

# GlueX Software Documentation

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# Goal

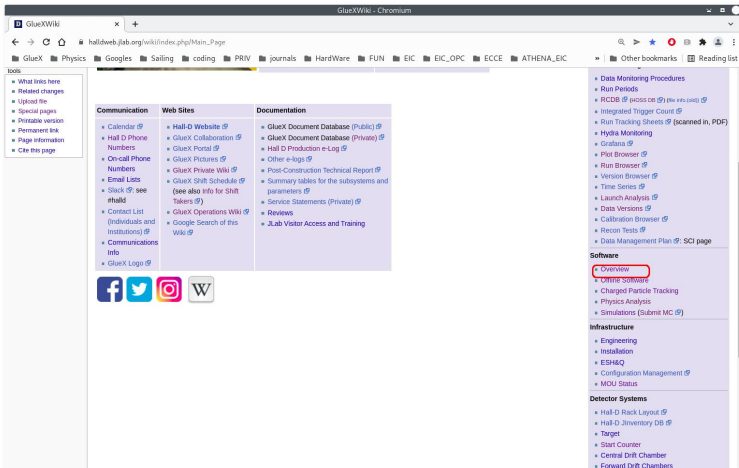
The goal of the documentation effort is to provide a single point of entry from which any information about the GlueX software, and data analysis in general, can be found.

A lot of documentation already exists, but it is incoherently distributed over many sources:

- GlueX wiki pages: dynamic evolution, some old, some obsolete, hard to navigate or find
- GlueX DocDB: Documentations, presentations, hard to find
- GlueX Workshops
- GitHub: Code itself, Readme files, wiki pages
- others: overleaf, ....

# Single Point of Entry

From our main GlueX wiki page navigate to the starting point of all software related documentation:



GlueXWiki - Chromium

GlueXWiki

halldweb.jlab.org/wiki/index.php/Main\_Page

GlueX Physics Sailing coding PRIV journals HardWare FUN EIC EIC\_OPC ECCE ATHENA\_EIC

Other bookmarks Reading list

tools

- What links here
- Related changes
- Upload file
- Special pages
- Private version
- Permanent link
- Page information
- Cite this page

Communication	Web Sites	Documentation
<ul style="list-style-type: none"> <li>Calendar</li> <li>Hall D Phone Numbers</li> <li>On-call Phone Numbers</li> <li>Email Lists</li> <li>Slack (see #halld)</li> <li>Contact List (Individuals and Institutions)</li> <li>Communications Info</li> <li>GlueX Logo</li> </ul>	<ul style="list-style-type: none"> <li>Hall-D Website</li> <li>GlueX Collaboration</li> <li>GlueX Portal</li> <li>GlueX Pictures</li> <li>GlueX Private Wiki</li> <li>GlueX Shift Schedule (see also Info for Shift Takers)</li> <li>GlueX Operations Wiki</li> <li>Google Search of this Wiki</li> </ul>	<ul style="list-style-type: none"> <li>GlueX Document Database (Public)</li> <li>GlueX Document Database (Private)</li> <li>Hall D Production e-Log</li> <li>Other e-logs</li> <li>Post-Construction Technical Report</li> <li>Summary tables for the subsystems and parameters</li> <li>Service Statements (Private)</li> <li>Reviews</li> <li>Lab Visitor Access and Training</li> </ul>

- Data Monitoring Procedures
- Run Periods
- RCDB (process on the info page)
- Integrated Trigger Count
- Run Tracking Sheets (scanned in, PDF)
- Hydra Monitoring
- Grabs
- Plot Browser
- Run Browser
- Version Browser
- Time Series
- Launch Analysis
- Data Versions
- Calibration Browser
- Recon Tests
- Data Management Plan (SCI page)

**Software**

- Overview
- Offline Software
- Charged Particle Tracking
- Physics Analysis
- Simulations (Submit MC)

**Infrastructure**

- Engineering
- Installation
- ESH&Q
- Configuration Management
- MOU Status

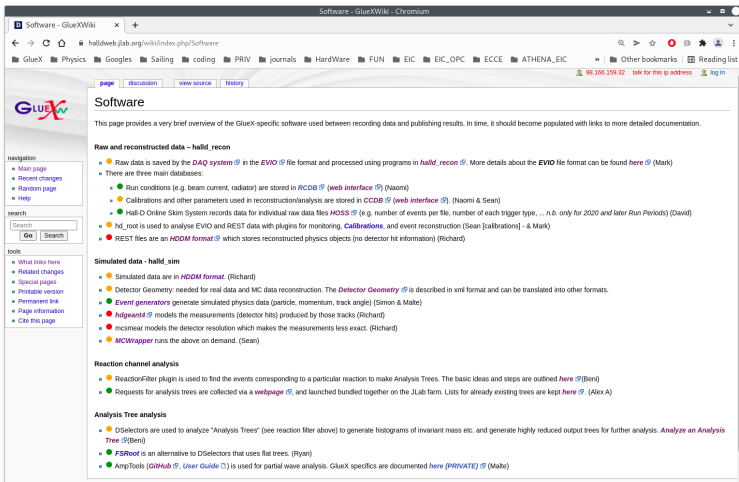
**Detector Systems**

- Hall-D Rack Layout
- Hall-D Inventory DB
- Target
- Start Counter
- Central Drift Chamber
- Forward Drift Chambers

Facebook Twitter Instagram Wikipedia

# Single Point of Entry

## Start of any search of documentation:



Software - GlueXWiki - Chromium

Software - GlueXWiki

Software

This page provides a very brief overview of the GlueX-specific software used between recording data and publishing results. In time, it should become populated with links to more detailed documentation.

**Raw and reconstructed data - hall\_d\_recon**

- Raw data is saved by the DAQ system in the EVIO file format and processed using programs in hall\_d\_recon. More details about the EVIO file format can be found here (Mark)
- There are three main databases:
  - Run conditions (e.g. beam current, radiator) are stored in RCDB (web interface) (Naomi)
  - Calibrations and other parameters used in reconstruction/analysis are stored in CCDB (web interface) (Naomi & Sean)
  - Hall-D Online Skim System records data for individual raw data files MOSS (e.g. number of events per file, number of each trigger type, ... n.b. only for 2020 and later Run Periods) (David)
- hd\_root is used to analyse EVIO and REST data with plugins for monitoring, Calibrations, and event reconstruction (Sean [calibrations] - & Mark)
- REST files are an HDDM format which stores reconstructed physics objects (no detector hit information) (Richard)

**Simulated data - hall\_d\_sim**

- Simulated data are in HDDM format. (Richard)
- Detector Geometry: needed for real data and MC data reconstruction. The Detector Geometry is described in xml format and can be translated into other formats.
- Event generators generate simulated physics data (particle, momentum, track angle) (Simon & Maib)
- hdgeant models the measurements (detector hits) produced by those tracks (Richard)
- mcsmeas models the detector resolution which makes the measurements less exact. (Richard)
- MCWrapper runs the above on demand. (Sean)

**Reaction channel analysis**

- ReactorFilter plugin is used to find the events corresponding to a particular reaction to make Analysis Trees. The basic ideas and steps are outlined here (Beni)
- Requests for analysis trees are collected via a webpage, and launched bundled together on the JLab farm. Lists for already existing trees are kept here. (Alex A)

**Analysis Tree analysis**

- DSelectors are used to analyze "Analysis Trees" (see reaction filter above) to generate histograms of invariant mass etc. and generate highly reduced output trees for further analysis. Analyze an Analysis Tree (Beni)
- FSRoot is an alternative to DSelectors that uses flat trees. (Ryan)
- AmpTools (GitHub, User Guide) is used for partial wave analysis. GlueX specifics are documented here (PRIVATE) (Maib)

## Four major Topics

- Data reconstruction: **hd\_recon**, charged and neutral particles, ....
- Data simulation: **hd\_sim**, MC simulations, HDGeant4, ....
- Reaction channel Analysis: Reaction Filter, definition of an event reaction, Physics Analysis Root Tree
- Data Analysis of Physics Analysis Root Tree: DSelector, FSRRoot, Amptools, ...
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Ultimate goal: Any question can be answered by following the bread crumbs of this page and its links.

## Current Status

- Main Contact: Each topic has a name associated with it
- Status "Bar": green does not mean complete, only "there is more then just one thing"
- Interaction: use "discussion" menu at the top for requests, comments, ect.
- IMPORTANT: This entry page should stay small, only one page, no scrolling needed!
- Current Action: Go through each topic to evaluate what is there and what is missing, starting with DSelector.
- ..... never ending story.