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Beam and treatment monitoring in FLASH and CONV regimes for PT applications

With this contribution we want to report about the interest we have in the Trento facility related to research activities we are carrying on in the context of several INFN, CREF and Sapienza projects.

The first activity that would profit from the collaboration with the Trento facility and the availability of a research proton beam delivered both at FLASH and Conventional rates is related to the development of a beam monitoring system exploiting the fluorescence of air induced by the beam at FLASH intensities. While the detection operating principle has been already validated using electron beams, the applications to PT irradiations is still stopped by the unavailability of proton beams at FLASH intensities. Whenever possible we would like to come to Trento to test the detector response using protons delivered in both regimes to ensure that the technique has a good potential also for the case of proton therapy treatment monitoring.

In the same context, we would like to exploit the Trento facility for our studies related to the monitoring of PT treatments using the prompt photon detection, the secondary charged and neutral particles produced (especially in the case of ^{12}C ions treatments) using a novel detection multimodal technique (the MULTIPASS approach for the PT monitoring) based on scintillating fibres properly arranged and readout in a compact way. For the study of the detector performance, the use of proton beams is of paramount importance to characterise the detector response to protons and study the prompt photons in proton therapy.

Finally the Trento facility would be the ideal place where to test the novel scintillating materials that are under development in the SBAI Department of Sapienza University of Rome: such materials have shown promising performance in terms of light yield and time resolution that exceed the current best products that are available on the market. While the evaluations have been done, so far, using mainly cosmic radiation, we are interested in benchmarking the novel materials against proton beams of therapeutic energy.

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