



Contribution ID: 100

Type: oral presentation

A Gaussian-sum filter for vertex reconstruction

Thursday 30 September 2004 17:10 (20 minutes)

A vertex fit algorithm was developed based on the Gaussian-sum filter (GSF) and implemented in the framework of the CMS reconstruction program. While linear least-squares estimators are optimal in case all observation errors are Gaussian distributed, the GSF offers a better treatment of the non-Gaussian distribution of track parameter errors when these are modeled by Gaussian mixtures.

In addition, when using electron tracks reconstructed with an electron-reconstruction Gaussian-sum filter, the full mixture can be used rather than the approximation by a single Gaussian.

Properties, results and performance of this filter with simulated data will be shown, and compared to the Kalman filter and to robust filters.

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Session Classification: Event Processing

Track Classification: Track 2 - Event processing