

TORCH time-of-flight detector

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The TORCH detector is a proposed large-area time-of-flight detector, which aims to enhance the particle identification performance of the LHCb experiment in the 2-15 GeV/c momentum range. The detector concept comprises 18 quartz radiator modules, which combined span the 6m-by-5m detector acceptance. The modules must be supported by a light-weight structure. Charged particles passing through the modules produce Cherenkov photons that are propagated to the periphery of the detector by total internal reflection, where they are detected by fast-timing photon-detectors. A highly polished quartz radiator is needed to preserve the photon Cherenkov angle. In order to reach the desired performance, individual photons need to be timed to around 70 picoseconds. The leading candidates for the photon detectors are MCP-PMTs and SiPMs. Both technologies require further R&D to meet the needs of the project. While targeted at LHCb, the TORCH concept could also be exploited in other planned experiments.

Requested length

20 minutes

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