



Exotica Hotline

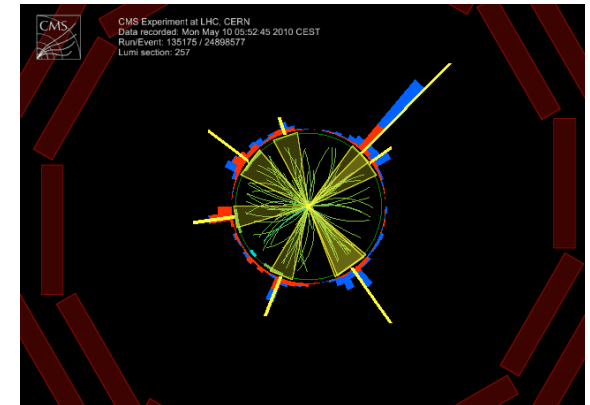
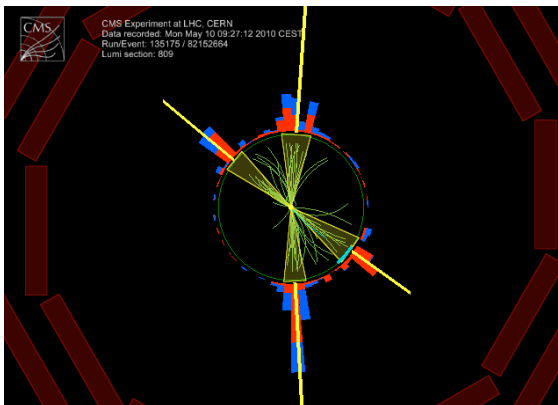


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(On behalf of the Exotica Group)

Physics Plenary (May 19th, 2010)



Exotica “Hotline”

- Use the Express Stream as a “hotline” for events with new physics signatures:
 - events with a large “sum H_T ” or five or more jets above a certain threshold
 - events with large missing E_T/H_T
 - events with high track multiplicities
 - events with high transverse momentum objects (electrons, muons, photons) above a certain threshold
 - anomalously high activity in certain detectors
 - etc.
- Aim for a max. of ~100 interesting events per day
- Hotline to provide first glimpse of “unusual” activity and enable prompt action
- Also helps provide fast feedback to DPGs and POGs

The Hotline workflow

Step 1:

- The existing Express stream (ES) serves our purpose well i.e. no need to define a separate stream
 - avoids imposing additional resources at HLT/online
- The current list of ES trigger bits (unprescaled single/double object triggers) work well
- In the future, for higher luminosity scenarios, ES bits will be proposed (as needed) by putting higher thresholds on existing triggers and/or looking for higher multiplicity events
 - will include appropriate rate and timing studies
 - Total Express stream rate should be under ~40 Hz
 - Tight CPU budget at HLT
 - ES bits should not add to total HLT rate or cpu time

The Hotline workflow

Step 2:

- Automatic machinery set up on CAF for running "skim" jobs daily starting from the reconstructed express stream data
 - 1 root file produced per day
 - lists of interesting run #/ event #/ lumi section and the filters that fired produced as well
 - to include detailed information regarding object (p_T , η , ϕ , isolation,...)
- Uses flexible code that can be modified/updated whenever needed
 - Not tied to specific releases
 - Resides in [UserCode/ExoticaHotLine/](#)
- Uses reconstructed quantities and trigger bits for optimal filtering
 - RECO information particularly useful for the cases cpu consumption may be prohibitive @ HLT
 - e.g. look for events with > 4000 tracks

Hotline Twiki

<https://twiki.cern.ch/twiki/bin/view/CMS/ExoticaHotline>

ExoticaHotline < CMS < TWiki

cern.ch <https://twiki.cern.ch/twiki/bin/view/CMS/ExoticaHotline>

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Physics We... cmstv Elog [CMSSW] In... HLT config ... CMSSW/DP... A...

CMS

CMS Homepage
CMS Twiki
Changes
Index

SSO logout

Create a LeftBar

TWiki > CMS Web > ExoticaHotline (11-May-2010, TulikaBose)

Exotica Hotline

- ↓ [Aim](#)
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- ↓ [Current list of filters implemented](#)
- ↓ ["Cleaning" criteria implemented](#)
 - ↓ [Event cleaning](#)
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 - ↓ [Cleanings to be implemented](#)
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Hotline Filters

- **Jets:**
 - > 1 jet with $p_T > 200$ GeV
 - > 5 jets with $p_T > 40$ GeV
- **MET/HT:**
 - MET > 250 GeV
 - HT > 300 GeV
- **Electrons/Muons:**
 - > 1 electron (muon) with $p_T > 100$ GeV
 - > 2 electrons (muons) with $p_T > 15$ GeV
- **Photons:**
 - > 1 photon with $p_T > 100$ GeV
 - > 3 photons with $p_T > 20$ GeV
- **Misc:**
 - > 3500 tracks
 - > 1 track with $p_T > 50$ GeV and $dE/dX > 5.6$ MeV/cm

Cleaning criteria

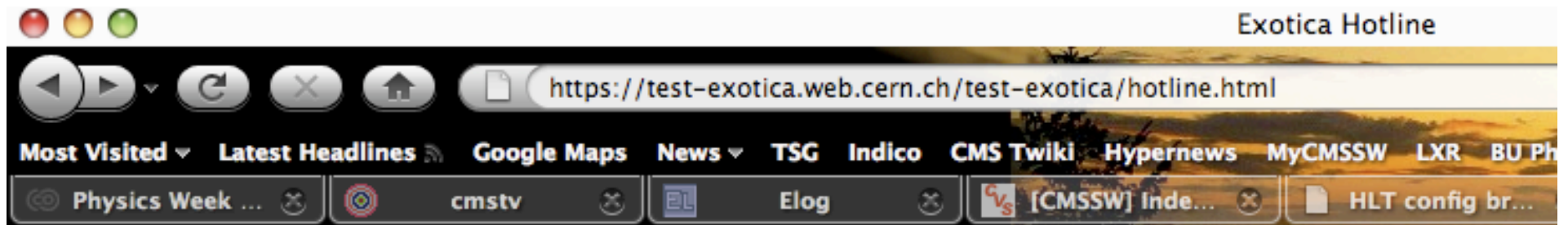
- Good primary vertex
- Physics Declared info from L1
- Reject scraping events
- Reject ECAL spikes (HLT bit, swiss cross)
- Reject HBHE HPD noise (HF noise filter being incorporated)
- Loose set of criteria suggested by Exotica Jet/Electron/Muon/Photon groups (JetID, H/E, isolation, etc.)
 - in consultation with DPGs and POGs

Detailed list at <https://twiki.cern.ch/twiki/bin/view/CMS/ExoticaHotline>

Filter selection and cleaning criteria being updated/optimized for higher luminosities

Hotline webpage

<https://test-exotica.web.cern.ch/test-exotica/hotline.html>



CMS Exotica Hotline

Here are some old event displays:

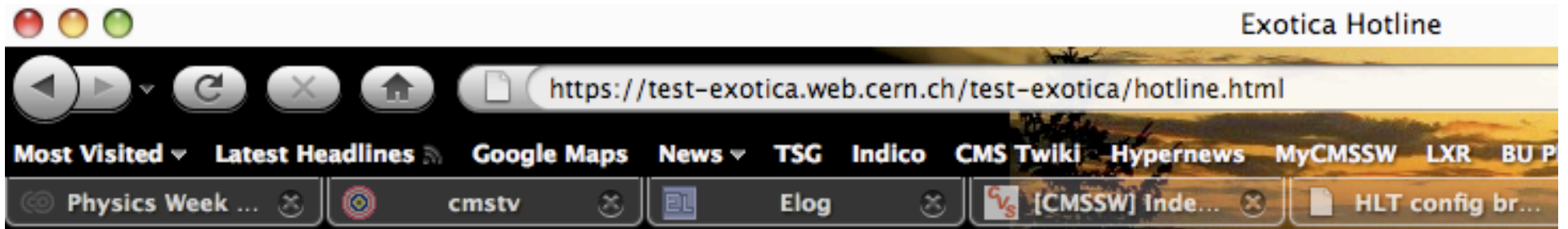
Here are some old root files:

Newer data will appear in directories each day. Choose the date you wish to scan below:

Date:

Hotline webpage

<https://test-exotica.web.cern.ch/test-exotica/hotline.html>



CMS Exotica Hotline

Here are the auto event displays (not working yet):

Here are this date's root files:

[2010_05_15.root](#)

[hotLineSummaryPlot.root](#)

Here are this date's summary files:

[ListOfEventsPerFilter.stat](#)

[ListOfFiltersPerEvent.stat](#)

Hotline summary

```
-----  
Event:  
  Run   number   = 135521  
  Event number = 20894946  
  Lumi  section = 196  
  List of Filters fired by this event:  
filterHighHt  
filterHighMet  
filterHighPtJet
```

```
-----  
Event:  
  Run   number   = 135521  
  Event number = 38258053  
  Lumi  section = 280  
  List of Filters fired by this event:  
filterMultiMuon
```

```
-----  
Event:  
  Run   number   = 135521  
  Event number = 42422711  
  Lumi  section = 300  
  List of Filters fired by this event:  
filterMultiMuon  
-----
```

Hotline ELOG

Enthusiastic team of scanners examine the root files and enter comments

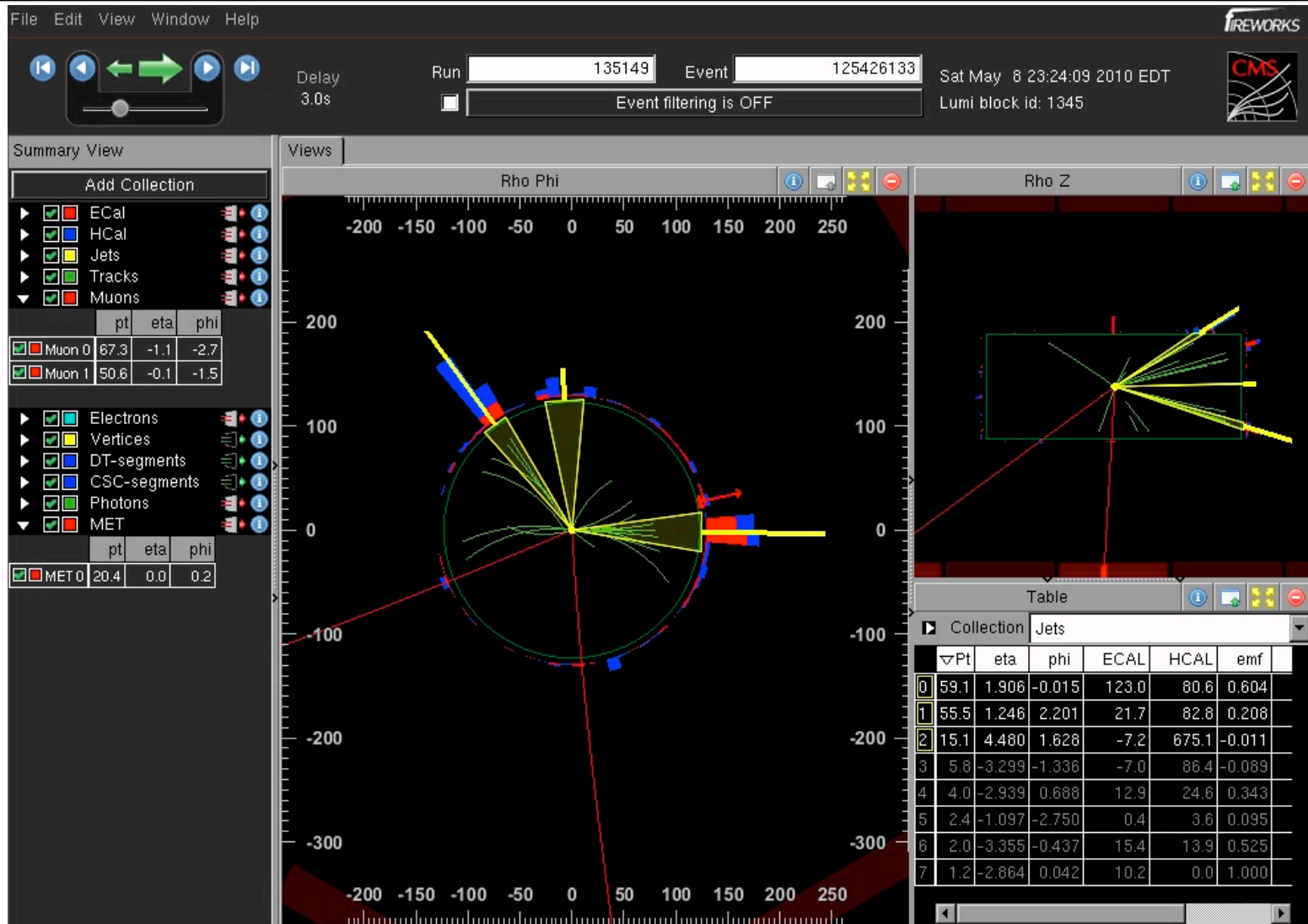
The screenshot shows a web browser window displaying the CMS online system Elog page. The browser's address bar shows the URL: http://cmsonline.cern.ch/portal/page/portal/CMS online system/Elog?_piref815_429145_815_429142_429142.strutsAct. The browser's navigation bar includes "Most Visited", "Latest Headlines", "Google Maps", "News", "TSG", "Indico", "CMS Twiki", "Hypernews", "MyCMSSW", "LXR", "BU Physics", "BU Faculty", "PY898", "DBS", "EVO", and "OnlineW". The browser's tab bar shows several open tabs, including "Physics Week ...", "cmstv", "Elog", "[CMSSW] inde...", "HLT config br...", "CMSSW/DPGA...", and "AFS ACLs - C".

The page content is titled "Exotica Hotline Page 1 of 2" and shows the user "User: TULIKA BOSE". The page has a navigation menu with "Hide Menu" and a list of categories: "Computing Shifts", "ECAL OD Boards-History", "General", and "Subsystems". The "Subsystems" category is expanded, showing a list of sub-categories: "Alignment", "BRM", "CASTOR", "CSC", "Castor TB", "CentralRunControl", "DAQ", "DAQ on call", "DCS", "DCS expert", "DT", "ECAL", "ECAL & HCAL TB", "ECAL Cosmics", "ECAL H4", "ECAL-DCS", "ECAL-shift", "Ecal Endcap Integration", "Event Display and DQM", "Exotica Hotline", "GCT", "Gas", and "HCAL".

The main content area displays a list of log entries, each with a timestamp, author, and description. The entries are as follows:

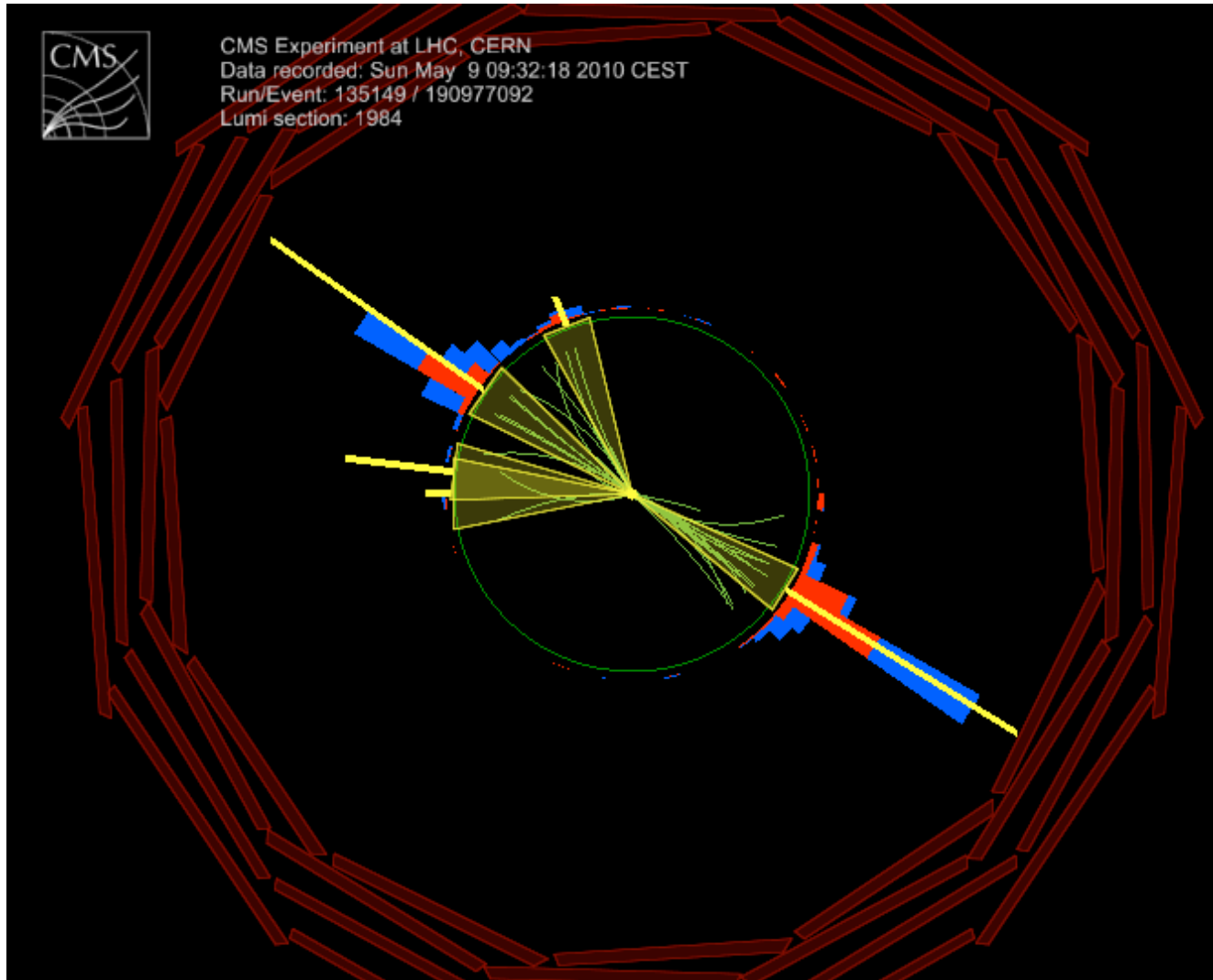
Timestamp	Author	Description
MON 17.MAY.10 14:49:08	Greg LANDSBERG	Interesting Event, Cosmic shower
MON 17.MAY.10 14:42:36	Greg LANDSBERG	Summary of the Event Scan, Hint on filtering out non-collision events
MON 17.MAY.10 11:58:16	Alexey FERAPONTOV	New Hotline Output, Calibration events?
→ MON 17.MAY.10 12:12:50	Tulika BOSE	New Hotline Output, Calibration events?
→ MON 17.MAY.10 12:18:28	Alexey FERAPONTOV	New Hotline Output, Calibration events?
→ MON 17.MAY.10 12:30:04	Tulika BOSE	New Hotline Output, Calibration events?
→ MON 17.MAY.10 22:24:33	Piotr TRACZYK	New Hotline Output, Calibration events?
MON 17.MAY.10 11:57:16	Greg LANDSBERG	New Hotline Output, Scan of the 16-05-10 output
SUN 16.MAY.10 23:06:49	Greg LANDSBERG	New Hotline Output, Scan of the 15-05-10 output - part deux
SUN 16.MAY.10 15:32:43	Greg LANDSBERG	New Hotline Output, Scan of the 15-05-10 output
SUN 16.MAY.10 14:56:54	Dan GREEN	New Hotline Output, problem with 15_05 root file
→ SUN 16.MAY.10 16:23:14	Greg LANDSBERG	New Hotline Output, problem with 15_05 root file
THU 13.MAY.10 16:19:07	Greg LANDSBERG	Interesting Event, Beam halo event from 05-10-2010 file
WED 12.MAY.10 21:47:29	Dan GREEN	Interesting Event, follow up - cosmics from 11-05 data
WED 12.MAY.10 14:19:13	Greg LANDSBERG	New Hotline Output, Scan results of the 11-05-10 output
WED 12.MAY.10 14:06:08	Greg LANDSBERG	Interesting Event, Interesting event from the last cosmics run
TUE 11.MAY.10 16:49:11	Alexey FERAPONTOV	Summary of the Event Scan, 2010-05-10 (partial) report
MON 10.MAY.10 18:48:49	Greg LANDSBERG	Interesting Event, Z+jets candidate?
→ MON 10.MAY.10 21:58:29	Leonardo BENUCCI	Interesting Event, Z+jets candidate?
→ MON 10.MAY.10 22:03:47	Alexey FERAPONTOV	Interesting Event, Z+jets candidate?
→ TUE 11.MAY.10 09:28:53	Martijn MULDER	Interesting Event, Z+jets candidate?
MON 10.MAY.10 18:27:05	Dan GREEN	Summary of the Event Scan, 05_07 events

“Discoveries”



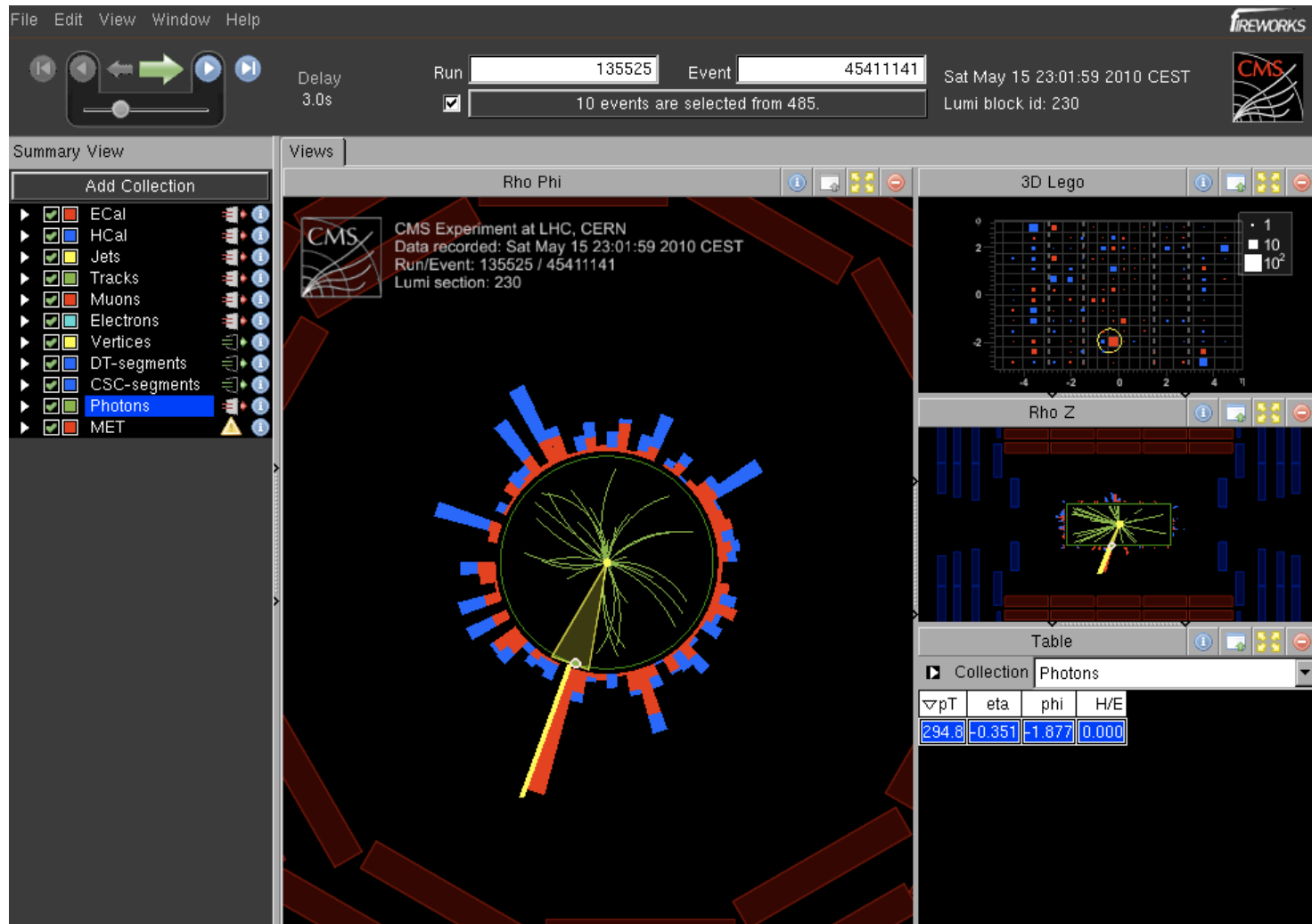
Z + jets event (found around the same time as Muon POG/EWK PAG)

Interesting events...



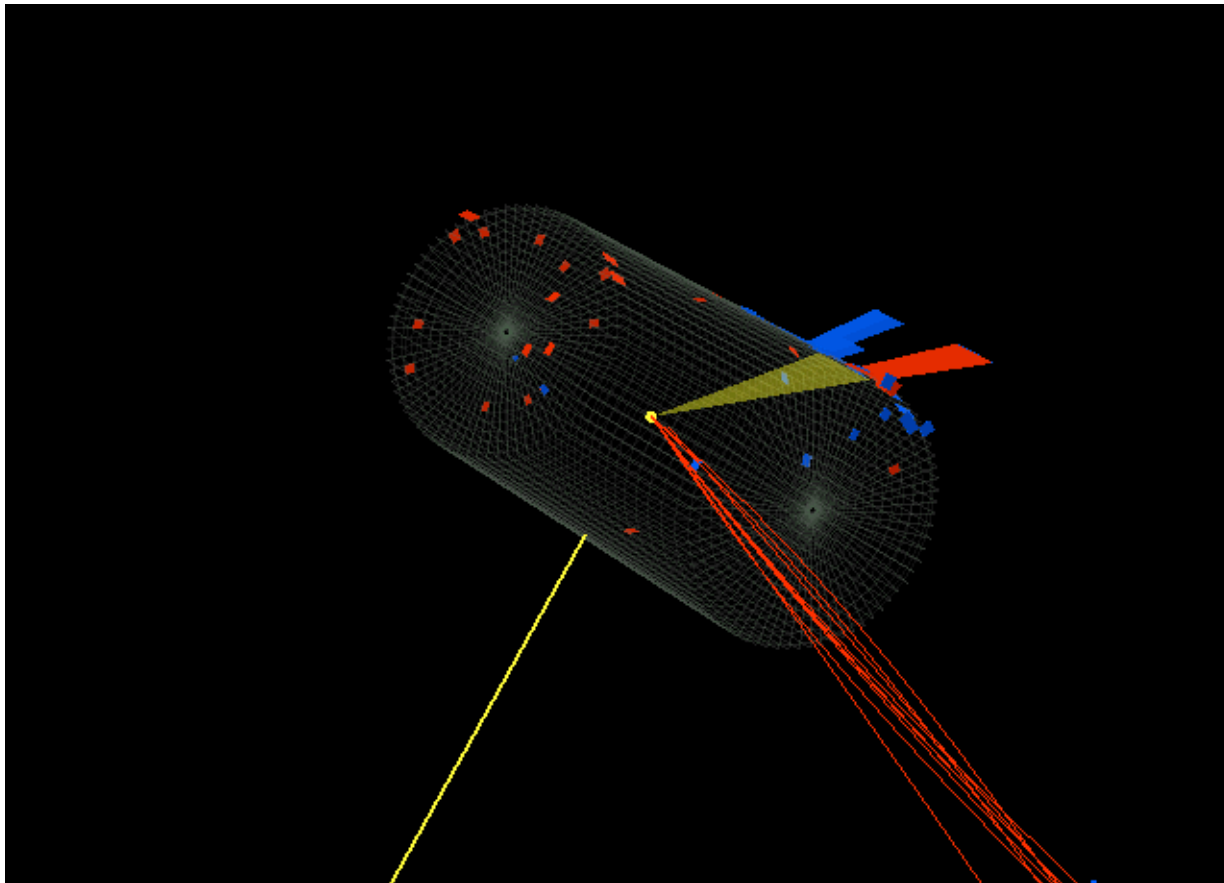
Very energetic multijet event with ~ 500 GeV HT

Interesting events...



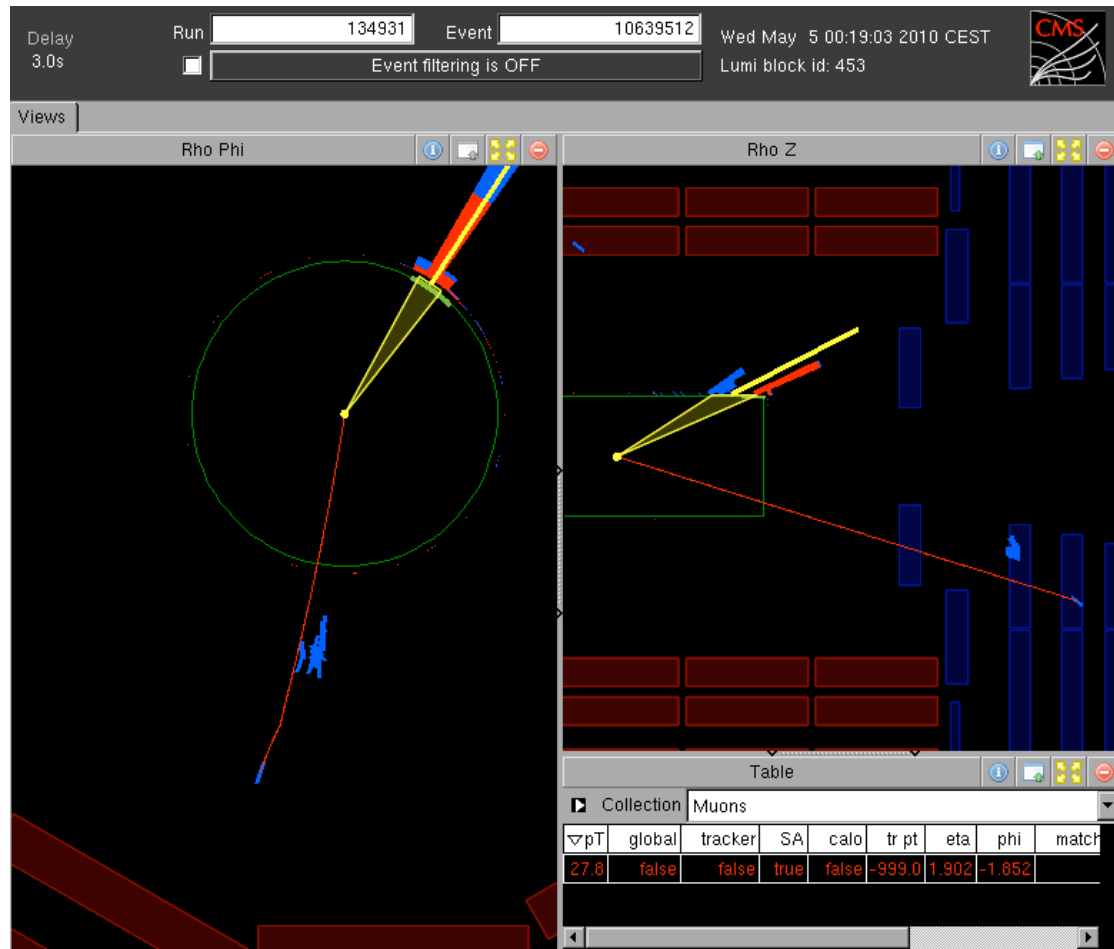
High p_T (~ 300 GeV) photon event

Odd muons



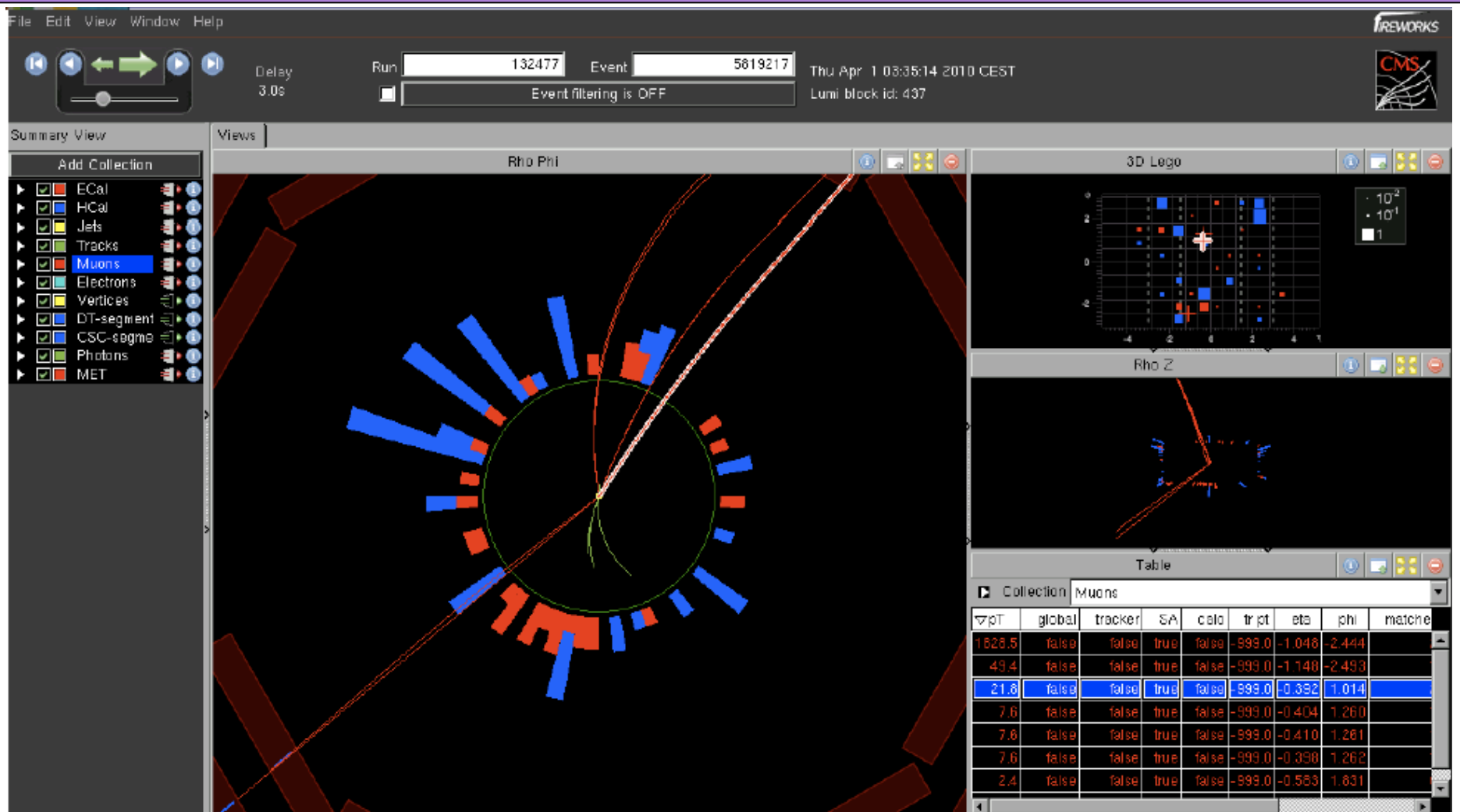
A cosmic muon showers in the CSC producing 19 segments that result in 9 STA muons
Reported to the Muon POG

Odd muons



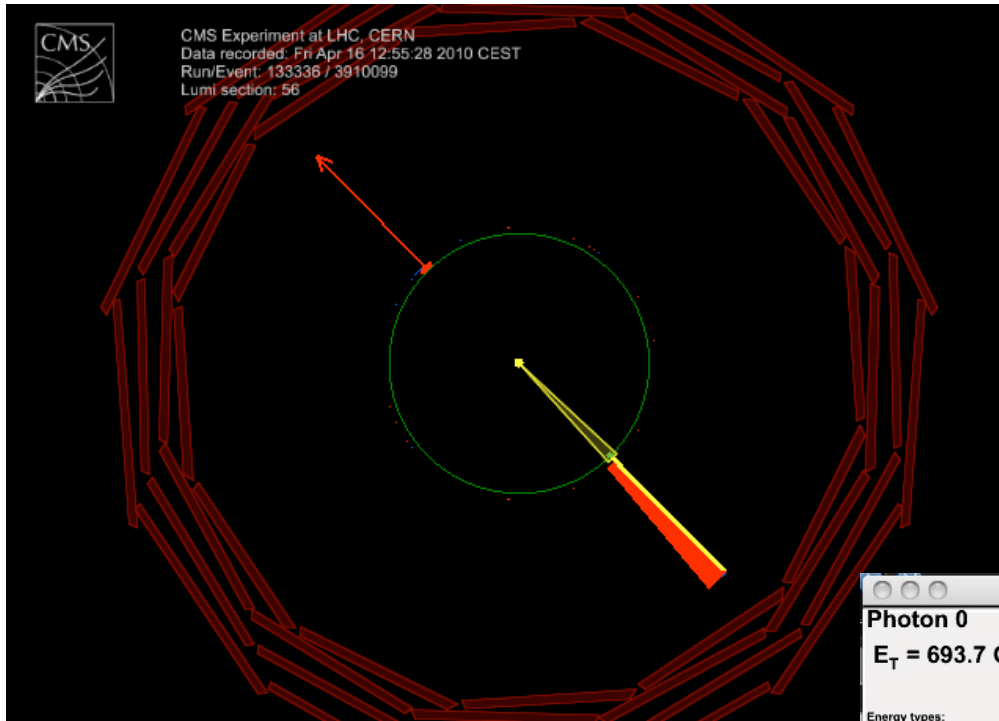
Only one standalone track remains after using an improved version of the muon trajectory cleaner (fix courtesy Daniele Trocino)

Odd muons

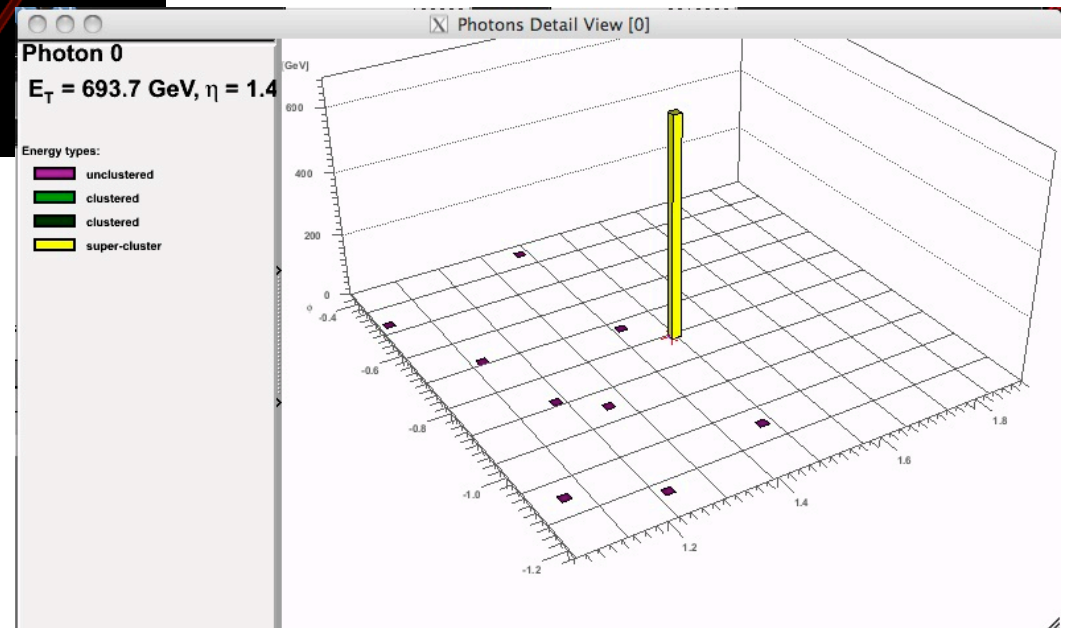


7 standalone muons!! 1.8 TeV muon – out of time cosmic in coincidence with minimum bias events....? Reported to the Muon POG – under investigation.

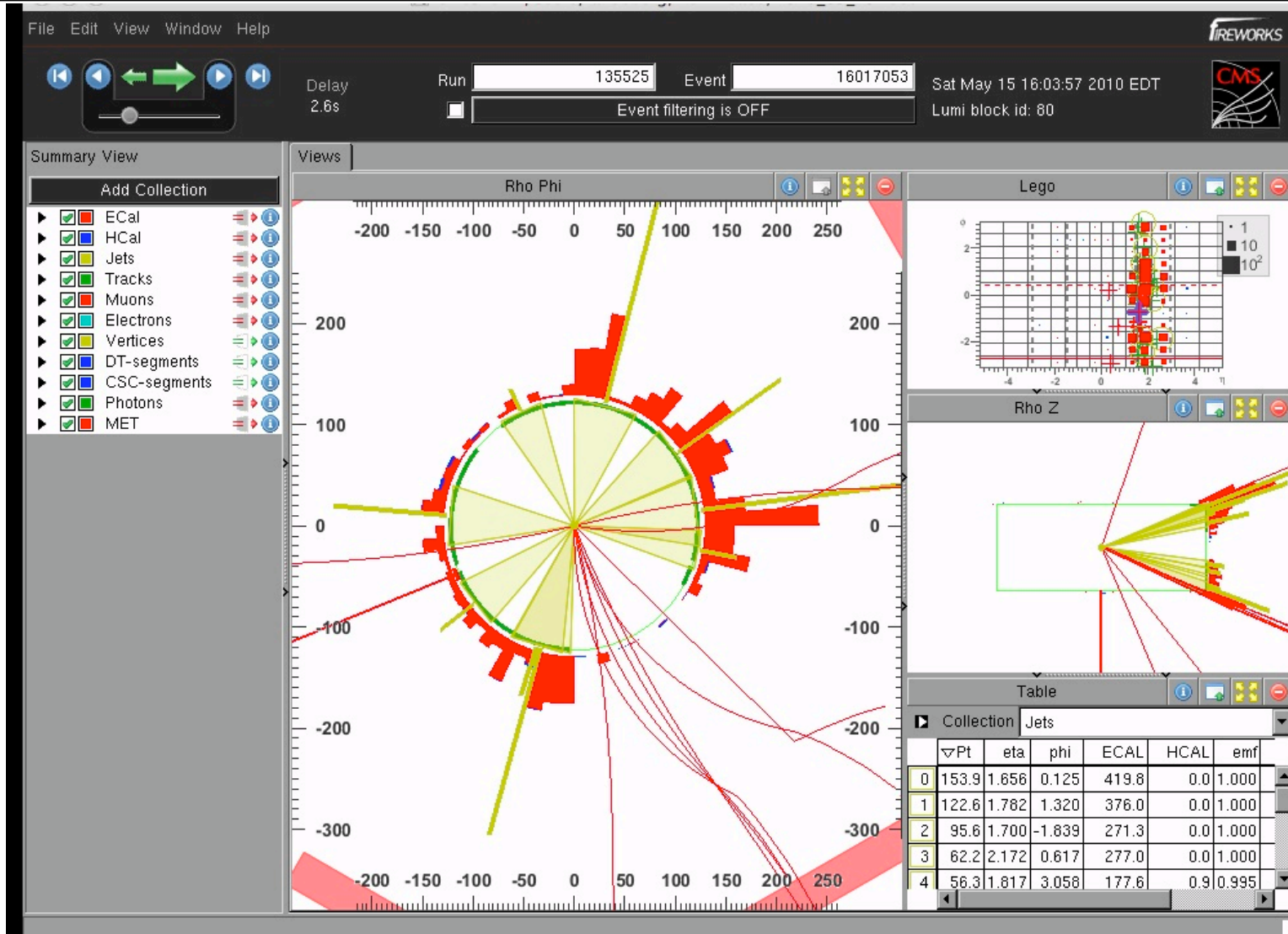
EB/EE boundary spike



Reported to ECAL DPG

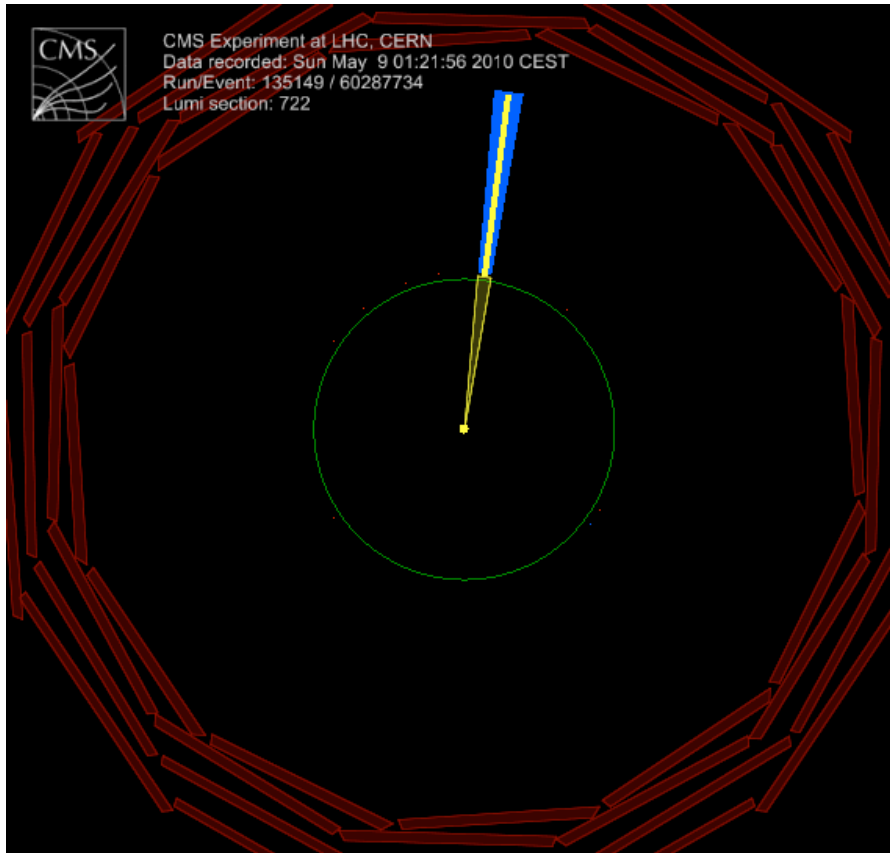


Coherent EE noise

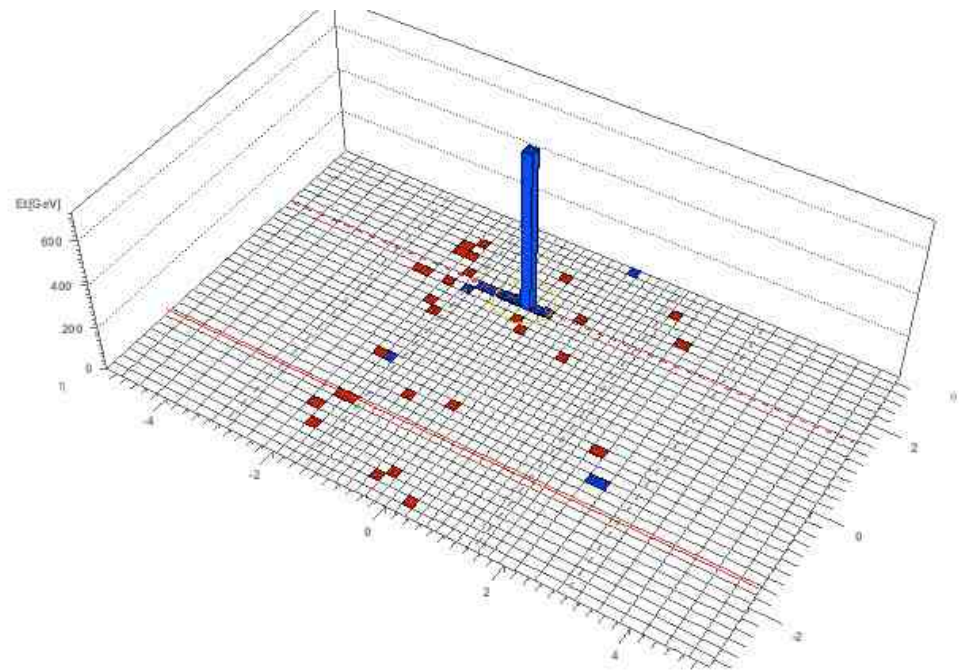


Coherent EE noise event

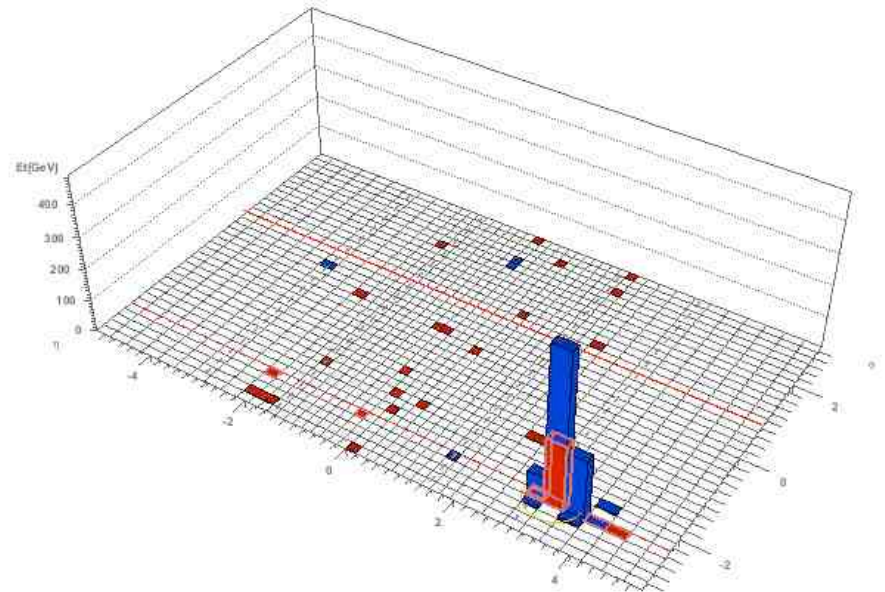
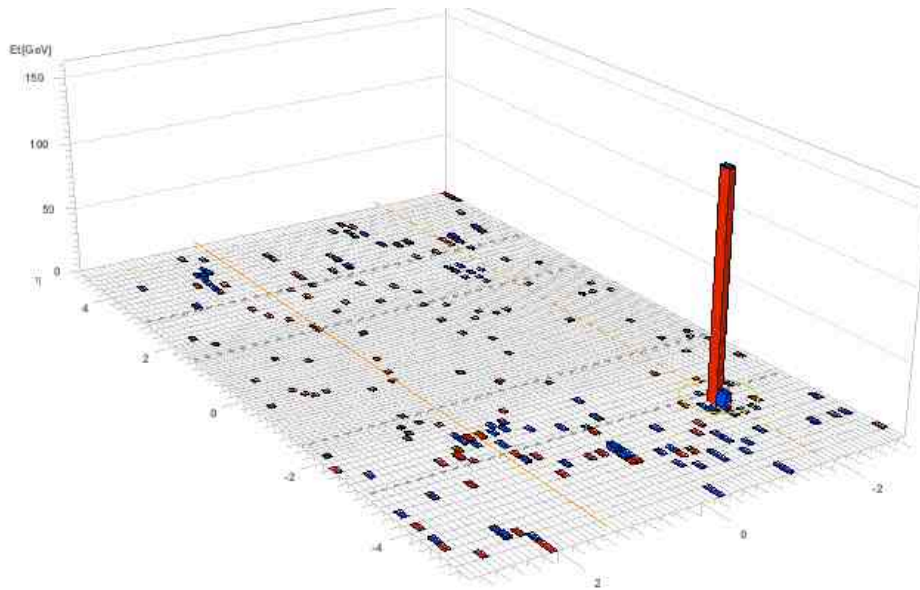
HB/HE HPD noise



Reported to HCAL DPG – testing fix



HF noise



HF PMT noise event

Summary

- The Exotica Hotline is in place and working very well
- It has already identified interesting physics events and odd detector/instrumental effects
- Developers and scanners are maintaining close contact with the DPGs and POGs and are providing feedback and implementing DPG/POG recommended changes, cleaning criteria
- Work on streamlining parts of the workflow and producing event displays in addition to the root files is ongoing
- Selection criteria are being optimized (and scaled based on increasing luminosity)

Outlook

- Comments/feedback/suggestions ?
- Please contact any of the primary hotline developers:
 - Tulika Bose, Massimiliano Chiorboli, Maurizio Pierini, Ellie Twedt
 - Exotica conveners (Greg and Chris)
 - Or send e-mail to cms-exotica-hotline@cern.ch
- Please volunteer to join the team of scanners
 - Dan Green, Greg Landsberg, Leo Benucci, Joel Goldstein, Alexey Ferapontov, Philippe Mine...
 - Only requirement: laptop/desktop that can run Fireworks
 - ... and the next discovery may be yours !!

