

# MICRO-SCINTILLATION PARTICLE DETECTOR FOR HADRON THERAPY

*The technology is a novel type of particle detector based on scintillation, with precise spatial resolution and radiation hardness.*

*The particle detector device consists of a single microfluidic channel filled with a liquid scintillator, which is designed to define an array of optically separated scintillating waveguides, each independently coupled to a photo-detector.*

*The device is housed within the patient treatment apparatus, positioned to intercept the beam line. During online treatment, the particle beam passes through the device and particles interact with the scintillant in the micro-channels to produce a luminous event/flash of light, which is captured by photo-detectors and recorded.*

## AREA OF EXPERTISE

- Detectors for medical applications

## APPLICATIONS

The microscint detector technology was initially developed for high-energy physics applications, but has great potential for online beam monitoring in hadron therapy, as a cancer treatment. The device will provide the required resolution, whilst being significantly thinner with respect to those currently in use in state-of-the-art technologies. This allows for the previously unavailable online beam monitoring.

## IP STATUS

Patent application filed.  
PCT/EP2012/001980.

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## ADVANTAGES

- Online beam monitoring whilst treating the patient allows for previously unavailable characterisation of beam profile and measurement of the intensity and dose of radiation administered.
- Potential to maximise treatment efficacy.
- Suitable for hadron and heavy ion beam monitoring.
- Fully radiation hard.
- Overall, it will provide unprecedented characterisation of the irradiation received by patients.

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## RELATED PUBLICATIONS

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- Mapelli et al., Development and Studies of Novel Microfabricated Radiation Hard Scintillation Detectors With High Spatial Resolution, IEEE TNS 58 (2011) 1177-1180
- Mapelli et al., Scintillation Particle Detection Based on Microfluidics, Sens Act. A 162 (2010) 272-275
- Mapelli et al., Novel Radiation Hard Microfabricated Scintillation Detectors with High Spatial Resolution, Nucl. Instr. And Meth. A 617 (2010) 400-401
- Patent application was filed by CERN on 8th May 2012 entitled; Microfabricated Scintillation Detector. Priority number PCT/EP2012/001980.

