

Yandex



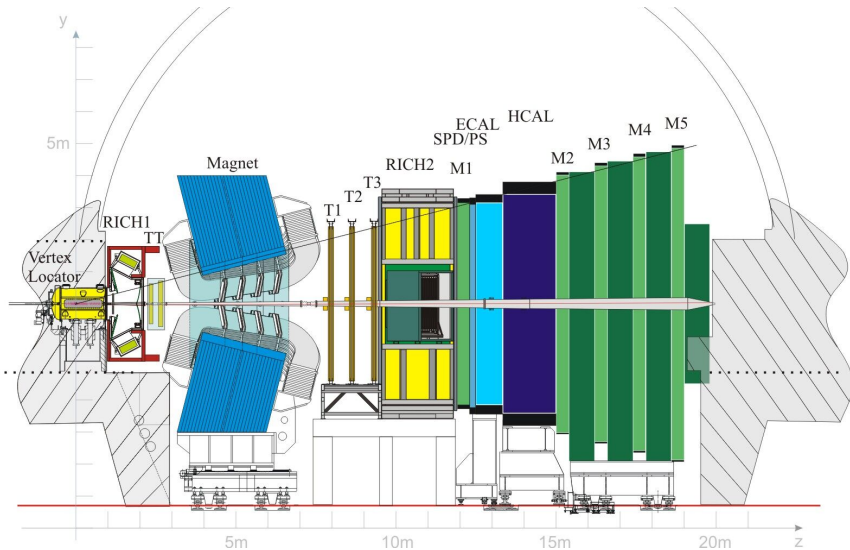
SCHOOL OF DATA ANALYSIS

Ideas on anomalies detection in LHCb

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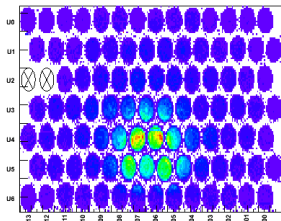
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Introducing the problem

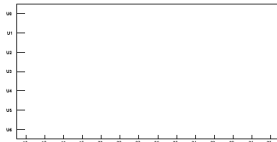


- [-] L0DU: page 2: Decisions Overview
- [-] L0DU: page 3: TCK monitoring
- [-] L0MUON: Status
- [-] LHCb: Total Event Size
- [-] MUON:1: Hits by ODE
- [-] MUON:2: Timing
- [-] MUON:3: Hit Density Maps
- [-] OT: Shift_Errors
- [-] OT: Summary
- [-] **PR3: Pr3 Status Overview**
- [-] RIC1: HPDs panels.
- [-] RIC2: HPDs panels.
- [-] SPD: Spd Status Overview
- [-] TT: Clusters
- [-] TT: Error banks
- [-] Trigger rates
- [-] VELO: Power-On
- [-] VELO: Vertices
- [-] VELO: ZS Overview
- [-] TT
 - [-] Expert
 - [-] Shift

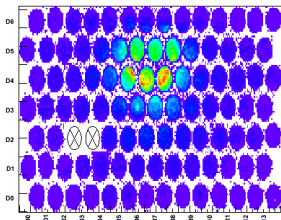
HitMap for Rich1 top panel



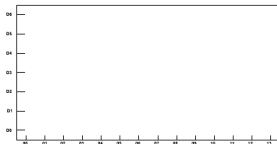
Disabled HPDs inRich1top



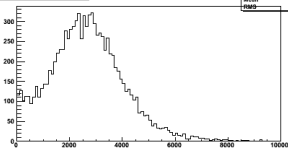
HitMap for Rich1 bottom panel



Disabled HPDs inRich1bottom



Number of hits in RIC1



Alarms from Automatic Analysis

- 2 Alarms 0 Warnings 102 archived
- CALO: EcoAnalysis.LargePedestal/Noise monit
- CALO: HcalAnalysis.LargePedestal/Noise monit
- archive

Page Comments

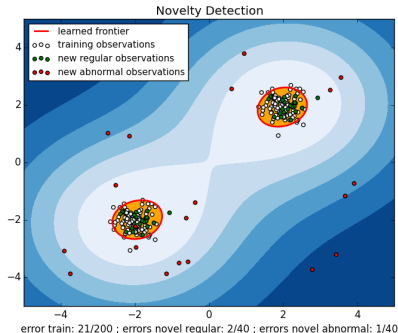
Data Manager RIC1 page.
 On left the RIC1 panels hit maps. The black crosses indicate the known missing HPDs.
 On right the map of disabled HPDs (top and middle histograms) and the total number of hits in RIC1 (bottom histogram).
 For further information see TWiki page:
<http://twiki.lbdg.cern.ch/bin/view/RIC1/DataManagerPresenterPage>
 If a new HPD is found missing in the hitmaps (i.e., an HPD not "crossed out" in the presenter page)

The contemporary monitoring system

- › Accumulates various channels into histograms by run
- › Presents them to shifter
- › Presents expert-selected references to shifter
- › Has automatic alarms with expert-defined logic. Uses the Kolmogorov—Smirnov, mean difference, fit parameters difference.

Reference-based one-class classification

- › Use the available metrics for comparing to the reference
- › Feed the points to the algorithm
- › Ask expert to confirm/mark false alarms
- › In principle, no better than the current automatic alarms.
- › Should reduce human factor - no initiative to setup an alarm will be required.



Distribution constancy for trigger lines

- › All the physical events come from the same distribution.
- › The lines are designed to select the events from a particular physical phase subspace.
- › If the distribution of lines outputs changes, they no longer select the events from a particular physical phase subspace.

Distribution constancy for trigger lines

- › Take two events samples
- › Build a classifier with the lines responses as features and sample id as a label
- › Compute the cross-validation AUC score on the samples
- › If $(\text{AUC} - 0.5) \gg 0$, this might be an anomaly.