Trigsim Status Report with RunIIb Flavour

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Outline

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- Documentation
- How to use it - with RunIIb flavour
- Status in p08 - current
- Status in p09 and beyond
- Samples

Intro to trigsim

- The trigger simulation simulates/emulates L1 and uses real online L2 and L3 code in to verify online code, predict rates, etc.
- The highest-level CVS package in the chain is called d0trigsim. It is also possible to run individual components from either tsim_l1l2 or tsim_l3....but these are mainly for developers.
- d0trigsim is still relatively young in the d0 software world. First production release was p06.00.01 in February 2001. Second is p08.12.00...now.

Documentation

- This is still a weak point for us. No central document exists describing the trigger simulator design and features.
- We do have a web-page:

  http://www-d0.fnal.gov/computing/trigsim/trigsim.html
- From here you can reach a page about each production release which describes known bugs, how to run, etc.
- Contacts:
  - Overall - Serban Protopopescu and Dugan O'Neil
  - L3 - Amber Boehnlein
  - L1/L2 - Dugan O'Neil

  See webpage for detailed list of developers...

Production Release p08.12.00 (original codebase is t01.32.00)

- **Status:** Looks good. Have not seen any crashes yet.

- **Known Problems/Fixes**

```
There are no known problems with fixes for this version

There are weaknesses in this
version which cannot be fixed:

- do not trust the l2gbl output. This was not done properly and is
fixed only in p09. The L2 preprocessor output is fine.

- the trigger towers input to L1 do not have the proper eta-dependent weights
applied. This issue is deeper than trigsim. D0sim, calttmaker,
calweights, packages are all involved. We are expecting a fix in p10.

- Missing pieces: eg. L2,L3 muons. Much more available in p09
```

- **Default Trigger List** There is a default L1/L2 trigger list included with this release. Have a look at it here. **Please note** that this has been slightly modified from the p08.11.00 list to fix some mis-programming of the L1 muon terms (old_list).
- **p08.11.00 Cookbook**

```
setup n32  (d0mino only)       -|
setup D0RunII p08.12.00         |
setup d0cvs                     | generic stuff
newrel -t p08.12.00 mydir       |
cd mydir                        |
d0setwa                         |
addpkg d0trigsim               -|


cd d0trigsim/bin               -|
ln -s mydata inputfile          | running on disk file
Runme.sh                       -|

cd d0trigsim/bin               -|
edit Runme_sam.sh project name  | running on SAM data
Runme_sam.sh                   -|
```

- **Sample Ntuples** Have a look in /prj_root/843/trigsim_1/ntuples to find some recent ntuples.

- **Description of Ntuple variables** - nothing yet, look at the p06.00.01 page to get an idea. Many of the variables have not changed.

How to use it - with RunIIb Flavour

- Inputs: Any d0reco or d0sim output file containing a RawDataChunk (RDC). For best results use mcp06 or later farm output for sim part.
- Outputs: ROOT file containing global ntuple is default output. Can also output file containing RDC and L3 chunks (RDC has trigger crates added).
- Create ROOT macro to run over ntuple, plot distributions, check pass/fail bits.
- Of course, there is no RunIIb-specific stuff in this simulation. However, we don't just output the final trigger bits to the ntuple. We output MC information and detailed info from each trigger subsystem.
- L1 packages put all of the L3 outputs into the ntuple: eg. l1cal by default sends info about 3 highest towers to ntuple. An rcp change in tsim_l1l2/rcp/l1cal_analyze.rcp outputs all 1280 trigger towers to ntuple. E. Perez and M. Abolins have already used these features extensively when thinking about RunIIb.

How to use it - with RunIIb Flavour

- We need a cookbook:

```
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setup D0RunII p08.12.00          |
setup d0cvs                      | generic stuff
newrel -t p08.12.00 mydir        |
cd mydir                         |
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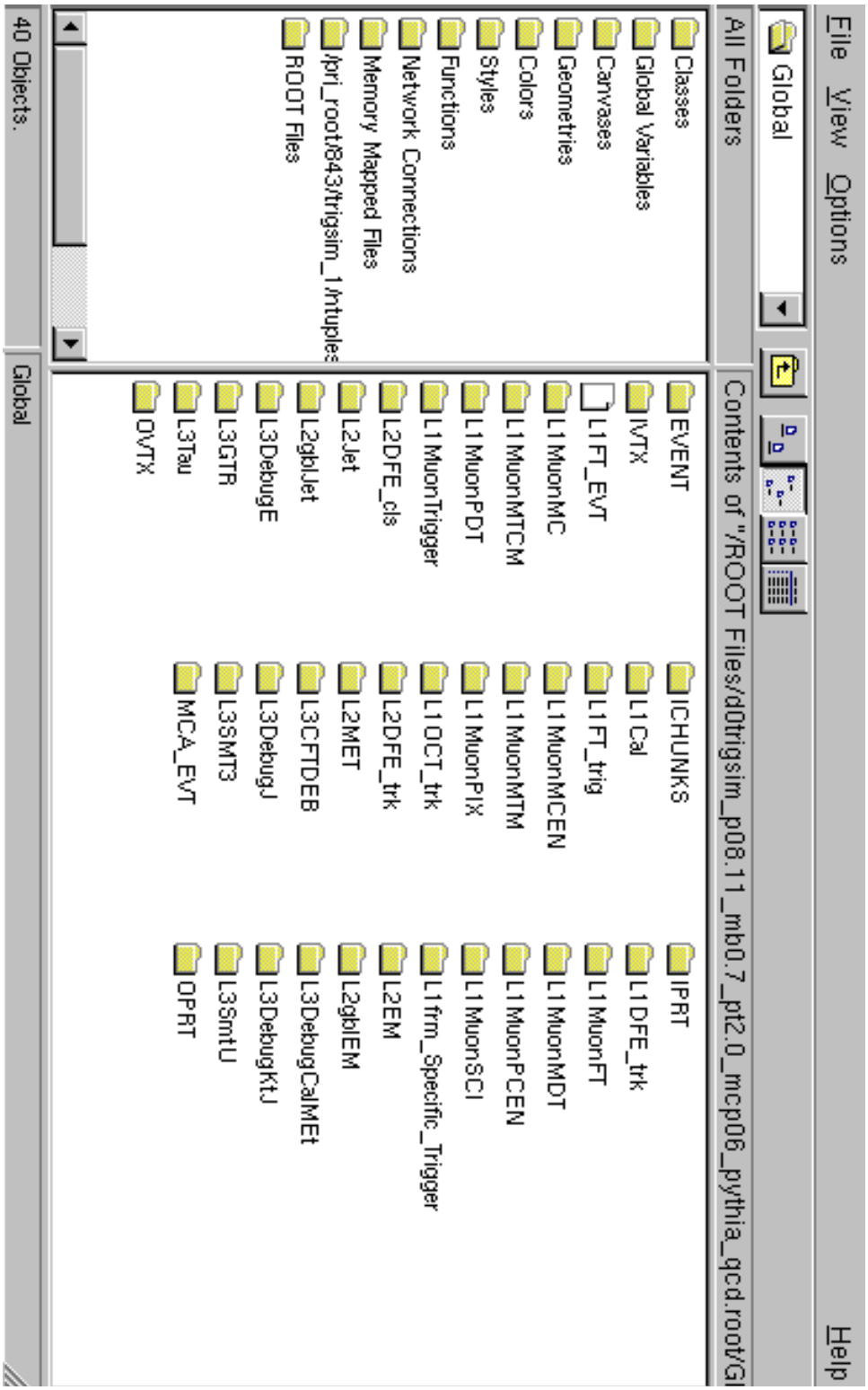
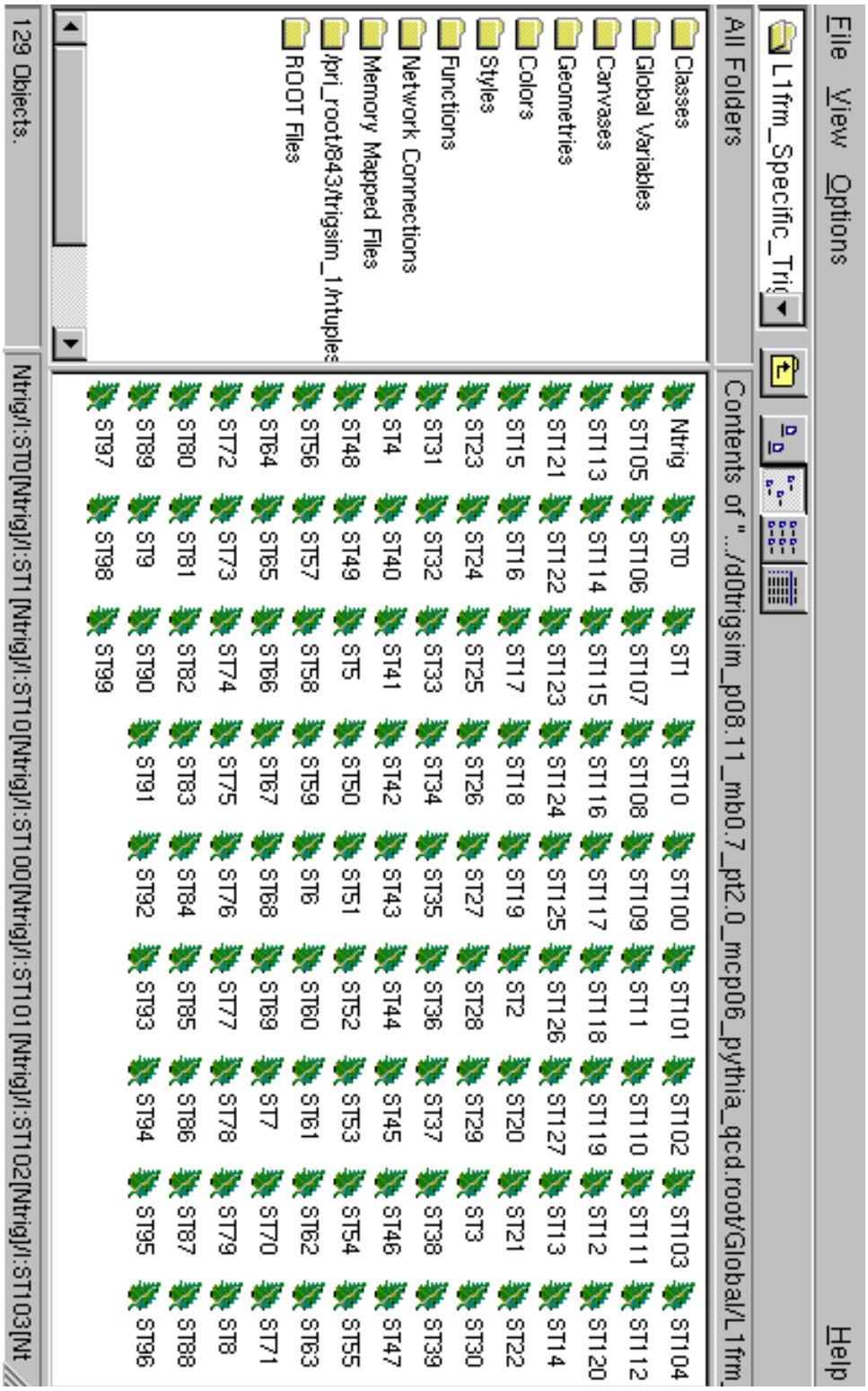
How to use it - with RunIIb Flavour



How to use it - with RunIIb Flavour



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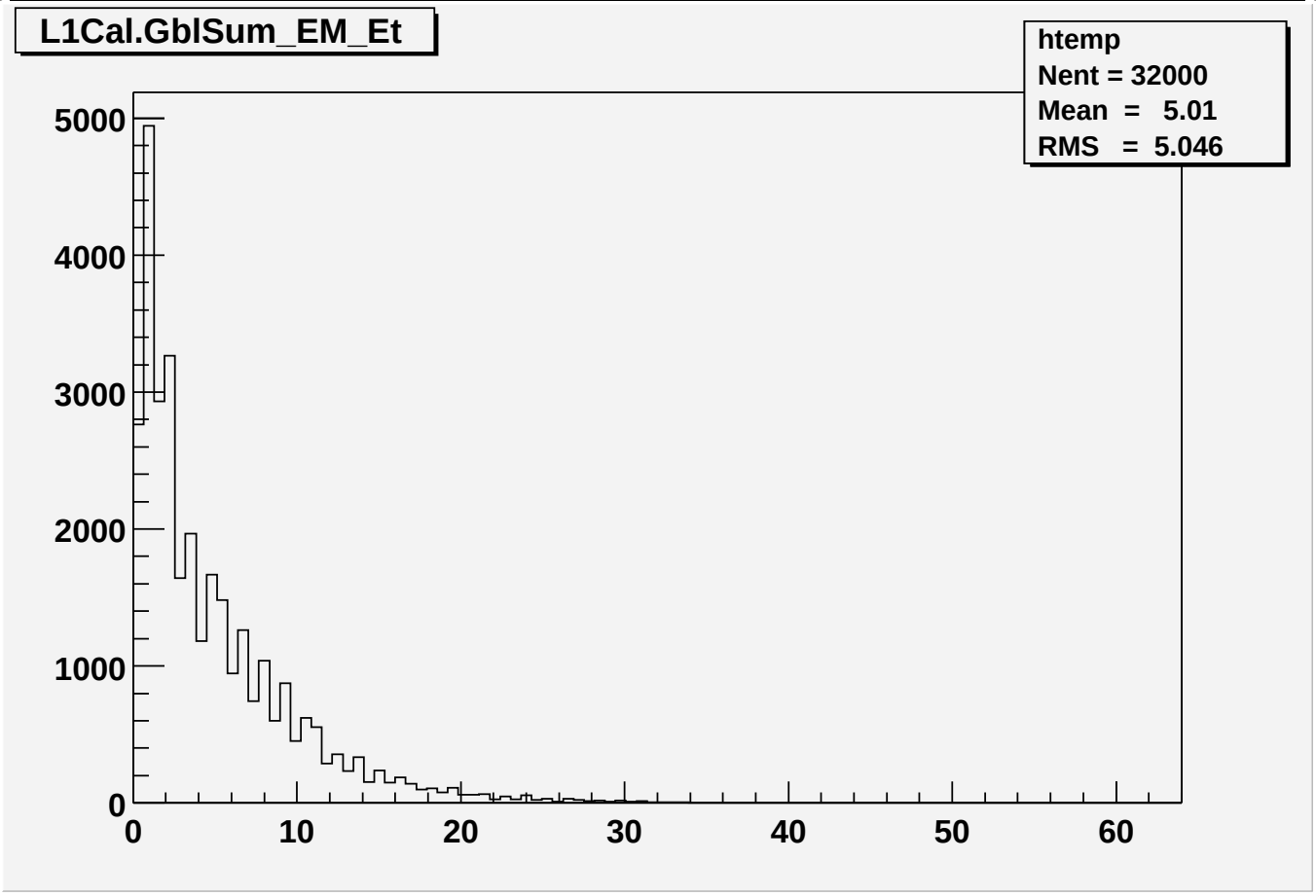

Status in p08 - current

- p08.12.00 release is very stable...have yet to see it crash on a good input file. We have processed 100s of thousands of events.
- L1 pieces are all there in some form except FPS. FT, CPS come from tsim_l1ft package. CAL is tsim_l1cal. MUON is tsim_l1muo.
- L2 Global EM (electron) and Jet algorithm are there. All preprocessors except muon....but not all run by default.
- L3 jet, electron, global tracking, tau and more. No muons.
- Simple 14 term trigger list supplied by triggermeister. Very difficult to change in this release. Easy to evaluate rate at which L1 bits fire in this release.
- See trigsim website for example macros, known problems, etc.
- First attempt at rate prediction being presented by triggermeister at ADM meeting (right now??)

Status in p09 and beyond

- p09 still under testing. Has many improvements in available L3 output and L2 Global output. L2 Global "bits" are now output to ntuple in easy-to-use form.
- p10 should contain much-improved cal weights and cell mappings....we look forward to this...
- biggest push now is to get trigsim running on real data. Hope most work makes it into p10.
- Also waiting for interface to trigger database. This will allow easy access to other trigger lists.

Samples

- Known weaknesses include lack of RunII cell mapping for cal and proper weights in trigtowers. Samples generated with d0sim in p10 (end of summer?) should have a fix.
- Recently the lancaster farm has produced 220k events of QCD with Pt>2GeV plus smaller numbers in higher Pt thresholds.
- These are the first good test samples for trigsim. Look in SAM:

  `qcd_mcp06_d0reco_pythia_ptgt2.0_mb-poission-0.7`

- More samples to come with higher mb overlay (triggermeister request).

Summary

- Despite its youth, d0trigsim has become useful!
- In addition to calculating efficiency and rates for existing trigger lists all info used to make decision can be kept in the ntuple. Allows a lot of flexibility.
- We have already been interacting with people doing RunIIb studies, they seem to be progressing nicely.
- See

  http://www-d0.fnal.gov/computing/trigsim/trigsim.html

  or contact me (oneil@fnal.gov) to get started.