Contribution ID: **127** Type: **poster**

Reconstruction and calibration strategies for the LHCb RICH detector

Monday 13 February 2006 11:00 (20 minutes)

The LHCb experiment will make high precision studies of CP violation and other rare phenomena in B meson decays. Particle identification, in the momentum range from ˜2-100 GeV/c, is essential for this physics programme, and will be provided by two Ring Imaging Cherenkov (RICH) detectors. The experiment will use several levels of trigger to reduce the 10MHz rate of visible interactions to the 2kHz that will be stored. The final level of the trigger has access to information from all sub-detectors. The standard offline RICH reconstruction involves solving a quartic equation that describes the RICH optics for each hit in the RICH detector, then using a global likelihood minimization, combining the information from both RICH detectors along with tracking information, to determine the best particle hypotheses. This approach performs well but is vulnerable to background from rings without associated tracks. In addition, the time needed to run the algorithm is of the order of 100 ms per event which is to be compared with the time of order 10 ms available to run the entire final level trigger. Alternative RICH reconstruction algorithms are being investigated that complement the standard procedure. First, algorithms of greater robustness, less reliant on the tracking information, are being developed, using techniques such as Hough transforms and Metropolis Hastings Markov chains. Secondly, simplified algorithms with execution times of order 3 ms, suitable for use in the online trigger are being evaluated. Finally, optimal performance requires a calibration procedure that will enable the performance of the pattern recognition to be measured from the experimental data. This paper describes the the performance of the different RICH reconstruction algorithms studied and reports on the strategy for RICH calibration in LHCb.

Primary authors: Dr JONES, Chris (Cambridge University); LAZZERONI, Cristina (University of Cambridge); Dr WILKINSON, Guy (Oxford University); PATEL, Mitesh (CERN); Dr MURESAN, Raluca-Anca (Oxford University); FORTY, Roger (CERN)

Presenters: LAZZERONI, Cristina (University of Cambridge); Dr MURESAN, Raluca-Anca (Oxford University)

Session Classification: Poster

Track Classification: Event processing applications