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Silicon Sensors Suite (3S) for characterization of hadron therapeutic beams - L. Tran, I. Fuduli, C. Porum, M. Petasecca, S. Guatelli, M. Lerch, M. Reinhard, D. Prokopovich, A. Rozenfeld (CMRP UOW, Wollongong, Australia)

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Centre for Medical Radiation Physics is developing quality assurance (QA) instrumentation for radiation therapy. Two types of experiments are proposed on C-12 and proton therapeutic beams.

1. High Spatial Resolution SOI Microdosimetry on proton and C-12 beams.

Microdosimetry based RBE study on C-12 and proton therapeutic beams along the Bragg Peak (BP) and SOBP (Spread-Out -BP) using SOI microdosimeters will be carried out. Aim of this experiment is to investigate the relative uniformity of RBE in passively delivered SOBP that never was done earlier experimentally.

RBE will be investigated downstream of the SOBP due to C-12 ions fragmentation with sub-millimetre spatial resolution to predict the effect of high and low LET ions on critical organs close to the targeted tumour.

In addition, the neutron and scattered charged particle total dose equivalent will be investigated out of field in a penumbra region and within 50 cm laterally in a PMMA phantom, to compare C-12 with proton beams for the same RBE weighted dose in SOBP.

The results will be compared with GEANT 4 simulations.

1. High Spatial Resolution Absorbed Dose Dosimetry with “Magic Plates”. Experiments will be carried out in a solid water and water phantom using transparent 1D and 2D Magic Plate (MP) dosimetry instruments intensively tested by CMRP in IMRT and SRS X-ray therapy and recently on proton SRS beam. Different modifications of MPs have spatial resolution of dose mapping in a range 0.1-10 mm. MP with areas 11x11 cm² and 5x5 cm² will be used for real time penumbra characterization on C-12 and proton collimated therapeutic beams of different sizes using scanning water phantom.

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