Bad Spills 2016

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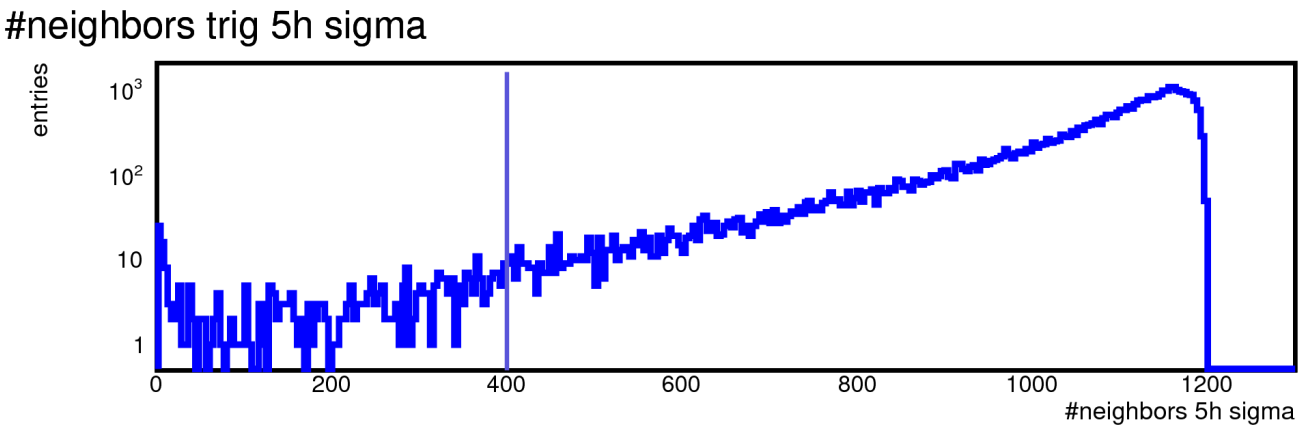
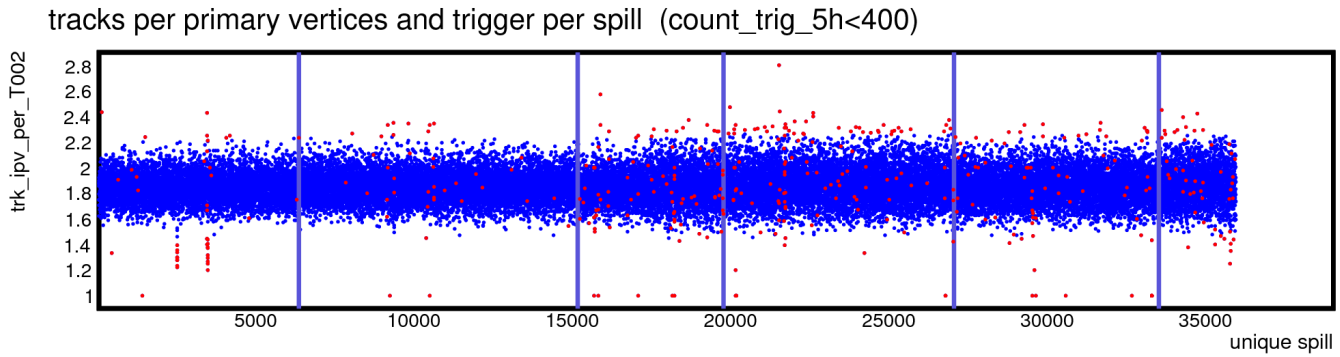
20^{th} December 2017

Overview

- Based on Heiners program
- Calculate RMS of distributions
- Count number of neighbours within RMS within 1200 spills
- Cut on minimal number of neighbours
- Here: > 400 neighbours within 5σ





Installation

- Tar file containing:
  - "phast_user"
    - Move into PHAST user folder
    - UserEvent11 for data selection
    - Classes for data selection
  - "spill_analysis"
    - Code for bad spill selection
    - Preparing root trees (kinematic range, calculating quantities ...)
    - Counting of neighbours
    - Selecting bad spills
- Tested with PHAST 7.141, ROOT 5.34/11
- Tested with PHAST 7.157, ROOT 6.10/04

Interesting parts

Phast part:

- Sum up variables per spill
- E.g. Number of primary vertices, number of triggers, ...
- Interesting files:
  - HDataQualityClasses
  - HDataQuality
  - HCalorimeter

Analysis part:

- spill_merger
  - Merge different files
  - Important: One file per run
  - Select the proper tree (e.g. $Q^2 > 1\,\mathrm{GeV}^2$)
  - Calculate further quantities
- counting
  - Uses option files
  - Counting number of neighbours
  - Different ranges ($3 - 6\sigma$)
  - Create new file
- bad_spill
  - Uses option files
  - Draw distributions
  - Mark bad spills

Counting bad spills

- Requires tree to be ordered
- Calculate RMS of distribution
- Counting in the range of $\pm X$ spills

$\Rightarrow$ Counting in the range of $\pm X$ entries

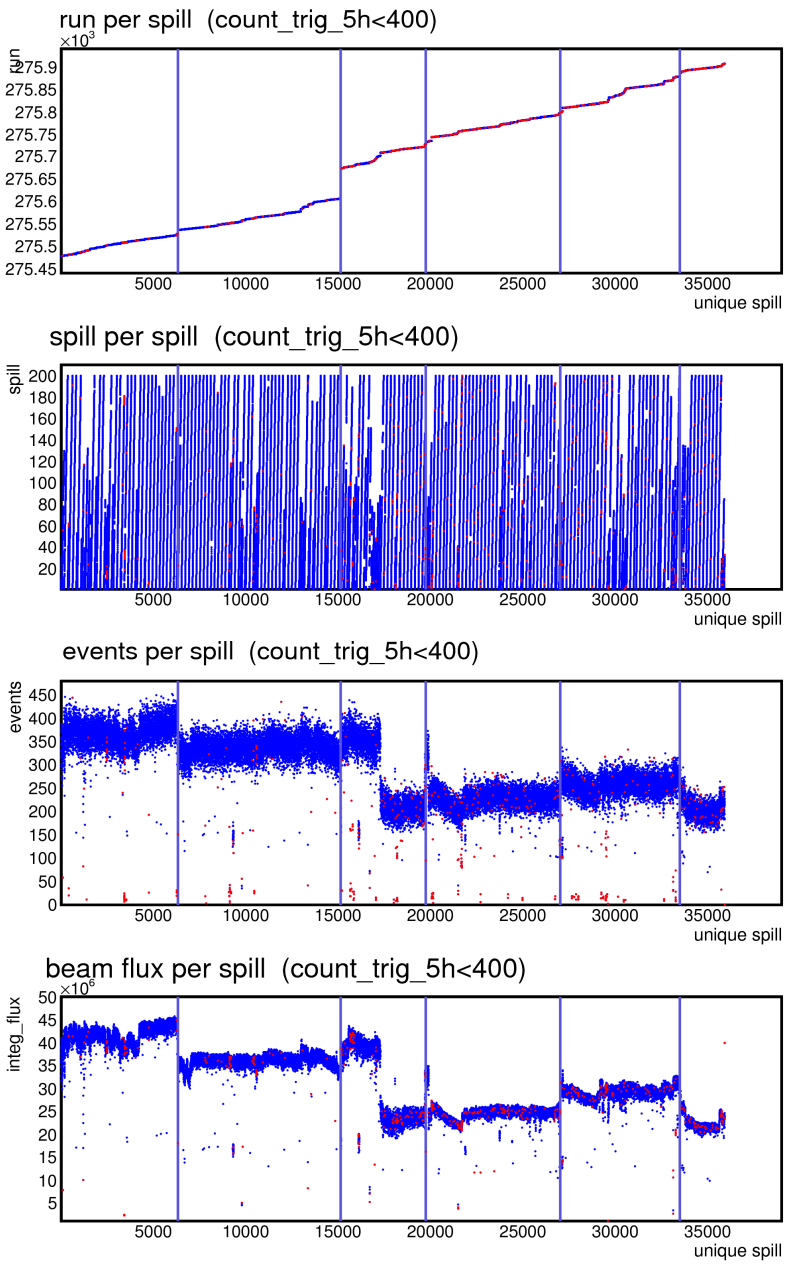
- Proper treatment for start/end

Method

- Create separate list for:
  - Triggers (MT,LT,OT,LAST,CT)
  - RICH
  - Calorimeters (EC,HC)
- Use badspill list suitable for each analysis
- Badspill selection for $Q^2 > 1\,\mathrm{GeV}/c$
- Various distributions available
- Variables per spill:

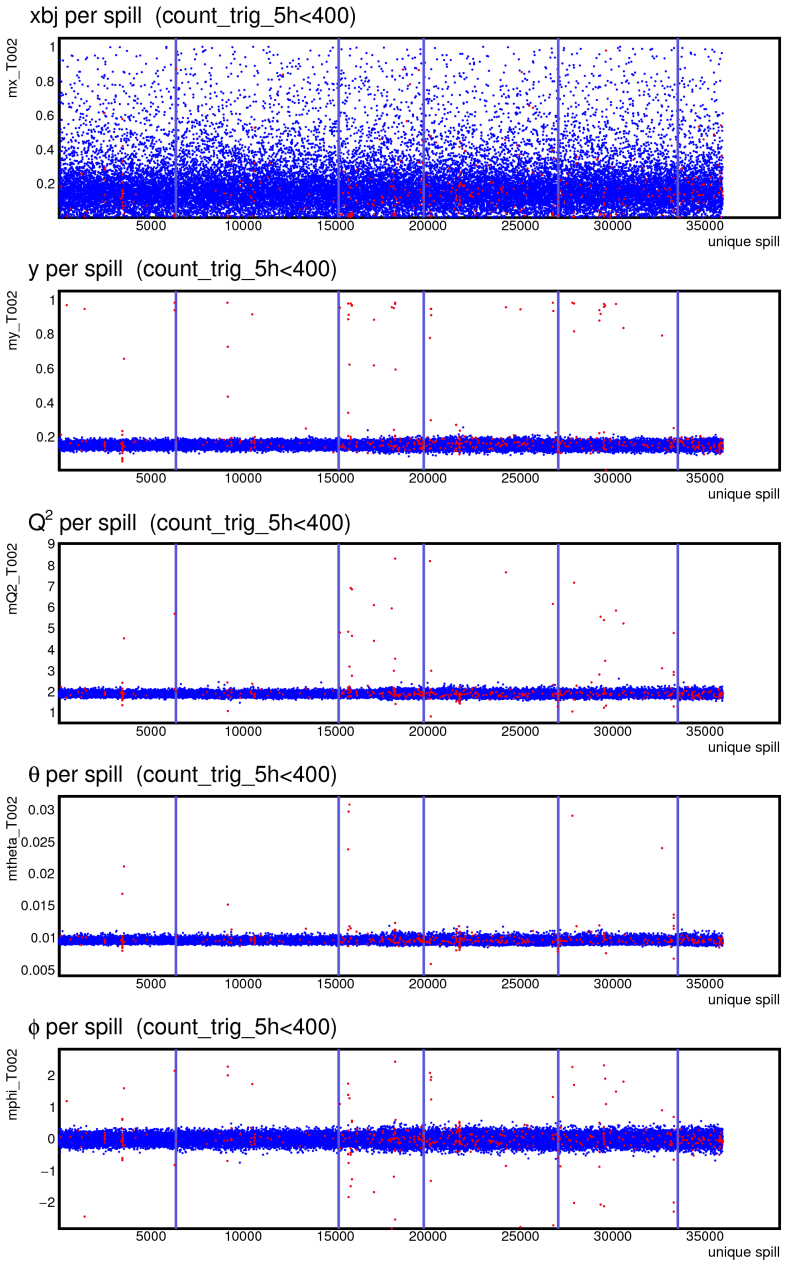
- Trigger
  - Prim. Vertices per event
  - Tracks per prim. vertex
  - Trigger per event
- RICH
  - LH values per track
  - Photons per track
  - Ring angle per track
- Calorimeter
  - Neutral clusters per event
  - Charged clusters per event
  - Energy per cluster

Example P09t1 MT



- Bad spills marked in red
- Vertical lines: Separate μ^+ and μ^-
- General information
- Kinematics
- Trigger specific information

Example P09t1 MT



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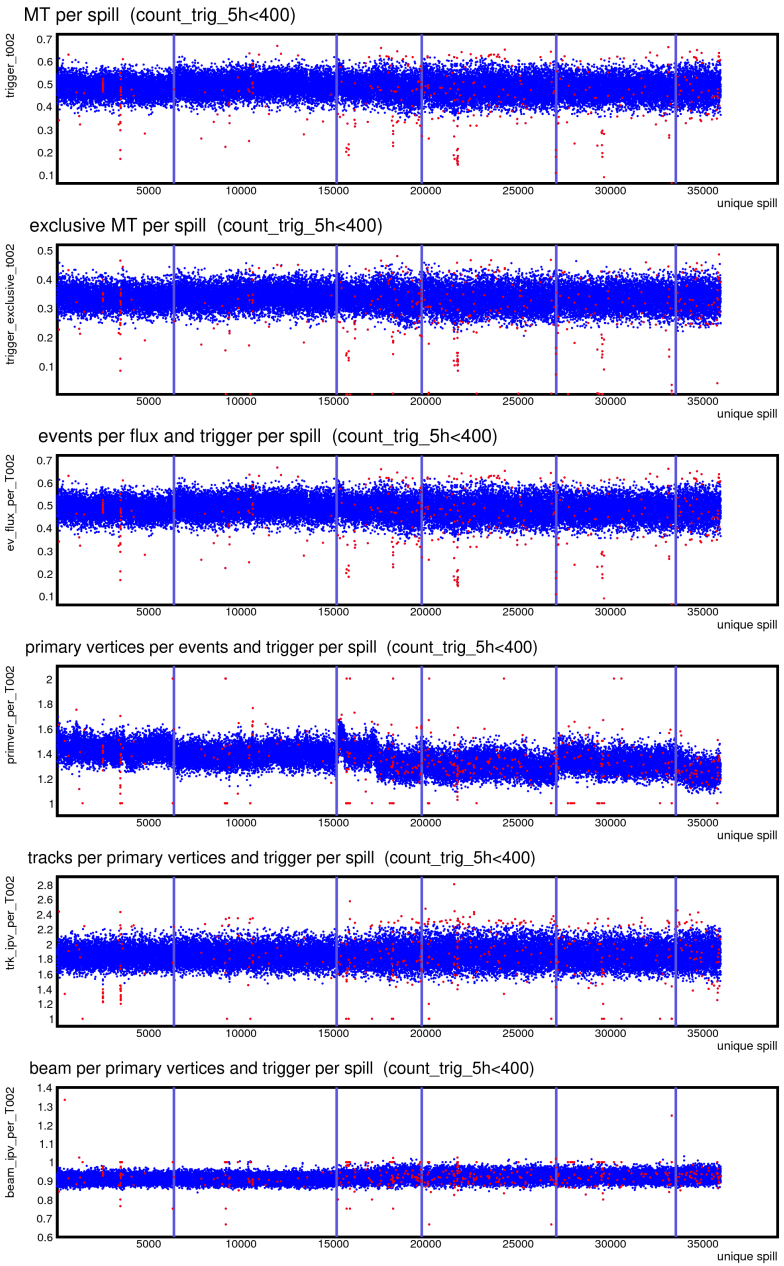

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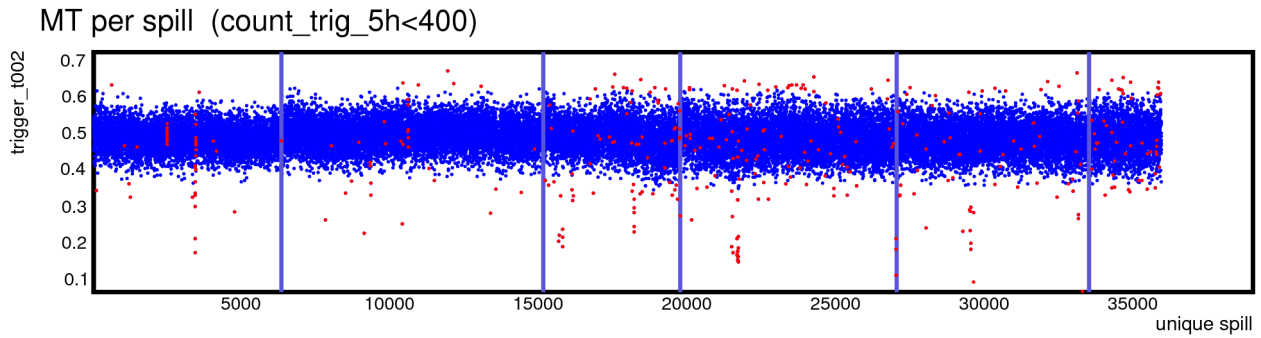
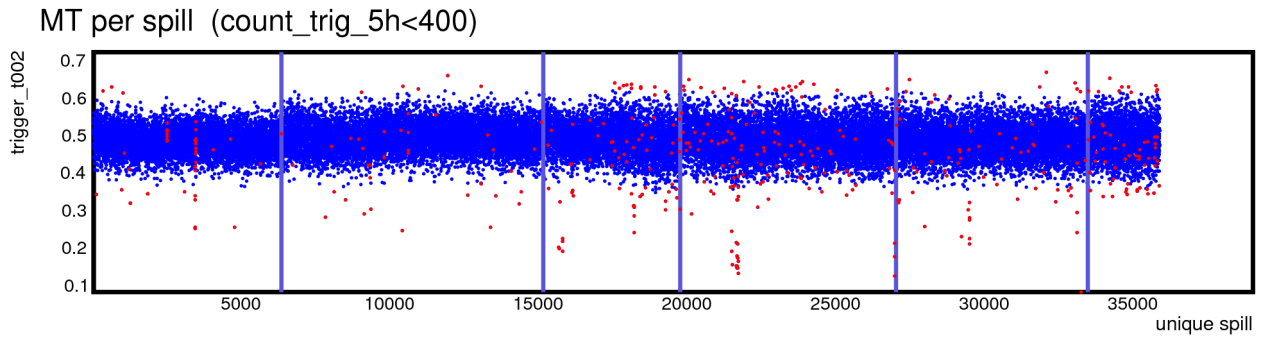
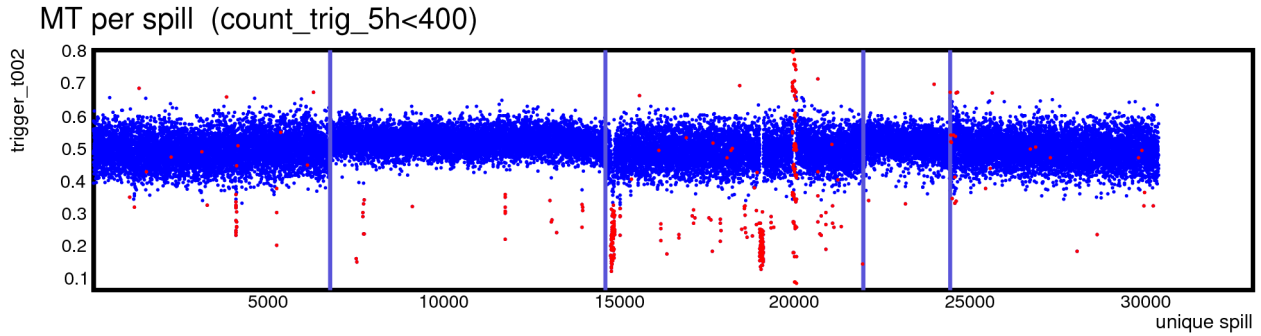
Comparison P09t1/P09t2/P10t1 MT



- P09t1



- P09t2



- P10t1
  - Problems in beam line

Summary

- Program is working with 2016 data
- Stable data taking
- Overview on the amount of bad spills

	MT	LT	OT	LAST	CT	Sum	RICH
P09t1	1.29%	2.23%	1.67%	1.40%	2.26%	6.00%	3.12%
P10t1	2.54%	2.88%	2.96%	2.03%	1.70%	5.02%	2.55%
P09t2	1.46%	2.07%	1.58%	1.46%	1.64%	5.93%	2.78%

	ECAL0	ECAL1	ECAL2	Sum
P09t1	1.21%	2.99%	2.97%	6.27%
P10t1	1.92%	2.77%	2.53%	4.35%
P09t2	1.22%	2.78%	2.54%	5.67%

	HCAL1	HCAL2	Sum
P09t1	2.65%	3.32%	5.44%
P10t1	2.49%	3.04%	3.86%
P09t2	2.52%	3.09%	5.11%