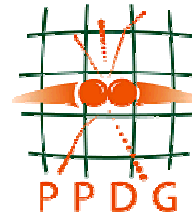


Particle Physics Data Grid: From Fabric to Physics

Selected Science Benefits

28 February 2004



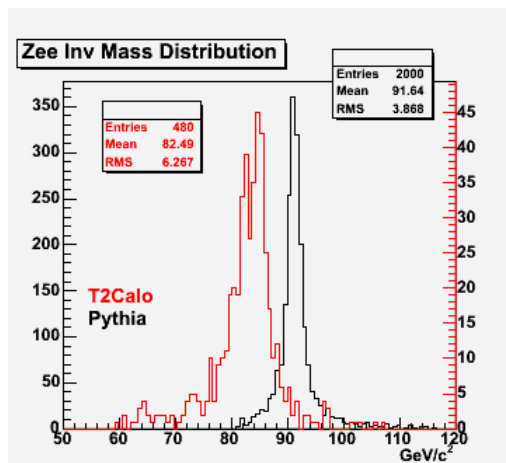
ATLAS Data Challenge 2: Grid-based production and analysis

Collaboratory: Particle Physics Data Grid (www.ppdg.net)

Contact: ppdg-exec@ppdg.net

ATLAS experiment: <http://atlas.ch/>

The ATLAS experiment is being prepared to take data at the Large Hadron Collider (LHC) at CERN, near Geneva, Switzerland beginning in 2007. A central goal of the LHC program is the discovery and characterization of the Higgs boson, an as yet unseen elementary particle predicted to exist and necessary to the theory describing why particles have mass. The ATLAS collaboration consists of 2000+ scientists around the world with hundreds of scientists participating in the U.S. (USATLAS).



The ATLAS Data Challenge DC2 is a major milestone in the preparation of the ATLAS world wide software environment that includes global distribution of data and access to computing resources in a distributed system. The goals of DC2 include the operation of the full software environment for ATLAS with multiple, interoperating grids. The results from DC2 will provide input for the ATLAS computing model as well as providing input to the overall resource estimates of needs. Physicist Ed May at Argonne National Laboratory says “DC2 produced simulation data and reconstruction has been and continues to be used for the study of the Level 2 trigger efficiency for high PT electrons, using data samples from Z->ee.” The Level 2 trigger is part of the real-time filter that selects one interaction out of 10 million for recording by the experiment. Understanding the

effectiveness of this filter is essential understanding physics meaning of the recorded data. The present grid-based simulation and production is providing the capability to refine this understanding. The figure at the left shows the simulated energy deposited in the level 2 trigger calorimeter compared with the mass of the Z-meson that decayed into two electrons.

The persistent shared grid infrastructure in the U.S., Grid3, is providing about 30% of the global resources used for DC2. The grid-enabling of the ATLAS applications and deployment of the Grid3 environment is a result of USATLAS participation in the Trillium consortium, a cooperative effort of the NSF funded iVDGL and GriPhyN projects and the DOE funded Particle Physics Data Grid project.