UNIVERSITÄT BONN

DATCON STATUS

PXD Workshop and 24th International Workshop on
DEPFET Detectors and Applications
16.05.2022

Bruno Deschamps

UNIVERSITÄT BONN

WHAT'S NEW ?

- I was completely away from DATCON but now back at it
- Ralf Farkas has joined the team
  - Work on implementing extrapolation and ROI creation directly from Hough Space via LUT (no more computation on FPGA)
- Left with stability issues
  - New run → link down
  - New run → DATCON does not start
  - During run → system stops (very often)
- Evaluated DATCON capabilities

UNIVERSITÄT BONN

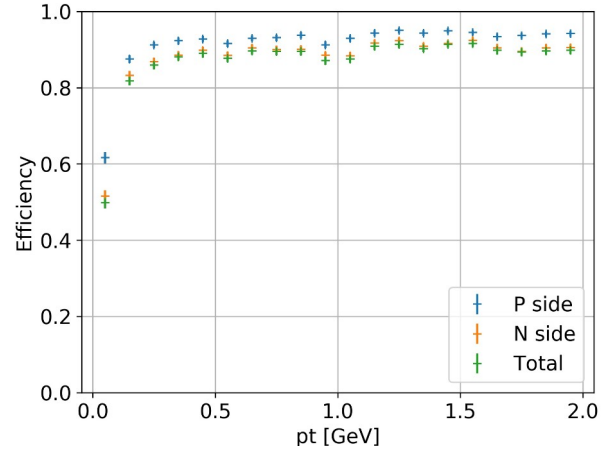
ALGORITHM

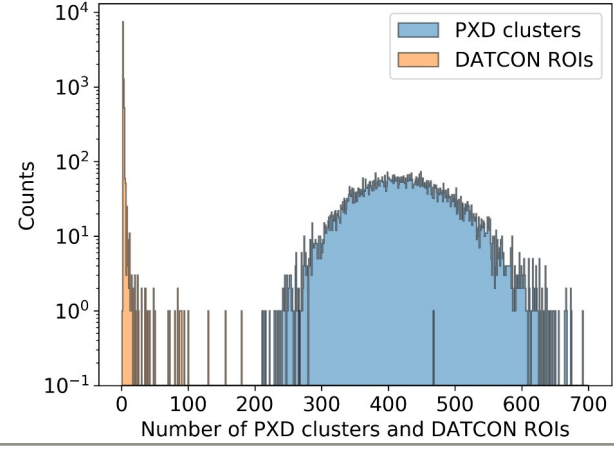
- Two parameters to define DATCON performance
- Data Reduction Factor (DRF)
  - Ratio between the number of active pixels and the total number of active pixels inside ROIs
  - $DRF = \frac{n_{PXD}}{n_{ROI}}$
- ROI finding efficiency (RFE)
  - Ratio of the number of tracks in a ROI over the total number of tracks
  - $RFE = \frac{\#\ \text{tracks in ROIs}}{\#\ \text{tracks}}$
  - A ROI which does contain hits from a track is not included

UNIVERSITÄT BONN

SINGLE TRACK + BKG

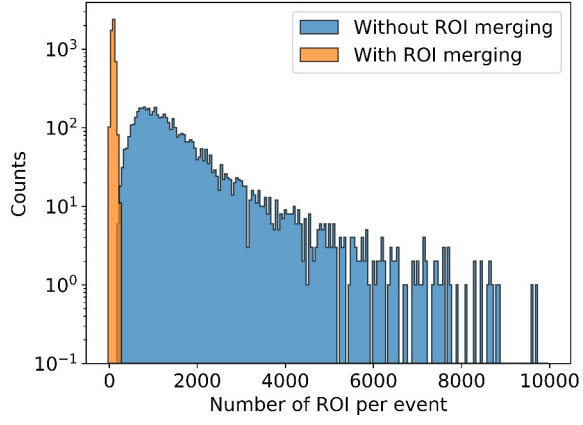
- Single track events are simulated with included background (early Phase3)
- Average DRF of 365 , RFE > 88 %
- Missed tracks can be caused by:
  - Track that do not originate from (0,0)
  - Error due to coordinate system. Important on N side
  - Low momentum tracks < 35 MeV that do not reach the third SVD layer
  - Not restricted to single tracks event



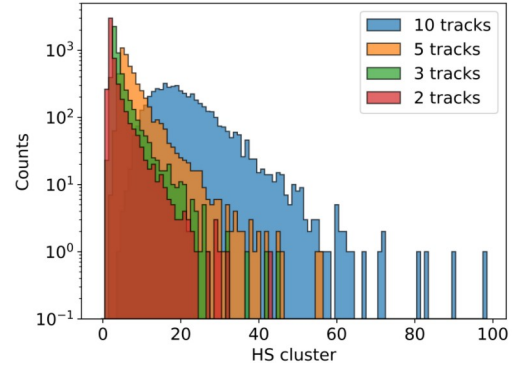


NUMBER OF ROIS

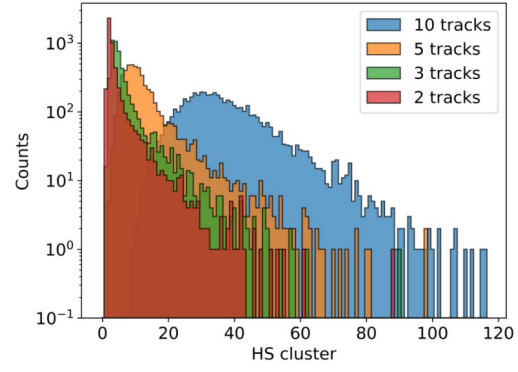
- Increase the number of track up to 10 → close to ϒ(4S) events
- More HS clusters than tracks is produced. A cluster becomes a track candidate and a ROI
- RFE ↗, DRF ↘
- Overlapping ROIs are merged



P side



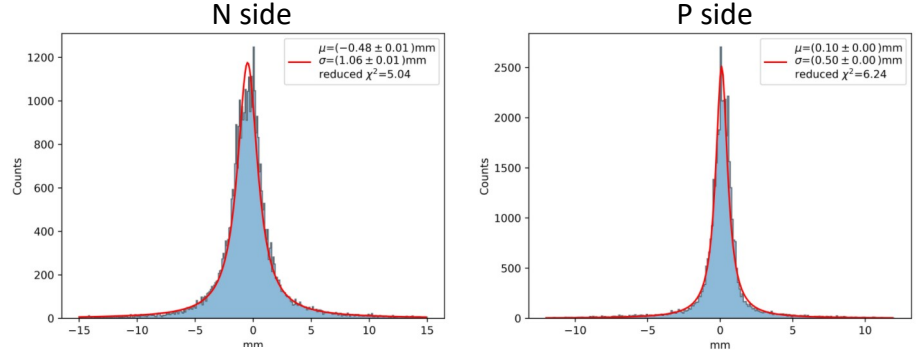
N side

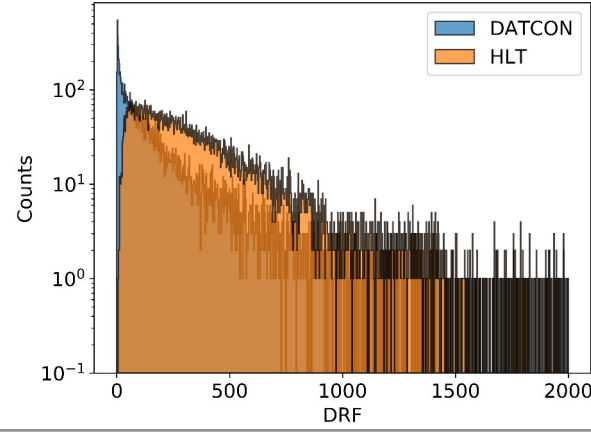


UNIVERSITÄT BONN

DATCON VS HLT

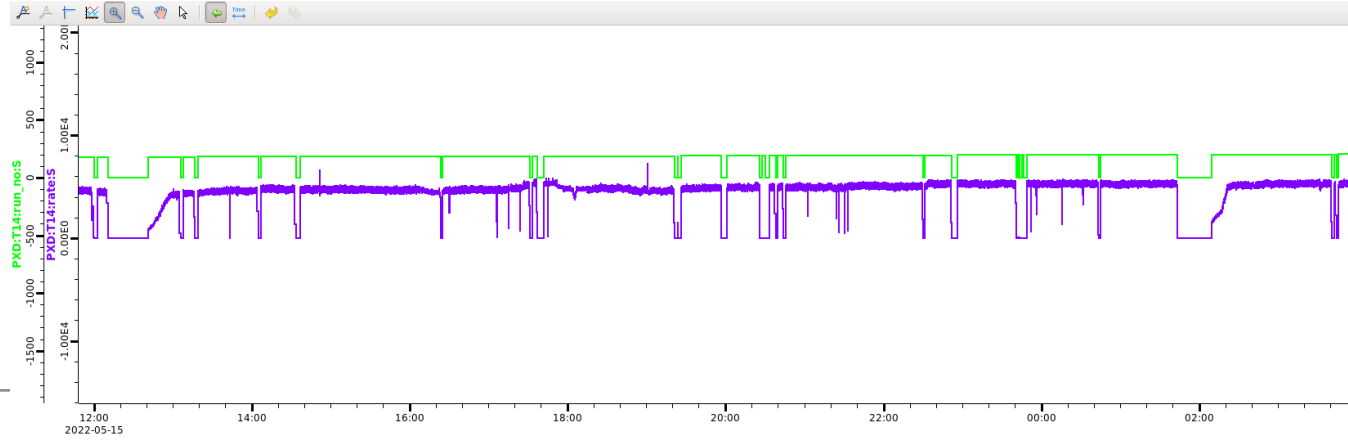
- Reprocessed part of run (20K events)
- Compare the ROI center position
- For 84 % of the events DATCON has DRF >10+
- Can only access events stored after the Belle II event builder
- 82 % of the events of the selected run were not stored
- Dedicated storage (SVD+ROI) ?





KEK OPERATIONS

- Problem in P-N ROI merging causing extremely long wait (infinite # of ROI)
- Now limiting to 32 ROIs per modules
- Running very stable since. No action was taken
- SVD-Concentrator link can fail to establish → automatic recovery like on Tracking boards



UNIVERSITÄT BONN

SUMMARY

- DATCON algorithm works fine
  - ROI creation is the biggest issue with a lot of fakes
  - Overlapping ROIs are merged
  - Limit overall # to 128 to comply with ONSEN
- If continues running stable, we need to :
  - Finish manual for shifter (nothing to do, but know what is shown) . Include to global run
  - Control that ROIs match re-processed runs
- Work with Ralf to improve performance. Requires plans and investigation
  - Hough Space resolution, SVD hits merging, ROI creation...
- Idea : Local save of raw SVD data and DATCON ROIs

UNIVERSITÄT BONN

THANK YOU

UNIVERSITÄT BONN

NUMBER OF ROI HLT/DATCON