Contribution ID: **192** Type: **oral presentation**

# Concepts, Design and Implementation of the New ATLAS Track Reconstruction (NEWT)

*Thursday 6 September 2007 17:50 (20 minutes)*

The track reconstruction of modern high energy physics experiments is a very complex task that puts stringent requirements onto the software realisation. The ATLAS track reconstruction software has been in the past dominated by a collection of individual packages, each of which incorporating a different intrinsic event data model, different data flow sequences and calibration data. The ATLAS track reconstruction has undergone a major design revolution to ensure maintainability during the long lifetime of the ATLAS experiment and the flexibility needed for the startup phase.
The entire software chain has been re-organised in modular components and a common Event Data Model has been deployed during the last three years. A complete new track reconstruction that concentrates on common tools aimed to be used by both ATLAS tracking devices, the Inner Detector and the Muon System, has been established. The common components approach has been extended to cover the tracking part of the highest level software-based trigger, the ATLAS Event Filter.
The New Tracking has been already used during many large scale tests with data from Monte Carlo simulation and from detector commissioning projects such as the combined test beam 2004 and cosmic ray events. The design, concepts and implementation of the newly developed track reconstruction will be presented and overview on the performance for various different applications will be given.

## Submitted on behalf of Collaboration (ex, BaBar, ATLAS)

ATLAS Offline Computing

## Summary

The ATLAS detector
consists of two independent tracking devices: the Inner Detector (ID) close to the interaction region and the Muon System (MS). While the Inner Detector reconstruction has to deal with the high track density that imposes a large number of combinatorial track candidates, the Muon System track reconstruction is mainly limited by the huge amount of inert material, the cavern background and the highly inhomogeneous magnetic field.
In the past - especially during the design phase of the ATLAS experiment - the ATLAS track reconstruction software consisted for both, ID and MS, of several competing reconstruction programs, each of which incorporating its own event data model, different reconstruction geometries, varying concepts in material integration and separate philosophies in algorithmic sequence and steering. A new track reconstruction (NEWT) has been deployed that is based on a common Event Data Model and the definition of interfaces that represent the various tasks (of different hierarchical level) of the reconstruction application. It is designed in a component

pattern structure that eases the integration of new developed track reconstruction modules and guarantees maintainability during the long lifetime of the ATLAS experiment. Being just half a year before the startup of the ATLAS experiment, a review of NEWT in both design and performance will be presented.

**Primary author:** Mr SALZBURGER, Andreas (University of Innsbruck & CERN)

**Co-author:** Mr ELSING, Markus (CERN)

**Presenter:** Mr SALZBURGER, Andreas (University of Innsbruck & CERN)

**Session Classification:** Event processing

**Track Classification:** Event Processing