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Reducing the risk of proton therapy with prompt-gamma

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Radiotherapy, one of the techniques used to treat cancer, can be divided into conventional (gamma and electrons) and heavy charged particles radiotherapy. The latter, realized mainly with proton or carbon nuclei, has been highly anticipated due to its dose deposition profile, which presents a high deposition region at its end - the Bragg Peak. Dose deposition profile affects the risk to the surrounding healthy tissues and the existence of a Bragg Peak allows to increase the dose in the target region, whilst minimizing the dose to surrounding healthy tissues, reducing the risk of the technique. The control and monitoring of the Bragg Peak location can further increase the precision of the treatment. One way to perform this monitoring is to measure the prompt-gamma detected perpendicular to the incident proton beam. For that purpose a detector with a GSO scintillator crystal, connected to a SiPM is being studied. A set of blades in front of the sensor will act as a collimator to ensure that only perpendicular photons are detected. Currently SiPM coupled to GSO crystals time and amplitude structure is being studied to design a DAQ for the full prototype with O(100) sensors. This poster will focus on the prototype system and its concept.

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