

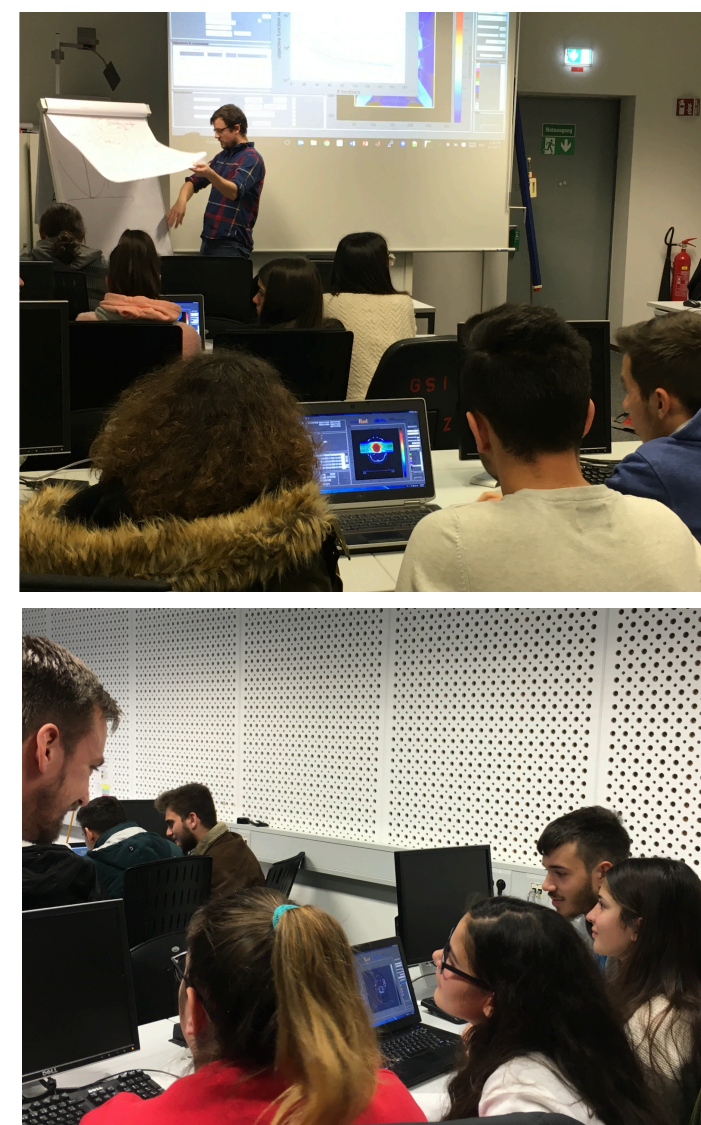
ACCELERATORS FOR HEALTH AND INTERNATIONAL MASTERCLASSES

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Particle Therapy MasterClass – an accelerator-driven application for health

ACCELERATORS AND PARTICLE THERAPY

During the past century, particle accelerators played an essential role on advancing scientific knowledge and on improving standards of living. Today, they are being increasingly used not only in research laboratories but also in hospitals and industry. As accelerator technology develops, the potential for new applications expands. Such developments are systematically supported by EU funded projects such as EuCARD2, ARIES, among others. In particular, the potential of accelerator-reliant therapy and diagnostic techniques increased considerably over past decades, playing an increasingly important role in identifying and curing otherwise difficult to treat cancers.



MASTERCLASS CONCEPT

With the aim to highlight benefits from fundamental research for medical applications and cancer treatment, a new MasterClass on Particle Therapy was developed. It was proposed to enrich the program of the International Physics MasterClasses¹ (IMC) an educational outreach activity and flagship project of the International Particle Physics Outreach Group² (IPPOG). The program engages young people with fundamental research and its applications offering them the chance to become *scientists for a day* and get a hands-on experience on real data. At the end of the day they join a common video conference to discuss their results as international scientific collaborations do.

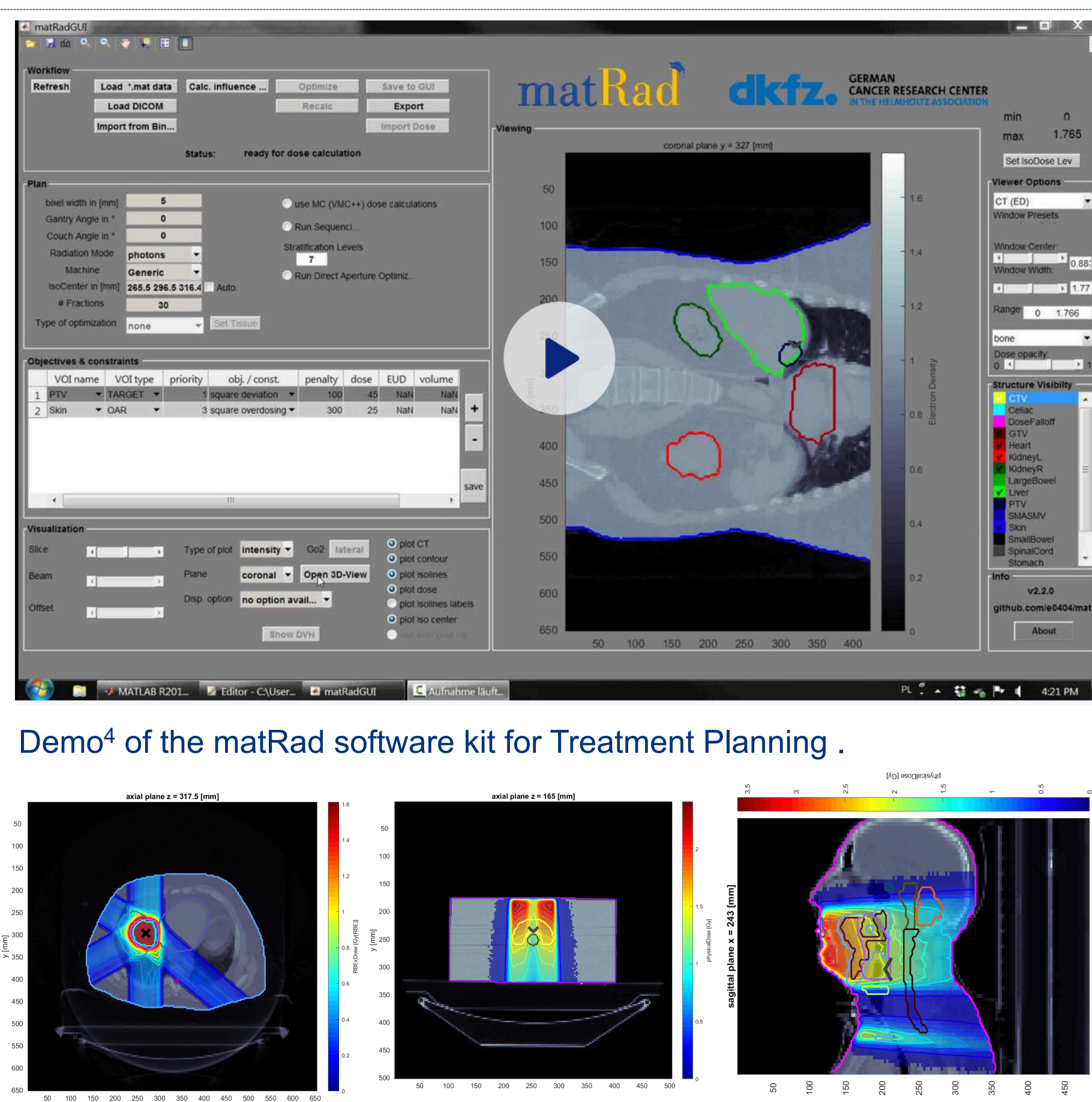


HANDS ON: TREATMENT PLANNING

The newly developed Particle Therapy MC is addressing high-school students who are invited at a university or research laboratory for a day to immerse in the world of science.

After introductory lectures on the role of physics in medical applications, a hands-on session allows them to experience actual radiation techniques employed for treatment of cancer tumors using x-rays, protons or carbon ions, in a realistic way. Participants get in touch with this heavily computer aided process via the open source treatment planning research toolkit matRad³, developed by the DKFZ Heidelberg.

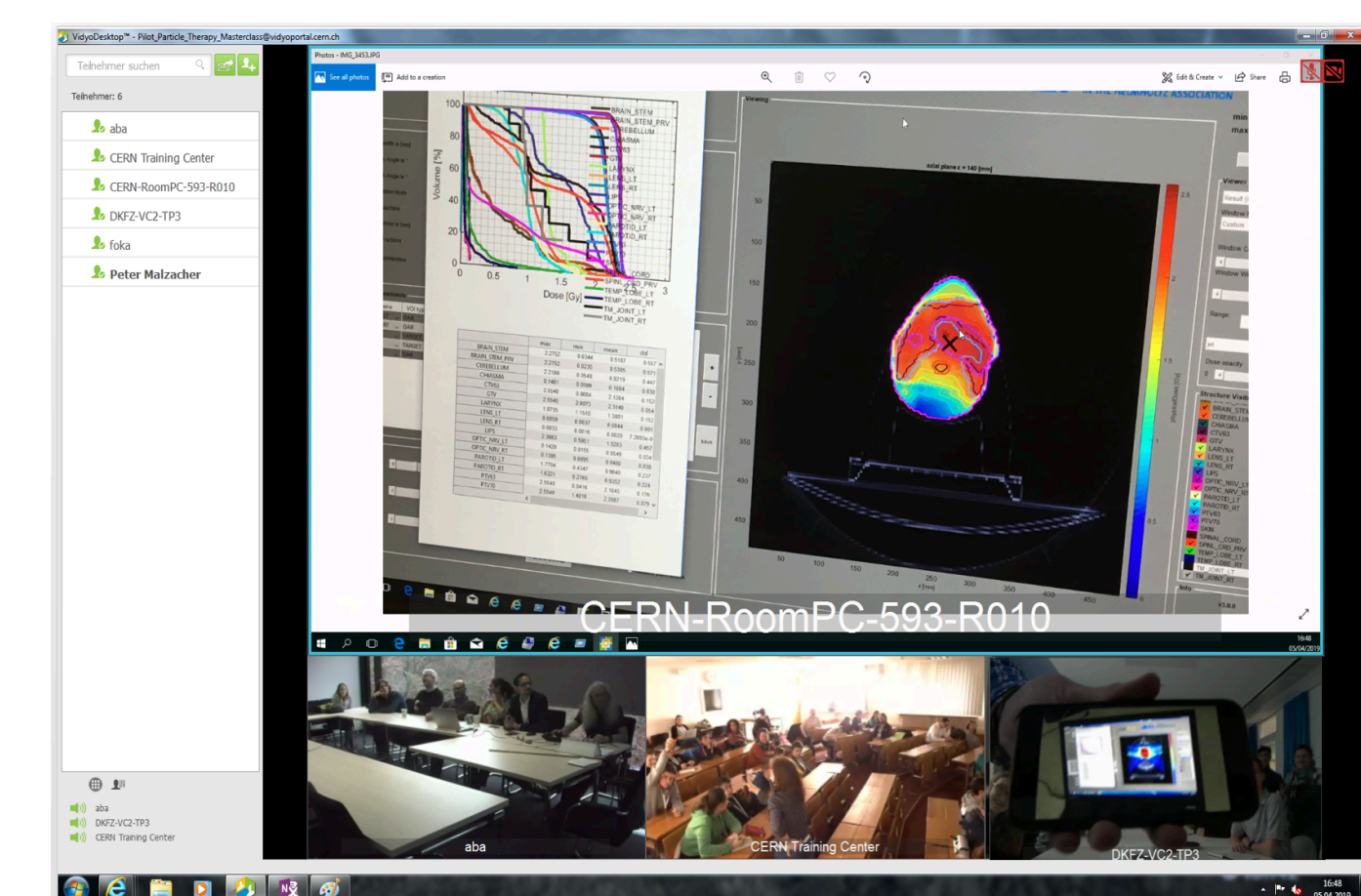
All material is free to be used for any academic purpose. Its potential can be exploited in many ways i.e. locally at schools, teachers programs, training sessions, laboratories, open days...



PILOT PARTICLE THERAPY IMC

A pilot full day IMC took place in April 2019 with the participation of GSI-FAIR, DKFZ Heidelberg, and CERN, all having the same agenda:

- Lectures: accelerators, medical applications...
- Visits: experiments, HIT therapy facility;
- Hands-on: matRad treatment planning;
- International Videoconference: results, Q&A.

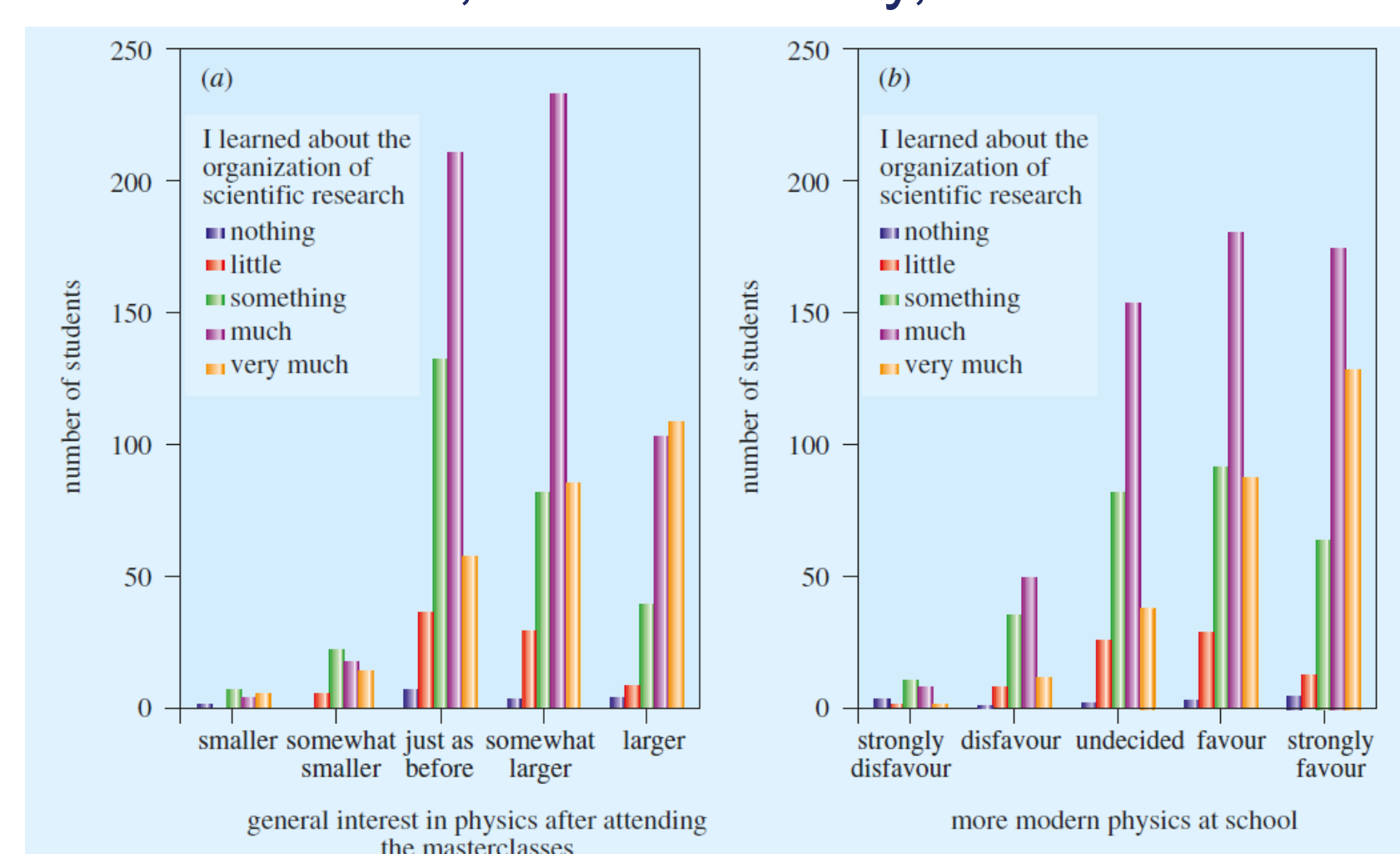


Videoconference with the 3 participating groups.

EVALUATION

The goal of the IMC program is to allow school-children to experience methods and tools used in research. Evaluations have shown that they:

- enjoy the event,
- develop an appreciation and interest for fundamental science and its applications,
- get motivated to pursue scientific studies and to contribute to further developments,
- contribute to enhancing awareness of their immediate environment, such as family, friends...



After a whole day of MasterClass activities students' motivation is raised.

OUTLOOK

The IMC project reaches out to about 15,000 school children around the world with about 225 institutes from 55 participating countries in 2019.

The Particle Therapy MasterClass was approved by the International Physics MasterClasses Steering group and will be integrated into the IMC 2020 schedule.



World map (left) and map of Europe (right) showing in green countries participating in International Masterclasses.