Offline Software Overview
GlueX Collaboration Meeting

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Outline

1. Tagger Reconstruction and Global Event Timing
2. Data Challenge 3
3. Miscellaneous Topics since May 2014
4. Other Talks at This Meeting

Tagger Reconstruction and Global Event Timing I

- Richard Jones introduced a random global time offset to all events, consistent with the 500 MHz RF time structure. This would simulate the real-life uncertainty due to event-to-event trigger latency variations and the time-bin effect from 250 MHz clock. Before this, all events are analyzed as if the true RF bucket is known, a priori. Also the true beam photon energy is also assumed in the analysis.

- HDDM Calls: Conversion to C++ API: All invocations of the HDDM API have been upgraded to use the C++ version rather than the old C version. This change comes in many places in the sim-recon tree. GEANT-3-based code (HDGeant) was exempted.

- HDDM Integrity Checks: The HDDM library now supports "integrity checks" where a cyclic redundancy check (CRC) code is computed event-by-event and is written with the event. Downstream programs can check that incoming data has not been corrupted.

Tagger Reconstruction and Global Event Timing II

- HDDM_s Changes: Simulation output has been changed to rationalize data storage in two areas: (1) the mix of truth and hit information and (2) the detector component hierarchy.

- Tagger Analysis: CCDB tagger tables have been rationalized and new C++ classes introduced in sim-recon to accommodate the new scheme. The start counter was used as a model for the low-level hit classes in the DAQ plug-in. There were some modifications needed to HDGeant (GEANT3) code to write the new classes.

- Analysis Library Changes: Paul Mattione has changed the analysis library to deal with the ambiguity of the "correct" tagger hit.

List of Changed Files

```
 1 src
 2 src/BMS
 3 src/BMS/Makefile.bin
 4 src/BMS/Makefile.common
 5 src/BMS/Makefile.shlib
 6 src/external/xstream/include/xstream/config.h
 7 src/libraries/AMPTOOLS_DATAIO/HDDMDataWriter.cc
 8 src/libraries/AMPTOOLS_DATAIO/HDDMDataWriter.h
 9 src/libraries/AMPTOOLS_DATAIO/ROOTDataReader.cc
10 src/libraries/ANALYSIS
11 src/libraries/ANALYSIS/ANALYSIS_init.cc
12 src/libraries/ANALYSIS/DHistogramActions.cc
13 src/libraries/ANALYSIS/DHistogramActions.h
14 src/libraries/ANALYSIS/DParticleCombo_factory_PreKinFit.cc
15 src/libraries/BCAL/BCAL_init.cc
16 src/libraries/BCAL/DBCALHit_factory.cc
17 src/libraries/BCAL/DBCALHit_factory.h
18 src/libraries/BCAL/DBCALTDCHit_factory.cc
```

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19   src/libraries/BCAL/DBCALTDCHit_factory.h
20   src/libraries/CCAL/CCAL_init.cc
21   src/libraries/CDC/CDC_init.cc
22   src/libraries/CDC/DCDCHit_factory.cc
23   src/libraries/CDC/DCDCHit_factory.h
24   src/libraries/CERE/CERE_init.cc
25   src/libraries/DANA
26   src/libraries/FCAL/DFCALHit_factory.cc
27   src/libraries/FCAL/DFCALHit_factory.h
28   src/libraries/FCAL/FCAL_init.cc
29   src/libraries/FDC/DFDCHit_factory.cc
30   src/libraries/FDC/DFDCHit_factory.h
31   src/libraries/FDC/FDC_init.cc
32   src/libraries/HDDM
33   src/libraries/HDDM/DEventSourceHDDM.cc
34   src/libraries/HDDM/DEventSourceHDDM.h
35   src/libraries/HDDM/DEventSourceREST.cc
36   src/libraries/HDDM/DEventSourceREST.h
37   src/libraries/HDDM/DEventWriterREST.cc
38   src/libraries/HDDM/DEventWriterREST.h
```

```
39   src/libraries/HDDM/SConscript
40   src/libraries/HDDM/event.xml
41   src/libraries/HDDM/rest.xml
42   src/libraries/PID/DBeamPhoton_factory.cc
43   src/libraries/PID/DBeamPhoton_factory.h
44   src/libraries/PID/DBeamPhoton_factory_TRUTH.cc
45   src/libraries/PID/DBeamPhoton_factory_TRUTH.h
46   src/libraries/PID/DEventRFBunch_factory.cc
47   src/libraries/PID/DEventRFBunch_factory.h
48   src/libraries/PID/DRFTime.h
49   src/libraries/PID/PID_init.cc
50   src/libraries/RICH/RICH_init.cc
51   src/libraries/START_COUNTER/DSCHit_factory.cc
52   src/libraries/START_COUNTER/DSCHit_factory.h
53   src/libraries/START_COUNTER/START_COUNTER_init.cc
54   src/libraries/TAGGER/DTAGHDigiHit.h
55   src/libraries/TAGGER/DTAGHGeometry.cc
56   src/libraries/TAGGER/DTAGHGeometry.h
57   src/libraries/TAGGER/DTAGHGeometry_factory.cc
58   src/libraries/TAGGER/DTAGHGeometry_factory.h
```

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59  src/libraries/TAGGER/DTAGHHit.h
60  src/libraries/TAGGER/DTAGHHit_factory.cc
61  src/libraries/TAGGER/DTAGHHit_factory.h
62  src/libraries/TAGGER/DTAGHTDCDigiHit.h
63  src/libraries/TAGGER/DTAGMDigiHit.h
64  src/libraries/TAGGER/DTAGMGeometry.cc
65  src/libraries/TAGGER/DTAGMGeometry.h
66  src/libraries/TAGGER/DTAGMGeometry_factory.cc
67  src/libraries/TAGGER/DTAGMGeometry_factory.h
68  src/libraries/TAGGER/DTAGMHit.h
69  src/libraries/TAGGER/DTAGMHit_factory.cc
70  src/libraries/TAGGER/DTAGMHit_factory.h
71  src/libraries/TAGGER/DTAGMTDCDigiHit.h
72  src/libraries/TAGGER/DTagger.h
73  src/libraries/TAGGER/TAGGER_init.cc
74  src/libraries/TOF/DTOFHitMC.h
75  src/libraries/TOF/DTOFHit_factory.cc
76  src/libraries/TOF/DTOFHit_factory.h
77  src/libraries/TOF/TOF_init.cc
78  src/libraries/TRACKING/TRACKING_init.cc
```

```
79  src/libraries/include/GlueX.h
80  src/programs/Analysis
81  src/programs/Analysis/hd_eventfilter/MyProcessor.cc
82  src/programs/Analysis/hd_eventfilter/MyProcessor.h
83  src/programs/Analysis/plugins/b1pi_hists/DReaction_factory_
84  src/programs/Analysis/plugins/event_size/JEventProcessor_ev
85  src/programs/Simulation/HDGeant/bcal2nt.cpp
86  src/programs/Simulation/HDGeant/bcal2nt_c.c
87  src/programs/Simulation/HDGeant/beamgen.F
88  src/programs/Simulation/HDGeant/control.in
89  src/programs/Simulation/HDGeant/controlparams.inc
90  src/programs/Simulation/HDGeant/gukine.F
91  src/programs/Simulation/HDGeant/hddmInput.c
92  src/programs/Simulation/HDGeant/hddmcp_c.c
93  src/programs/Simulation/HDGeant/hitBCal.cc
94  src/programs/Simulation/HDGeant/hitCDC.c
95  src/programs/Simulation/HDGeant/hitFCal.c
96  src/programs/Simulation/HDGeant/hitFTOF.c
97  src/programs/Simulation/HDGeant/hitStart.c
98  src/programs/Simulation/HDGeant/hitTag.c
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 99  src/programs/Simulation/HDGeant/hitUPV.c
100  src/programs/Simulation/HDGeant/savenewvertex.c
101  src/programs/Simulation/HDGeant/settofg.F
102  src/programs/Simulation/HDGeant/uginit.F
103  src/programs/Simulation/bggen
104  src/programs/Simulation/bggen/code/bg_hddm.c
105  src/programs/Simulation/filtereta/filter.cc
106  src/programs/Simulation/filtereta/filtereta.cc
107  src/programs/Simulation/filtergen/filter.cc
108  src/programs/Simulation/filtergen/filtergen.cc
109  src/programs/Simulation/gamp2hddm/gamp2hddm.cc
110  src/programs/Simulation/geneta/bg_hddm.cc
111  src/programs/Simulation/geneta/bg_hddm.h
112  src/programs/Simulation/genp_pi0/bg_hddm.cc
113  src/programs/Simulation/genp_pi0/bg_hddm.h
114  src/programs/Simulation/genp_pi0/genp_pi0.cc
115  src/programs/Simulation/genp_pi0/kinematics.c
116  src/programs/Simulation/genr8/genr8.c
117  src/programs/Simulation/genr8_2_hddm
118  src/programs/Simulation/genr8_2_hddm/genr8_2_hddm.cc
```

```
119  src/programs/Simulation/gxtwist
120  src/programs/Simulation/lowengen/code/bg_hddm.c
121  src/programs/Simulation/mcsmear/MyProcessor.cc
122  src/programs/Simulation/mcsmear/MyProcessor.h
123  src/programs/Simulation/mcsmear/mcsmear.cc
124  src/programs/Simulation/mcsmear/smear.cc
125  src/programs/Simulation/mcsmear/smear_bcal.cc
126  src/programs/Simulation/pi02hddm/pi02hddm.cc
127  src/programs/Simulation/plugins/extract_ptype_hddm/JEventPro
128  src/programs/Simulation/plugins/extract_ptype_hddm/JEventPro
129  src/programs/Simulation/plugins/hdparsim
130  src/programs/Simulation/pythiagen/pyth_hddm.c
131  src/programs/Simulation/root2hddm/root2hddm.cc
132  src/programs/Simulation/stdhep_translators/stdhep2hddm.c
133  src/programs/Utilities/hddm2cMsg/Makefile
134  src/programs/Utilities/hddm2cMsg/hddm2cMsg.cc
135  src/programs/Utilities/hddm_cull_events/Process_r.cc
136  src/programs/Utilities/hddm_cull_events/Process_s.cc
137  src/programs/Utilities/hddm_cull_events/hddm_cull_events.cc
138  src/programs/Utilities/hddm_cull_events/hddm_cull_events.h
```

```
139   src/programs/Utilities/hddm_merge_events/hddm_merge_events.c
140   src/programs/Utilities/hddm_merge_files/Process_r.cc
141   src/programs/Utilities/hddm_merge_files/Process_s.cc
142   src/programs/Utilities/hddm_merge_files/hddm_merge_files.cc
143   src/programs/Utilities/hddm_merge_files/hddm_merge_files.h
144   src/programs/Utilities/hddm_select_events/hddm_select_events
145   src/programs/Utilities/hddm_select_events/hddm_select_events
146   src/programs/Utilities/hddm_select_events/selectEvents_r.cc
147   src/programs/Utilities/hddm_select_events/selectEvents_s.cc
148   src/programs/Utilities/plugins/DAQ/JEventSource_EVIO.cc
149   src/programs/Utilities/plugins/TTab/DTranslationTable.cc
150   src/programs/Utilities/plugins/TTab/DTranslationTable.h
151   src/programs/Utilities/plugins/danaevio/DDANAEVIO_factory.cc
152   src/programs/Utilities/plugins/danaevio/DDANAEVIO_factory.h
153   src/programs/Utilities/plugins/danaevio/dana_evio_dict.xml
154   src/programs/Utilities/plugins/danahddm/JEventProcessor_dana
155   src/programs/Utilities/plugins/danahddm/JEventProcessor_dana
156   src/programs/Utilities/plugins/rawevent/JEventProcessor_rawe
157   src/programs/Utilities/plugins/rawevent/JEventProcessor_rawe
158   src/programs/Utilities/plugins/rawevent/mc2coda_modules.h
```

Data Challenge 3

- Original goals:
  1. process fake raw data resident in the tape library
  2. render the data in EVIO format
  3. perform more efficient generation of the electromagnetic background
  4. use the Geant4 version of HDGeant
  5. incorporate new code for obtaining constants from the CCDB
- Dropped #3, #4, #5 during summer
- Dropped #1, #2 in September
- Other large scale simulation tasks superceded: commissioning geometry, tagger hall

Miscellaneous Topics I

- David Lawrence produced new field maps for studies of effects at lower field.
- Sean Dobbs has the backend database code for EventStore all done.
- David changed CCDB so that one-dimensional arrays treated the same whether they are single column or single row.
- Simon has changed the code to get the parameter for the minimum number of hits on a track candidate from a JANA configuration parameter.
- David has finished implementing the chain from HDDM simulation output to EVIO format to JANA-based reconstruction.
- Will Levine has observed a late tail in the BCAL time distributions for pions and not photons.
- David implemented, in JANA, use of an MD5 check-sum that is generated and downloaded along with each resource file to check file integrity.

Miscellaneous Topics II

- Haswell CPU Testing: David did bench-marking test with a demo machine that SciComp had on loan for this purpose. This is to inform future purchase for the Farm.

- David changed the HDDS build system from GNU Make to SCons.

- Gxtwist is a stand-alone simulation of the tagger hall. Richard has updated the geometry based on the latest drawings. He has also added reality to the radiator with separate positions for the diamond and the amorphous radiators.

- Re-creating tracks with new mass hypotheses during analysis (post-reconstruction): This can be very time-consuming. Simon worked on providing a full set of mass hypotheses for the REST file.

- Comparing Simulated HDDM and EVIO Files: Sean has done comparisons between hit information between simulation native output (HDDM format) and EVIO data derived from same using the new trunk from Richard.

Other Talks at This Meeting

- Offline Data Quality Monitoring: see Paul Mattione's talk (this session)
- Simulating the Commissioning Detector Configuration: see Sean Dobb's talk (this session)
- Analysis of Six Final States Using Data Challenge 2 Monte Carlo: see Ryan Mitchell's talk (Physics session)