HEAVY ION THERAPY MASTERCLASS SCHOOL AND CAPACITY BUILDING FOR FUTURE ION RESEARCH AND THERAPY FACILITIES

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The Heavy-Ion Therapy MasterClass School took place, online, between 17th and 22nd of May 2021, for first time (HITM https://indico.cern.ch/event/1019104/), attracting over a thousand participants, from undergraduate students to practitioners. The unexpected and unprecedented high number of participants shows an increasing interest in heavy-ion therapy research and related training. It also demonstrates the enormous potential of the next generation, represented by the young students and early-stage researchers. The main emphasis was on the use of accelerators for the treatment of cancer tumours, highlighting the role of research centres, such as the GSI heavy-ion research centre, where carbon-ion therapy was pioneered in early 90s in Europe.

The main feature of the HITM School was the multidisciplinary approach which stimulated participants, despite the online format. Overview lectures provided the necessary panorama, while focus lectures presented details on medical accelerators and accelerator physics including: Ion sources, Beam optics, Beam delivery systems, Controls, as well as Linear accelerators for isotope production. The scientific programme was shaped to target topics in emerging fields, highlighting the importance of fundamental research in developing new applications in medicine, particularly cancer diagnostics and treatment. The participants feedback clearly demonstrated their appreciation, including the inventive format of the school which is also described in this presentation.

The programme enriched with hands-on sessions focusing on treatment planning, which is the prescription of the therapeutic dose, and related tools. Those were based on the matRad open-source professional toolkit, developed by the DKFZ German cancer research center in Heidelberg, specifically for training and research. Participants, guided by the tutors, used photons, protons or carbon ions to optimise their treatment plans for specific cases. During a video-conference with experts from the CNAO ion therapy centre in Italy, they had the chance to discuss their results, ask questions and enjoy a virtual visit of the accelerator complex and therapy rooms. This was complemented by a virtual visit at the GSI room where some 500 patients were treated with 95% success before the carbon therapy was introduced in the clinics of Heidelberg and Marburg in Germany.

These virtual visits, “from physics to clinics”, clearly highlighted the relevance of fundamental research and its applications for cancer treatment. Participants realised that challenges set by the research projects’ ambitions push high-tech technology which ultimately translates to benefits for society.

The HITM School programme was complemented by social events in the evenings that made a strong impression employing an interactive platform, with different themes every day, spanning from pyjama party and games to a career fair. They provided the feel of real-life interactions while at the same time brought to participants valuable information where institutes such as CERN, CNAO, DKFZ, Cosylab, GSI/FAIR, MedAUSTRON and ENLIGHT presented career opportunities in emerging fields where there is often a lack of specialised personnel. Overall, despite the online format, various interactive methodologies stimulated the typical exchanges in both the lectures and the social events.

The HITM School was organised in the framework of the HITRIplus EU funded project, that received funds from the European Commission's Horizon 2020 Research and Innovation programme under Grant Agreement No 101008548, and is a collaboration between research infrastructures, universities, industry, the four existing European heavy-ion therapy centres, and SEEIIST, the South East European Institute for Sustainable Technologies.

Motivated by the positive response the organisers plan the next one, the HITM School 2022 in the summer 2022, in Thessaloniki, Greece, in person, but also foreseen online participation, through live streaming. Such HITM Schools are expected to support capacity building in preparation for the future ion research and therapy facility planned by SEEIIST, where Greece also actively participates as a full member.