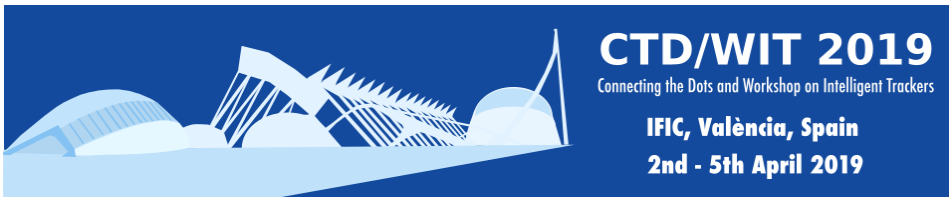

Contribution ID: **6** Type: **Talk**

GPGPU-implemented Tracking in a COMET Phase-I Drift Chamber

Tuesday, April 2, 2019 11:30 AM (25 minutes)

Track finding with GPGPU-implemented fourth order Runge-Kutta (RK) method is investigated to track electrons from muon decay in the COMET Phase-I drift chamber. The COMET Phase-I experiment is aiming for discovering the neutrinoless, coherent transition of a muon to an electron in the field of an aluminium nucleus, $\mu^- N \rightarrow e^- N$, with a single event sensitivity of 3×10^{-15} . In the COMET drift chamber, about 30-40 \% of signal events are composed of multiple turns where the correct hit assignments to each turn partition are significant in the track finding. Scanning all possible track seeds can resolve the hit-to-track assignment problem with a high robustness about the noise hits, but requires a huge computational cost; initial track seeds $(\theta, z, p_x, p_y, p_z)$ have broad uncertainties, so many initial seeds should be tried and compared. In this presentation, this problem of massive computations are mitigated with 1) the parallel computing of RK track propagation, which assigns each track to each GPU block unit, 2) a better initial guess on the track seeds using the Hough transform and the geometrical property of the cylindrical drift chamber. The computation speed enhancement compared to CPU-only calculation will also be provided.

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Track Classification: 6: Architectures and techniques for fast track reconstruction