

# Offline Software Overview

## GlueX Collaboration Meeting

Mark M. Ito

Jefferson Lab

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# Topics for Following Talks

- Offline Monitoring: Kei
- Conversion to Geant4: Richard
- Overhaul ROOT TTree Format: Paul M.

# New Offline Software Wiki Page

- 1 General Information
- 2 Software Documentation
- 3 Offline Data Monitoring
- 4 Computing Facilities
- 5 Software Management
- 6 Meetings and Reviews
- 7 Communication and Help
- 8 Legacy Links
- 9 Uncategorized Links



The screenshot shows a MediaWiki page titled "GlueX Offline Software". At the top, there are navigation tabs: "page", "discussion", "edit", "history", "delete", "move", and "protect". The GlueX logo is in the top left. Below it is a "navigation" box with links for "Main page", "Recent changes", "Random page", and "Help". A "search" box with "Go" and "Search" buttons is below that. A "tools" box contains links for "What links here", "Related changes", "Upload file", "Special pages", "Printable version", "Permanent link", "Page information", and "Cite this page". The main content area has a "News:" section with a list of recent updates from October 2, 2015, to September 3, 2015. Below the news is a note about a legacy version. A "Contents [hide]" section follows, listing the page's structure with numbered links for each section and subsection.

page discussion edit history delete move protect Marki

## GlueX Offline Software

**News:**

- October 2, 2015: Minutes of the September 30 meeting are available.
- September 21, 2015: Minutes of the September 16 meeting are available.
- September 11, 2015: New simple email list [🔗](#), "git\_update"
- September 9, 2015: ROOT TTree Format Overhaul [🔗](#)
- September 3, 2015: Minutes of the September 2 meeting are available.
- Previous news items...

The legacy version of this page is here.

**Contents [hide]**

- 1 General Information
  - 1.1 Shell Environment Set-Up
  - 1.2 Building GlueX Software
- 2 Software Documentation
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- 5 Software Management
  - 5.1 Source Code Management
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## Conversion to Git

Director's Review of 12 GeV Software Computing, June 7-8, 2012,  
Committee Recommendations:

...

17. While we encourage the move to git as a code management system, be sure not to underestimate the extent of the paradigm shift. Identify a workflow model for your use of git. Communicate clearly the new paradigm (easy branching, no central repository, etc.). Set up (or link to) tutorials for users with a mapping of routine CVS tasks to their git equivalents (such as cvs diff, etc.). Document or link to documentation for standard git tasks without obvious equivalent in CVS or SVN, such as git rebase, or bisect.

...

# Why Change?

- Better management of changes
- Better communication of changes
- Better documentation of changes
- Less down-time with broken code on trunk

# Repositories on GitHub

 Jefferson Lab

 Repositories

 People 182

 Teams 69

 Settings

## GlueX

Software Development for the GlueX Experiment — Edit

22 MEMBERS

6 REPOSITORIES

Leave

Settings

Use @JeffersonLab/gluex to mention this team in comments.

Team members

Repositories

Add repositories

 jeffersonlab/build\_scripts

Some members have greater privileges. [View details](#)

Read

Remove

 jeffersonlab/git\_test

Some members have greater privileges. [View details](#)

Write

Remove

 jeffersonlab/gluex\_install

Some members have greater privileges. [View details](#)

Read

Remove

 jeffersonlab/hdds

Some members have greater privileges. [View details](#)

Write

Remove

 jeffersonlab/hdpm

Some members have greater privileges. [View details](#)

Write

Remove

 jeffersonlab/sim-recon

Some members have greater privileges. [View details](#)

Write

Remove

# Notes on Git/GitHub

- Everyone needs an account on GitHub.
- Anyone can update the master branch.
- Changes should go onto topic branches, but enforced only administratively.
- Nightly builds working from the Git Repositories
- “git\_update” simple email list: daily digest of changes
- Team Maintainers and Team Administrators

# Spring 2015 Simulations Complete

## Runs Generated [\[edit\]](#)

Run number	Magnetic Field	Photon Spectrum	Event Type	Events/File	# of Files
9301	None	Incoherent	bggen	30k	5000
9302	800A	Incoherent	bggen	30k	100
9303	1300A	Incoherent	bggen	30k	100
9304	None	Coherent	bggen	30k	100
9305	800A	Coherent	bggen	30k	5000
9306	1300A	Coherent	bggen	30k	5000
9311	None	Incoherent	beam	10M	5000
9312	800A	Incoherent	beam	10M	100
9313	1300A	Incoherent	beam	10M	100
9314	None	Coherent	beam	10M	100
9315	800A	Coherent	beam	10M	5000
9316	1300A	Coherent	beam	10M	5000

- 
- Used sim-recon-1.3.0
- Run 9306 redone with sim-recon-1.5.1 (BCAL “raw” data generated)



# Future Simulation Runs (from Sean)

- new naming scheme, the next effort will be “sim1”
- the current state of thinking:
  - ▶ use the “mc\_sim1” variation and run 9001
  - ▶ 1350A solenoid field that we decided was the default
  - ▶ For EM background, will the nominal BGRATE=1.1

## Motivation

- Rapidly changing software
  - sim-recon
  - hdds/hdds-commissioning
  - online monitoring plugins
- Working with multiple branches
- Test/debug builds

# Build-settings templates

- Package names: python, xerces-c, cernlib, root, evio, ccdb, jana, hdds, sim-recon, online-monitoring, online-sbms, scripts
- Set top directory and build tag in text file named top.txt
- Store remaining build settings in simple text files of format: \$name \$value
  - paths.txt, tobuild.txt, urls.txt, vers.txt, nthreads.txt

settings-Sp15/top.txt:

```
# top    build-tag
default Sp15
```

settings-Sp15/vers.txt:

```
xerces-c  3.1.2
cernlib   2005
root      5.34.26
evio      4.3.1
ccdb      1.05
jana      0.7.3
hdds      latest
sim-recon latest
```

settings-Sp15/commands.txt:

```
hdds      "scons -u install"
sim-recon "scons -u -j8 install"
```

settings-Sp15/paths.txt:

```
xerces-c /group/halld/Software/builds/[OS]/xerces-c/xerces-c-[VER]
cernlib /group/halld/Software/builds/[OS]/cernlib
root /group/halld/Software/builds/[OS]/root/root_[VER]
evio /group/halld/Software/builds/[OS]/evio/evio-[VER]
ccdb /group/halld/Software/builds/[OS]/ccdb/ccdb_[VER]
jana /group/halld/Software/builds/[OS]/jana/jana_[VER]
hdds hdds
sim-recon sim-recon
```

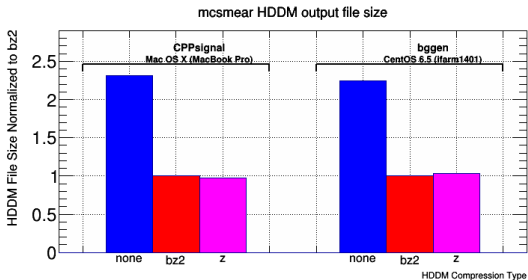
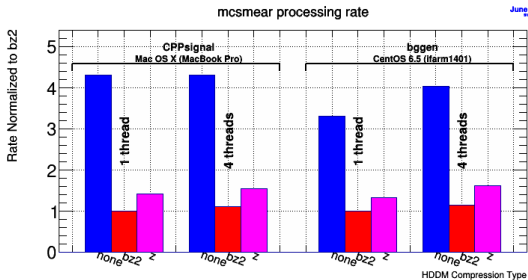
settings-Sp15/urls.txt:

```
xerces-c http://www.motorlogys.com/apache/xerces/c/3/sources/xerces-c-[VER].tar.gz
cernlib http://www-zeuthen.desy.de/linear_collider/cernlib/new/cernlib.2005.corr.
root https://root.cern.ch/download/root_v[VER].source.tar.gz
evio https://coda.jlab.org/drupal/system/files/coda/evio/evio-4.4/evio-[VER].t
ccdb https://github.com/JeffersonLab/ccdb/archive/v[VER].tar.gz
jana https://www.jlab.org/JANA/releases/jana_[VER].tgz
hdds https://github.com/JeffersonLab/hdds
sim-recon https://github.com/JeffersonLab/sim-recon
```

# Multi-Threaded mcsmear

David studied the effects. Findings are:

- ① HDDM has multiple options for compressing the data stream: no compression, bz2 compression, zlib compression
- ② mcsmear runs approximately 3-4 times faster with no compression than with bz2 compression
- ③ mcsmear does not scale well with multiple threads
  - ▶ most of its time is spent in writing the event to the HDDM output stream
  - ▶ this action must be serialized
- ④ Our computing model does not require us to store large amounts of simulated HDDM files on tape
  - ▶ if we do, drives have built in compression
  - ▶ cost limited to bandwidth of moving the files to/from tape and local disk storage



# EM Background From Event Mixing

- David L. wrote `hddm_merge_events` program, merges hits from multiple `hddm` files
  - Idea: Including EM background by mixing together `bggen` and background template events can dramatically reduce CPU time needed
  - N.B. Took awhile to realize this relied on HDDM C API, currently limited to pre-mcsmear files.
- Generated equal amounts of `bggen` and EM bkg. events.
  - EM bkgd generated by shooting pions down the beam pipe using modified `genpi` program.
  - $E(\gamma) = 7 - 12$  GeV, coherent brem.,  $BGRATE = 1.10$   
Solenoid current = 1200A
- Compare results with `bggen` events generated with standard EM background simulation



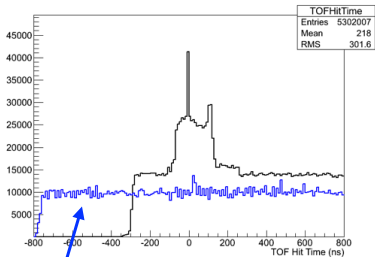
## Rate for Multiple Hits per Channel

	No EM Bkgd.	Std. EM Bkgd.	Mixed EM Bkgd.
BCAL	1.8%	1.9%	1.9%
CDC	8.3%	8.4%	8.4%
FCAL	0.8%	1.4%	1.5%
FDC	8.9%	9.1%	9.2%
SC	0.6%	2.1%	2.3%
TAGH	—	14.9%	14.9%
TAGM	—	5.1%	5.1%
TOF	6.2%	20.4%	20.9%

# Detector Noise Using PS Triggered Data

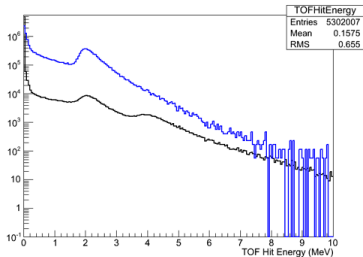
- Look at Run 3185
  - Select events with only reconstructed pair in PS and PSC
    - Clean selection, relative time resolution ~few ns
- Look at hits in main spectrometer

# TOF



10x smaller!

Black — Data



Blue — Simulation

# New Releases Since the Last Meeting

## JANA Downloads

Number of items: 13

<a href="#" style="color: white; text-decoration: none;">jana_0.7.3.tgz</a> <small>Tue, 30 Jun 2015 09:17:42 -0400</small>	327.0 kB
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## HDDS Tagged Releases

Name	Date	Repository Location <sup>[1]</sup>	Release Notes	Comments
hdds-3.3	July 24, 2015	..	<a href="#">Release HDDS 3.3</a>	Tagged after Richard's changes to CDC endplate geometry.
hdds-commissioning-1.0	June 12, 2015	<a href="#">tags/hdds-commissioning-1.0</a>	<a href="#">release_notes.txt</a>	From revision 18741 of <code>^branches/hdds-commissioning</code> . To be used for analysis of Fall 2014 detector configuration.
hdds-3.2	May 28, 2015	<a href="#">tags/hdds-3.2</a>	<a href="#">release_notes.txt</a>	From revision 18553 of trunk. Used for simulation of Spring 2015 data and for Data Challenge 3.

## Sim-Recon Tagged Releases

Click on the release name to go to the release notes. For more information on tagged releases, see [Releases of GlueX Software](#).

Name	Release Date	Repository Location <sup>[1]</sup>	Comments
<a href="#">1.5.1</a>	August 30, 2015	..	Based on master branch of August 28, 2015. Some start counter pull requests elided.
<a href="#">1.4.0</a>	July 24, 2015	..	First release tagged on GitHub. New locations for plugins.
<a href="#">sim-recon-1.3.0</a>	June 30, 2015	<a href="#">tags/sim-recon-1.3.0</a>	based on revision 18919 of trunk, has new BCAL simulation code
<a href="#">sim-recon-1.2.0-fall14</a>	June 12, 2015	<a href="#">tags/sim-recon-1.2.0-fall14</a>	based on <code>^tags/sim-recon-1.2.0</code> , has a patch from Simon Taylor for handling the commissioning target in the HDGEOMETRY library.
<a href="#">sim-recon-1.2.0</a>	May 28, 2015	<a href="#">tags/sim-recon-1.2.0</a>	based on revision 18552 of trunk, used for simulations for Spring 2015 and for Data Challenge 3

## Other Topics 1

- New volatile disk hardware: upgrade from Lustre 1.8 to 2.5
- New work disk hardware: traditional fileserver to Lustre
- Offline style build on gluon cluster: already there on the group disk
- ROOT 6: Beni demonstrated compatibility, still some work to do
- Turning the Fine-Mesh Field Map into a Resource: Sean did the work
- Moving the Plug-Ins from online tree to offline: done by David for use by Offline Monitoring
- Policy on CCDB Variations for Reconstructing Simulated Data: we have one

## Other Topics 2

- Software for Correcting for Pedestal Drifts: discussion started
- Data Challenge 3: one pass done, converting to SWIF to streamline tape access
- Default for builds: with debug symbols or without? Stay with with-symbols
- F125 algorithms: Mike S. found problem, corrupt times for small pulses
- Auto-Build on Pull Request: working version in place, almost ready for roll-out