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Scintillating array for real –time high –resolution ion therapy dosimetry –Initial Design and Simulations

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Radiobiology is a multidisciplinary area where the effects of radiation in cells, tissues and organs are studied. To understand the biological effects of radiation it is important to be able to have a read of the energy deposition at a micro and nano scales.

Having this in mind, this project is being developed with the aim of building a detector that offers radiobiology researchers the chance to perform their studies with good spatial resolution and real-time dose measurement. The technique chosen to build this detector is scintillation dosimetry with plastic optical fibers. The optical fibers were chosen because they offer a very good spatial resolution and tissue-equivalence, being able to offer a spatial resolution of 0.25 mm.

In this talk will be presented the initial design of the detector, ready for production: This detector will be developed as an irradiation box with a sensitive area composed of plastic optical fibers with the possibility of mapping dose in one plane or in two orthogonal planes originating a spatial resolution of 1x1 mm, 0.5x0.5 mm and 0.25x0.25 mm depending on the optical fibers used. The detector will be prepared for the possibility of receiving a cell culture plate and moving it in front of the detector's sensitive area. It will be also presented simulations (detector performance and shielding) where it is shown the signal expected when the detector is irradiated with a proton beam and a study of the shielding necessary in the experimental setup.

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