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Real-time reconstruction of long-lived particles at LHCb using FPGAs.

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Finding tracks downstream of the magnet at the earliest LHCb trigger level is not part of the baseline plan of the Upgrade trigger, on account of the significant CPU time required to execute the search. Many long-lived particles, such as Ks and strange baryons, decay after the vertex track detector (VELO), so that their reconstruction efficiency is limited. We present a study of the performances of a future innovative real-time tracking system based on FPGAs, R&D developed in the context of the LHCb Upgrade Ib (LHC Run 4), dedicated to reconstructing particle downstream of the magnet in the forward tracking detector (Scintillating Fibre Tracker), that is capable of processing events at the full LHC collision rate (30 MHz).

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