Geometry specification for Hall D

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Abstract

The GlueX experiment should have a single centralized repository where all information regarding the structure and dimensions of the detector and beamline are maintained. This database will be used by Monte Carlo simulations, reconstruction and event displays to define the geometry of the detector. This document contains a proposal defining the way that this information is represented in terms of a single xml document. The document resides in a family of xml files which all follow a common dtd or schema called the Hall D Detector Specification, or HDDS.

What it does

The goal of this project is to develop a proposal for a XML-based geometry specification for the Hall D detector and beam line. The immediate need for a specification is to have a single reference for geometrical parameters used in Monte Carlo simulations. Eventually one can imagine a longer list of clients who may need geometrical information.

1. simulation - HDFast, HDGeant, ...
2. visualization - interactive event display
3. analysis - track, photon reconstruction

What it contains

The objective is to group together all of the static properties of the detector and encapsulate them all under one document. These *static properties* are any features of the detector that are specified or measured apart from the physics data themselves. Features that are extracted from the data themselves are generically known as *calibration constants* ; these are set apart from the geometry because they are of interest to a smaller set of client applications, and are generally more volatile by nature than something that can be specified in a design. Properties like the thickness of the exit window to the target, or the magnetic field map inside the solenoid are examples of what goes into HDDS. Properties like the average light output by a pion in the Cerenkov detector or dE/dx of a MIP in the central tracking chamber are examples of calibration constants that do not go into HDDS.

What inspired it

All modern experiments employ some kind of database for storing geometrical constants. The idea of using XML was inspired by the example of the ATLAS experiment at CERN, and the availability of open-source parsing tools for constructing interfaces to the above-listed client applications that we need to write. The ALTAS AGGD web page is a great help in getting started with this project. A CERN workshop on the general problem of detector geometry specification was held April 14, 2000. The transparencies and video recording of the talks is found on CERN's web site at the XML Detector Description Workshop.

Where it is now

A first draft of the geometry specification for Hall D is now in place. The document is spread across several files, one for each subsystem. All of the files have been checked for well-formedness and validated against the schema. The following are available for browsing, but are still very much under development. The best way to look at these files is with a XML-enabled browser like IE6, Mozilla or Netscape 6. These files may be found either in the Hall D cvs repository under CVSROOT/hddm or on the web at http://zeus.phys.uconn.edu/halld/geometry/.

- HDDS_1.0.dtd - xml document type definition (dtd) file
- HDDS-1_0.xsd - xml hdds schema, supersedes HDDS_1.0.dtd
- main_HDDS.xml - top-level detector spec file
- Material_HDDS.xml - materials spec file
- Beamline_HDDS.xml - beam line spec file
- Solenoid_HDDS.xml - solenoid magnet spec file

- Target_HDDS.xml - target spec file
- StartCntr_HDDS.xml - start counter spec file
- BarrelEMcal_HDDS.xml - barrel EM calorimeter spec file
- ForwardEMcal_HDDS.xml - forward calorimeter spec file
- CentralDC_HDDS.xml - central drift chamber spec file
- ForwardDC_HDDS.xml - forward drift chambers spec file
- CerenkovCntr_HDDS.xml - Cerenkov counter spec file
- ForwardTOF_HDDS.xml - forward time-of-flight spec file

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