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# Physics and Radiobiology Experimental Beam Tests at the Trento Proton Therapy Center

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The Trento Proton Therapy Center is a cyclotron based proton therapy center located in Trento (Italy) where proton beams with energies from 70 MeV up to 228 MeV are used for cancer treatment. The Center started clinical operations in 2015 and since then more than 1300 patients were treated.

The facility features not only two patient rooms, both equipped with 360 degree rotating gantries, but also a unique experimental room equipped with two beam lines used exclusively for non-clinical research.

The two non-clinical beamlines are used for a variety of physics, radiobiological or biological experiments and they can provide proton beams with energies between 70-228 MeV where particle rate can be tuned from 200 Hz up to  $10^{10}$  Hz.

This flexibility allows a variety of measurements and tests such as characterization of solid state silicon based (pixel, drift and microstrip) tracking systems, new crystal scintillator calorimetric tests for high energy physics and space applications, development of innovative microdosimetry instruments and also high rate proton irradiation studies.

One of the two beamlines is also equipped with a unique passive beam modulator system, called double ring, used for large area proton irradiation effect studies on biological cells, silicon sensors and electronic devices.

This contribution will describe the Trento Proton Therapy Center, the Experimental Room of the Center and the instruments used for beam quality monitoring during the experiments. An overview of the experiments performed in the experimental room will be also given.

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