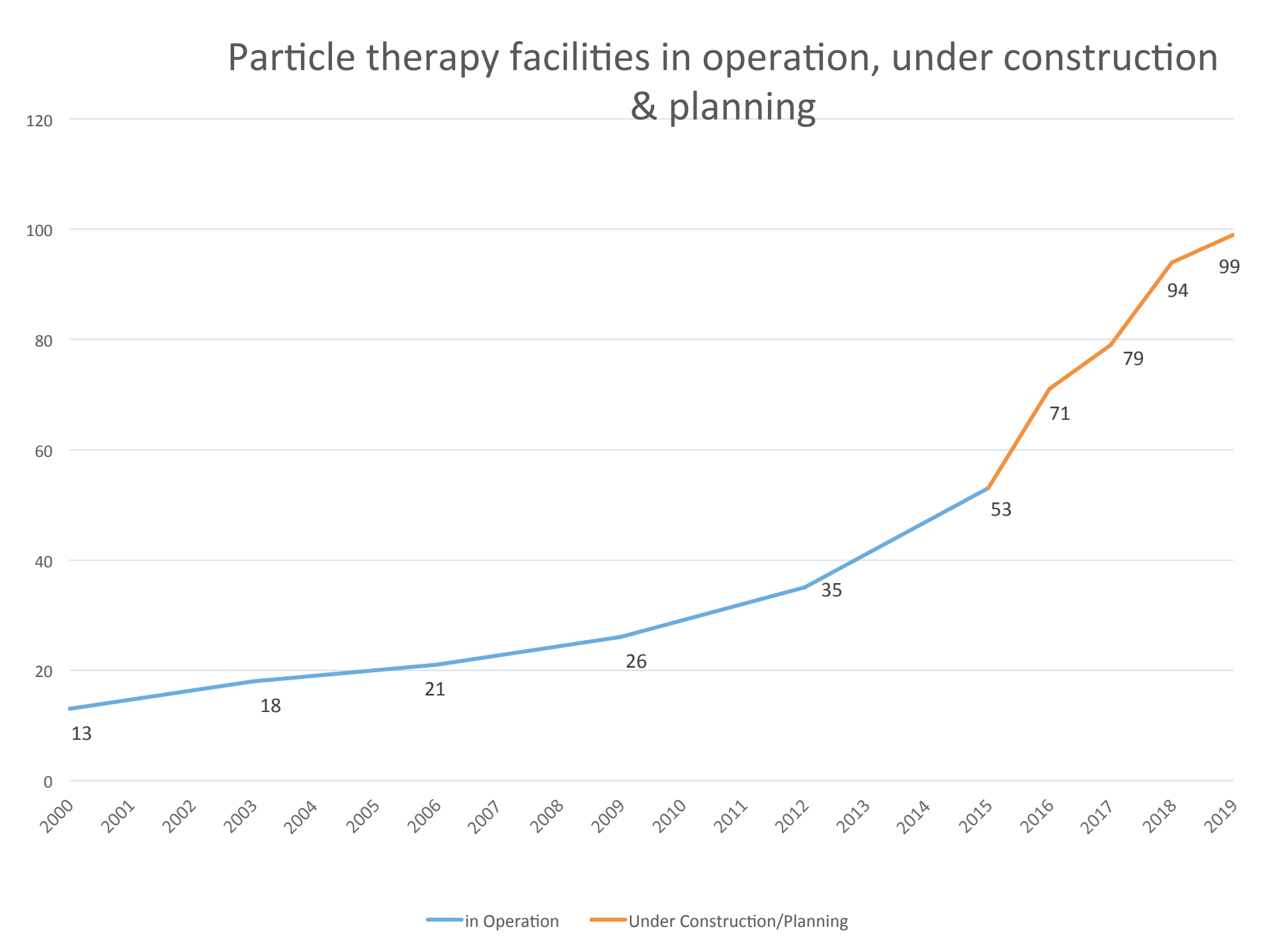
Particle therapy centres in Europe - 2002

Source: PTCOG, October 2015

Particle Therapy Centres in Europe

2016




Particle therapy facilities in operation, under construction & planning
120
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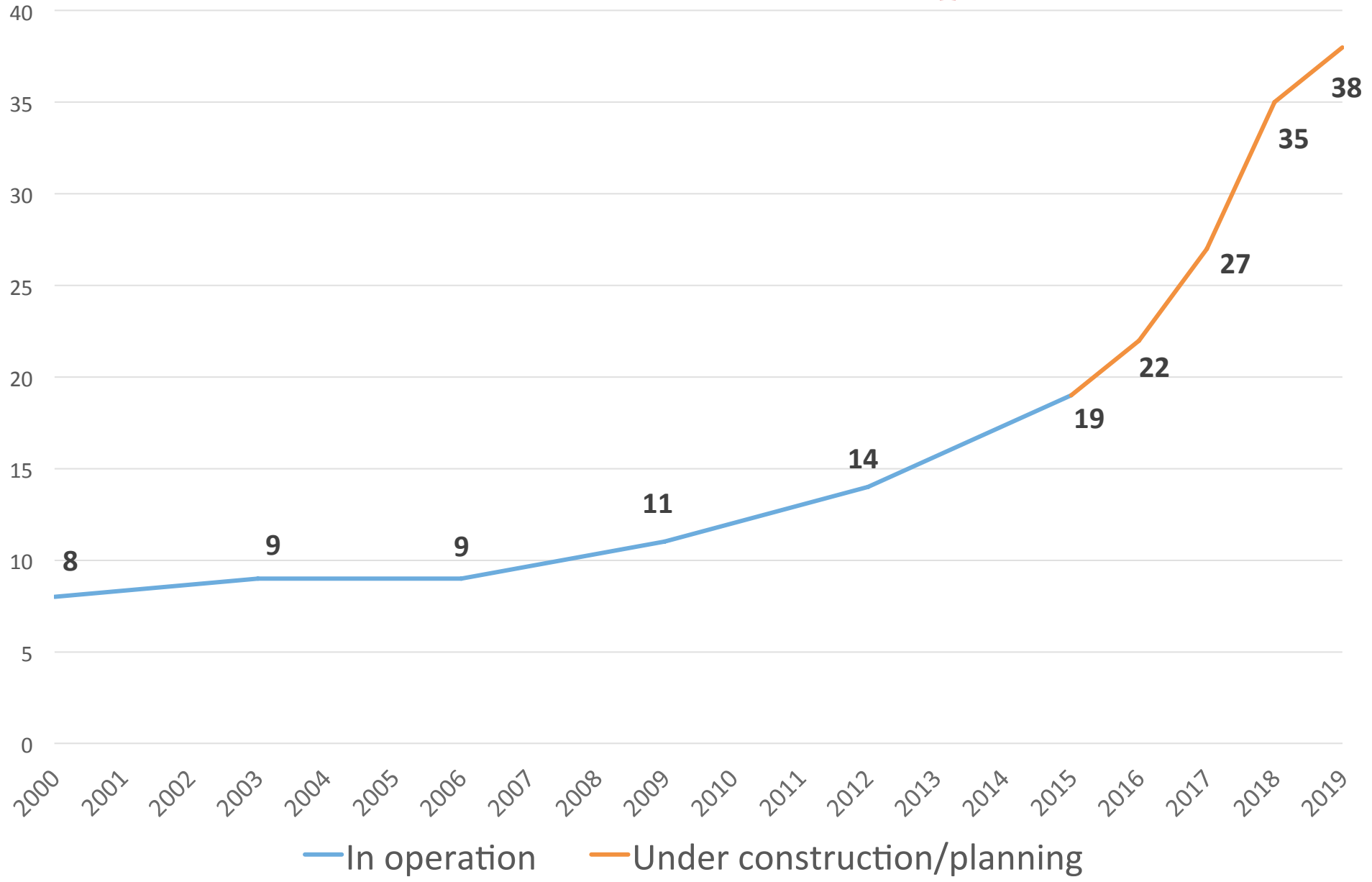
in Operation
Under Construction/Planning

Particle Therapy Facilities in Operation & Construction/ Planning Phase in Europe



ENLIGHT: meet urgent need for education & training

ENLIGHT Project submitted to **CERN & Society Foundation** for training and education in 2016 and just approved:

Project comprises of three types of training:

1. Introductory Multidisciplinary Training
2. Advanced Training including hands-on
3. Individual longer-term internship

Carbon-ion gantry at the Heidelberg Ion-Beam Therapy Centre, Germany

From physics to medicine

State-of-the-art techniques borrowed from particle accel- partme in the Knowledge Trans erators, detectors and physics computing are increasingl chnology pillars of particle phys- used in the medical field for both diagnosis and and large-scale computing. a variety of diseases.

CERN's co that, wherever possible oped in the fits to so

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BioLEIR

A WORLD-LEADING BIOMEDICAL RESEARCH FACILITY FOR IMPROVED CANCER THERAPY

Cancer is the second cause of death in Europe, where more than 3.2 million people are diagnosed with the disease every year. A study published in The Lancet Oncology in 2012 shows that, by 2030, the global incidence of cancer is expected to increase by more than 75% in developed countries and by more than 90% in developing countries.

An open-access biomedical research facility

CERN's BioLEIR will enable more rapid progress in the development of hadron therapy, one of the most promising and innovative weapons in the fight against cancer. Hadron therapy, an advanced radiotherapy technique, treats tumours with protons or other ions, which can be tuned to deliver their dose precisely within the tumour target, effectively sparing the surrounding healthy tissues.

BioLEIR will provide beams of different ions at various energies, thus allowing medical and radiobiological collaborators to fully investigate their biological impact on tumour cells and tissues, and then to optimise hadron therapy for different cancer types. BioLEIR will also allow physicists to test innovative particle detectors and to perform accurate nuclear fragmentation studies, in order to improve medical imaging techniques and treatment planning.

Why at CERN?

The need for an open-access biomedical research facility was first raised by the scientific community at the 2010 Physics for Health workshop, where CERN was asked to take the lead on the project. In 2012, a brainstorming meeting evaluated the possibility of using the existing CERN Low Energy Ion Ring (LEIR) as the basis for BioLEIR.

CERN makes the technologies developed for its research available to society, most notably the World Wide Web, invented at CERN and generously put into the public domain so that it is freely available to all.

CERN has gathered considerable expertise in hadron therapy through the coordination of several projects related in the field.

How?

BioLEIR will rely on the LEIR accelerator, which is used typically for a few months each year for pre-accelerating heavy ions for the Large Hadron Collider.

Adapting the existing infrastructure for biomedical use is outside the scope of CERN's core activities, and will take up to 3 years once funding is secured. Financial support will be needed for modifications of the LEIR machine that are specific to the biomedical requirements, and for the actual biomedical research area.

Manpower costs will be covered for the most part by CERN. CERN will also provide administrative support for visiting scientists, but needs additional funding annually to hire a medical physicist who would provide full-time support to the biomedical experiments, as well as to cover young scientists' residency and travel allowances.

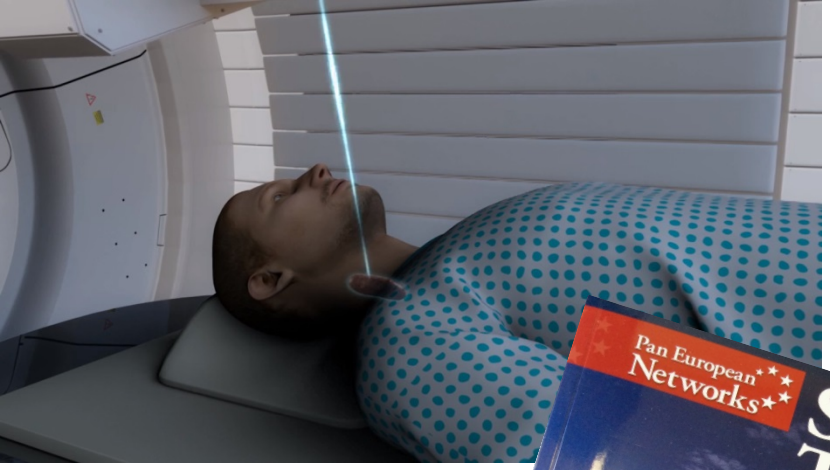
The running costs for both LEIR and BioLEIR are covered by the overall running costs of the CERN accelerator complex. The estimate of the modification costs not covered by CERN is less than 10% of the total capital invested in this

Applications

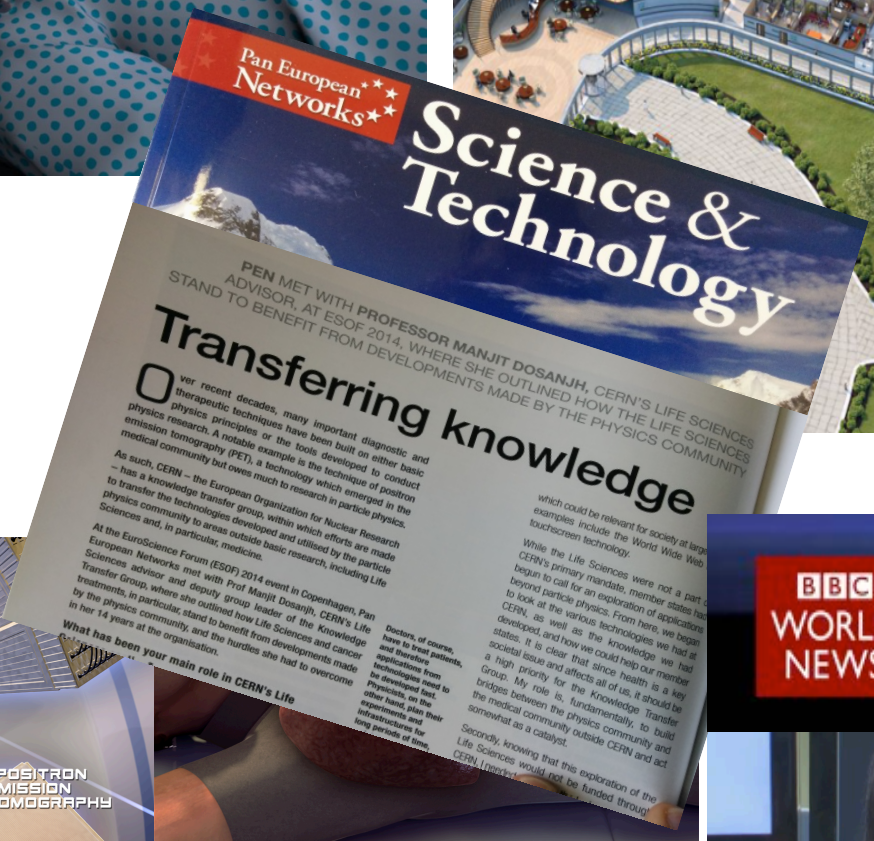
UROPEAN HADRON THERAPY COMMUNITY TOUCHES BASE

uropean hadron therapy community gathered in Stockholm from 3 to 5 ember for the annual ENLIGHT workshops. Three of the four EC-funded projects under the umbrella of ENLIGHT (see box) were discussed in the prestigious Nobel um at the Karolinska Institutet.

On its second birthday, the PARTNER Initial Training Network was especially under the spotlight, as the European Commission conducted a formal project review bringing together the institutes, companies and young researchers involved. The 21 PARTNER researchers experienced the thrill of presenting their work in this privileged setting. During the coffee breaks, they joked bout this being their only chance in life to brilliant young minds will

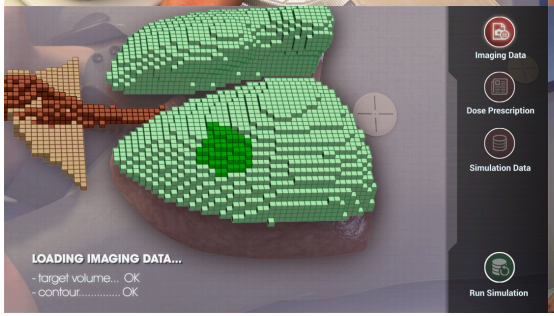



R&D
Ion Gantry
Offices
Treatment rooms
Proton Gantry
Beam Secti
Shielding
Preparation rooms
Reception
Childrens Area
Imaging
Control room
Particle accelerator
© 2015 Nymus3D - All


Pan European Networks
Science & Technology
PEN MET WITH PROFESSOR MANJIT DOSANJH, CERN'S LIFE SCIENCES ADVISOR, AT ESOF 2014, WHERE SHE OUTLINED HOW THE LIFE SCIENCES STAND TO BENEFIT FROM DEVELOPMENTS MADE BY THE PHYSICS COMMUNITY
Transferring knowledge
Over recent decades, many important diagnostic and therapeutic techniques have been built on either basic physics principles or the tools developed to conduct physics research. A notable example is the technique of positron emission tomography (PET), a technology which emerged in the medical community but owes much to research in particle physics.
As such, CERN – the European Organization for Nuclear Research – has a knowledge transfer group, within which efforts are made to transfer the technologies developed and utilised by the particle physics community to areas outside basic research, including Life Sciences and, in particular, medicine.
At the EuroScience Forum (ESOF) 2014 event in Copenhagen, Pan European Networks met with Prof Manjit Dosanjh, CERN's Life Sciences advisor and deputy group leader of the Knowledge Transfer Group, where she outlined how Life Sciences and cancer treatments, in particular, stand to benefit from developments made by the physics community, and the hurdles she had to overcome in her 14 years at the organisation.
What has been your main role in CERN's Life


POSITRON EMISSION TOMOGRAPHY


BBC WORLD NEWS
HORIZONS


Imaging Data
Dose Prescription
Simulation Data
Run Simulation
LOADING IMAGING DATA...
- target volume... OK
- contour..... OK


SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY


Scientific Linux CERN 5

ENLIGHT 2017: training at Aarhus

Participants in the training

ENLIGHT

ENLIGHT 2018 will be held in London
25-27 June

Looking forward to seeing you there
www.cern.ch/enlight