Beam monitoring detectors for High **Intensity Muon Beams**

Currently PSI delivers the most intense continuous muon beam in the world with up to few 10⁸ μ +/s, and aims at reaching 10¹⁰ μ +/s within the High Intensity Muon Beam (HIMB^[1]) project. Usual beam monitoring tools are not suited for μ^+ beams as it is necessary to distinguish μ^+ from the particles contaminating the beam, such as e^+ and π^+ .

The performances of these detector as measured along the beamline, their detailed MC simulations and the beam characteristics are presented.

The SciFi detector

It is a grid of scintillating fibers coupled to plastic scintillators divided in two layers each measuring one transverse direction.

- It can operate in **vacuum** under **high magnetic** field conditions.
- It is **non-invasive**: 80 % of the beam is not affected by the detector. Can be run together with data taking to monitor beam properties.

Can perform particle ID through energy deposition and time of flight with respect to the proton beam RF.

Coincidences between fibers can be exploited to measure a 2D beam profile.



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The MatriX detector

The matriX detector is a matrix of plastic scintillators coupled to SiPMs. It can operate in vacuum under high magnetic field conditions Can perform particle ID through energy deposition.

It measures by construction a full 2D beam profile.



A plexiglass lightguide is placed in between the scintillator and the SiPM to increase separation between e⁺ and μ^+ .









