

Track finding with GPU-implemented Runge-Kutta 4th order tracks in the drift chamber

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The track finding with GPU-implemented Runge-Kutta (RK) fourth order tracks is investigated to track the electrons from the muon conversion in the COMET drift chamber. In the COMET drift chamber, about 40 % of signal events are composed of multiple turns where the right hits assignment to each turn track is significant in the track finding. Scanning all possible initial track parameters can resolve the hit-to-track assignment problem with a high robustness about the noise hits, but requires a huge computational cost because of two reasons: 1) The adaptive RK method to propagate the electron track needs small global errors, corresponding to small step sizes. 2) Initial longitudinal track parameters (z , p_z) have broad uncertainties, so many initial seeds of longitudinal track parameters should be tried and compared. In this presentation, these problems of massive computations are mitigated with 1) the parallel computing of RK track propagation, which assigns each track to each GPU unit cell, called thread, 2) a better initial guess on the longitudinal track parameters using the neural network to reduce the uncertainties of parameters. Future aspects on the applicability to other experiments will also be discussed.

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