

MONDO: a neutron tracker for particle therapy secondary emission fluxes measurements

During Particle Therapy treatments the patient irradiation produce, among different types of secondary radiation, an abundant flux of neutrons that can release a significant dose far away from the tumor region. A precise measurement of their flux, energy and angle distributions is eagerly needed in order to improve the Treatment Planning Systems software and to properly take into account the risk of late complications in the whole body. The technical challenges posed by a neutron detector aiming for high detection efficiency and good backtracking precision will be addressed within the MONDO project, whose main goal is to develop a tracking detector targeting fast and ultrafast secondary neutrons. The neutron tracking principle is based on the reconstruction of two consequent elastic scattering interactions of a neutron with a target material. Reconstructing the recoiling protons it is hence possible to measure the energy and incoming direction of the neutron. Plastic scintillators will be used as scattering and detection media: the tracker is being developed as a matrix of squared scintillating fibers of 0.250 mm side. The light produced and collected in the fibers will be amplified using a triple GEM based image intensifier and acquired using CMOS Single Photon Avalanche Diode arrays. The principal detector goal will be the measurement of the neutron production yields, as a function of production angle and energy, using therapeutical beams.

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Track Classification: Scintillating Detectors