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A novel optical fibre analysis system for particle accelerators

Development of an optical fibre-based beam loss monitor (oBLM) is in progress at the Cockcroft Institute (CI), UK. It utilises the Cherenkov radiation (CR) emitted in optical fibres by relativistic particle showers generated in beam loss or RF breakdown events. Emitted CR is channelled along the fibres to photomultiplier detectors, and a time-of-flight method is used to calculate the beam loss/RF breakdown location from the CR arrival time. The oBLM system has previously been shown to reliably detect both types of events, and work has currently focused on a detector upgrade to improve the signal-to-noise ratio and position resolution. The main application of this detector to EuPRAXIA would likely be within the BLM systems, which could allow for measurements of the beam loss background near sensitive beam diagnostic elements such as spectrometers. This contribution presents a summary of the recent developments on the oBLM project and invites further discussion on its potential use cases in EuPRAXIA.

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