Contribution ID: **6** Type: **not specified**

The Proton Radiography experiment

Abstract

In recent years we have been witnessing a growing scientific interest in proton Radiography (p-Rad). The p-Rad systems, currently used in-vivo for proton range verification, operate by integrating the particle signal thus having limited spatial resolution together with a high dose.
The main goal of this experiment is to develop, starting from the 'proton Computed Tomography' (pCT) system already build by INFN-Florence, a 'single-event'p-Rad apparatus capable of acquiring radiographies in less than 1s with a dose up to a thousand times lower (down to about 20 microGy) and a significantly better spatial resolution compared to the 'integrating'systems. To reach this target the calorimeter of the present pCT system will be upgraded replacing the YAG:Ce detectors with faster plastic scintillators.
Together with the proton Radiography apparatus, this collaboration aims to increase the accuracy of the proton therapy treatments working on two other lines which make extensive use of the present pCT apparatus. The first one is dedicated to the acquisition of tomographies of medical prostheses to measure their 3-dimensional distributions of the proton Stopping Power (relative to water) (SPR). This information will help to overcome some of the issues in the treatment plan definition when non-biological materials are present in the irradiation area (xCT measurement saturation in case of metals and unknown SPR).
Moreover, using the pCT apparatus to produce 3D SPR images of a biological phantom, the x-ray CT (xCT) calibration in proton treatment planning could be verified using the pCT map as reference. This study aims to conduct a multi-centre survey with the participation of four European proton therapy/research centres.

Primary authors: Dr CIALDAI, Carlo (INFN-Firenze); Dr CIVININI, Carlo (INFN-Firenze); Dr FOGAZZI, Elena (Università di Trento and TIFPA); Dr D'AMATO, Elvira (Physics department, University of Trento,); Dr VERROI, Enrico (INFN-TIFPA); Dr FRACCHIOLLA, Francesco (Medical Physics Unit, Hospital of Trento, Azienda Provinciale per i Servizi Sanitari (APSS) and TIFPA); Dr TOMMASINO, Francesco (Physics department, University of Trento and TIFPA); Prof. BRUZZI, Mara (Physics and Astronomy department, Università di Firenze and INFN-Firenze); Prof. SCARPA, Marina (Physics department, University of Trento and TIFPA); Dr SCARINGELLA, Monica (INFN-Firenze); Dr RIGHETTO, Roberto (Medical Physics Unit, Hospital of Trento, Azienda Provinciale per i Servizi Sanitari (APSS), and TIFPA); Dr LORENTINI, Stefano (Medical Physics Unit, Hospital of Trento, Azienda Provinciale per i Servizi Sanitari (APSS) and TIFPA)

Presenter: Dr CIVININI, Carlo (INFN-Firenze)