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TORCH detector concept and design

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The TORCH time-of-flight detector is part of a proposed upgrade of the LHCb experiment, foreseen for the high-luminosity phase of the LHC. The TORCH detector aims to provide particle identification of hadrons in the sub-10 GeV/c momentum range, exploiting the prompt production of Cherenkov photons in an array of fused-silica plates. Photons are propagated to the periphery of the detector via total internal reflection, where they are focused by a cylindrical mirror onto an array of fast-timing photon detectors. In order to achieve the design goals of TORCH, individual photons must be timed to better than 100 ps precision. Progress on R&D activities, the detector design, and performance studies since the last RICH conference will be discussed. This includes updates to the design that have evolved from a scoping process for the whole LHCb experiment.

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