

STAR Vertex reconstruction algorithms in the presence of abundant pileup.

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One of the world's largest time projection chambers (TPC) has been used at STAR for reconstruction of collisions at luminosities yielding thousands of piled-up background tracks resulting from few hundreds pp minBias background events or several heavy ion background events, respectively.

The combination of TPC tracks and trigger detector data used for tagging of tracks are sufficient to disentangle the primary vertex and primary tracks from the pileup. In this paper we will focus on techniques for vertex reconstruction. A luminosity driven evolution of vertex finder algorithms at STAR will be sketched. We will make distinction between multiple primary vertices from the trigger bunch crossing (bXing) and reconstructing vertices associated with minimum bias collisions from early/late bXings.

The vertex finder algorithm based on likelihood measures will be presented. We will compare it with a chi square-minima method (Minuit). Fine-tuning criteria for weighting the matching of TPC to fast detector data, taking into account efficiency, purity, trigger dependence, stability of calibrations, and benefits of external beam line constraints, will be discussed.

The performance of the algorithm for real and simulated STAR pp data (including pileup) will be assessed. Extension of the algorithm for reconstruction vertex in CuCu and heavier ions collisions will be discussed.

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