

# Triggering on charged particles in collider experiments

*Wednesday, May 26, 2021 8:24 AM (18 minutes)*

We propose an algorithm, deployable on a highly-parallelized graph computing architecture, to perform rapid triggering on high-momentum charged particles at the Large Hadron Collider and future colliders. We use software emulation to show that the algorithm can achieve an efficiency in excess of 99.95% for reconstruction with good accuracy. The algorithm can be implemented on silicon-based integrated circuits using FPGA technology. Our approach can enable a fast trigger for massive charged particles that decay invisibly in the tracking volume, as in some new-physics scenarios. If production of dark matter or other new neutral particles is mediated by metastable charged particles and is not associated with other triggerable energy deposition in the detectors, our method is useful for triggering on the charged mediators using the small-radius silicon detectors. The estimated spurious trigger rate is below 40 kHz for the HL-LHC with 200 collisions per 25 ns beam crossing.

## **TIPP2020 abstract resubmission?**

Yes, this would have been presented at TIPP2020.

## **Funding information**

**Primary author:** KOTWAL, Ashutosh (Duke University (US))

**Presenter:** KOTWAL, Ashutosh (Duke University (US))

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