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Development of a Proton Computed Tomography system based on silicon microstrip detectors and YAG:Ce scintillating crystals

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Proton Computed Tomography (pCT) is a medical imaging technique based on the use of proton beams with energies above 200MeV to directly measure stopping power distributions inside the tissue volume. Prima (PROton IMAGing) is an Italian collaboration working on the development of a pCT scanner based on a tracker and a calorimeter to measure single proton trajectory and residual energy. The tracker is composed by four planes of silicon microstrip detectors to measure entry and exit positions and angles.

Residual energy is measured by a calorimeter composed by YAG:Ce scintillating crystals. A first prototype of pCT scanner, with an active area of about 5x5 cm², has been constructed and characterized with 60 MeV protons at the INFN Laboratori Nazionali del Sud Catania (Italy) and with 180 MeV protons at Svedberg Laboratory Uppsala (Sweden). A new pre-clinical prototype with an extended active area up to 5x20 cm², real time data acquisition and a data rate up to 1 MHz is under development. A description of the two prototypes will be presented together with first results concerning tomographic image reconstruction.

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