



Contribution ID: 163

Type: **poster presentation**

ATLAS strategy for primary vertex reconstruction during run-II of the LHC

Based on experience gained from run-I of the LHC, the ATLAS vertex reconstruction group has developed a refined primary vertex reconstruction strategy for run-II. With instantaneous luminosity exceeding 10^{34} cm⁻² s⁻¹, an average of 40 to 50 pp collisions per bunch crossing are expected. Together with the increase of the center-of-mass collision energy from 8 TeV to 13 TeV, this will create a challenging environment for primary vertex pattern recognition.

This contribution explains the ATLAS strategy for primary vertex reconstruction in high pile-up conditions. The new approach is based on vertex seeding with a medical-imaging algorithm, adaptive reconstruction of vertex positions, and iterative recombination of occasional split vertices. The mathematical foundation and software implementation of the method are described in detail. Monte Carlo-based estimates of vertex reconstruction performance for LHC run-II are presented.

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Track Classification: Track2: Offline software