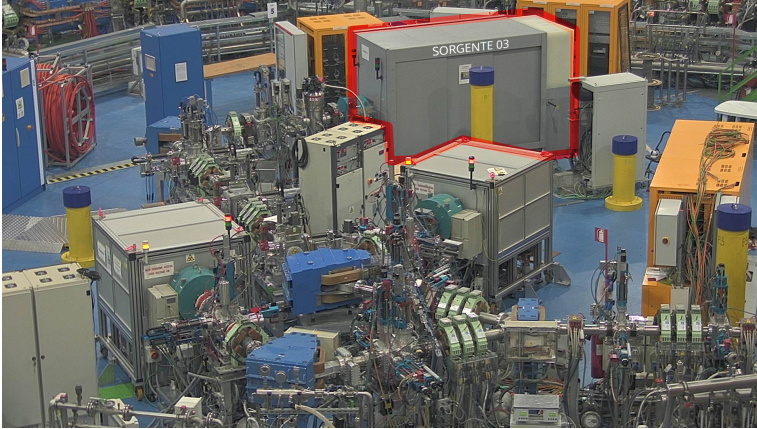


Newsletter Focus

INSPIRIT, UPGRADING PROJECT OF CNAO'S SYNCHROTRON FOR INCREASINGLY PRECISE HADRONTHERAPY TREATMENTS



Developing advanced cancer treatments with precision hadrontherapy that are faster and more effective than current ones, to fight tumours that are inoperable or resistant to traditional radiotherapy treatments. This is the goal of the INSPIRIT project, conducted by CNAO The National Centre for Oncological Hadrontherapy in Pavia, HiFuture, a Teoresi Group laboratory of excellence specialising in embedded systems design, and INFN. The project, worth a total of 10 million euros,

3.8 of which funded by the Lombardy Region, consists of the upgrading of the high-tech system at CNAO, one of the six centres of excellence worldwide, and the only one in Italy, capable of delivering hadrontherapy treatments with both protons and carbon ions. The upgrade was possible partially thanks to the implementation of a new source. The accelerator at the heart of CNAO is the only synchrotron in Italy that is used for hadrontherapy treatments, an advanced form of radiotherapy that uses hadronic particles to irradiate cancer cells, rather than X-rays, used in conventional radiotherapy.

The new source, implemented with key contributions of INFN Southern National Laboratories and the INFN Pavia Division, is capable of producing various ionic species, and the particle beams produced will be directed to both the three treatment rooms and the experimental room. Specifically, the new source will be used to produce helium, oxygen and lithium, which have different radiobiological characteristics compared to protons and carbon ions and, therefore, are of considerable interest for radiotherapy treatments as well as for radiobiological studies. Moreover, the source will also be used for the production of iron ions, a species of considerable interest from the aerospace point of view: indeed, the iron beam will be used as part of experiments to irradiate materials to be used in the construction of devices used in space missions. Within the scope of the project, HiFuture, on the other hand, worked on the control system for the new source, new controllers for the linear accelerator magnets, and validation processes for the dose delivery system software to make it compatible with the delivery of treatments with new ionic species. The upgrading of CNAO's technology system also involved many components of the accelerator, providing the Pavia medical centre's synchrotron with even better performance. Thanks to the upgrading of the hadrontherapy system and the introduction of the third source, in the future it will be possible to take an increasingly personalised approach to the individual patient, depending on the oncological pathology, even for particularly difficult tumours.