VXD Tracking Status and Plans

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What happened since last VXD Workshop (Jan 2014)?

Been there, done that:

- Study of $\theta\,90^{\circ}$-issue in VXDTF 1.0
- Working on VXDTF 2.0
- Small check of VXDTF 1.0-status regarding combined beam test

Quo vadis VXDTF 1.0?

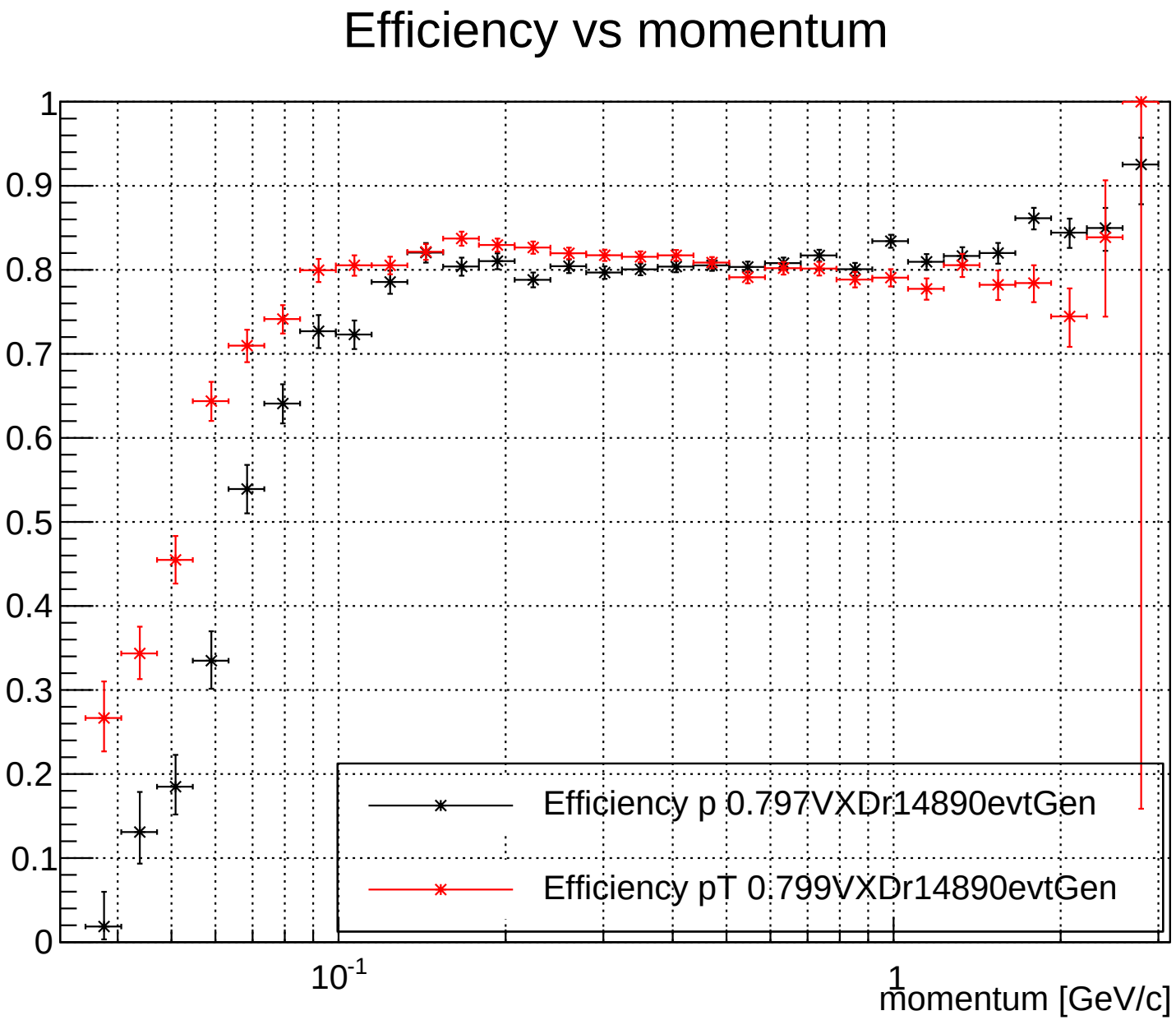
Most relevant takeaway messages for VXDTF 1.0

- VXDTF increased its overall tracking efficiency (generic $\Upsilon(4S)$-no bkg) since January 1st:
  - SVD only: 85.2% $\rightarrow$ 92.5%
  - VXD: 79.9% $\rightarrow$ 92%
  - taken from daily validation build for VXD tracking:

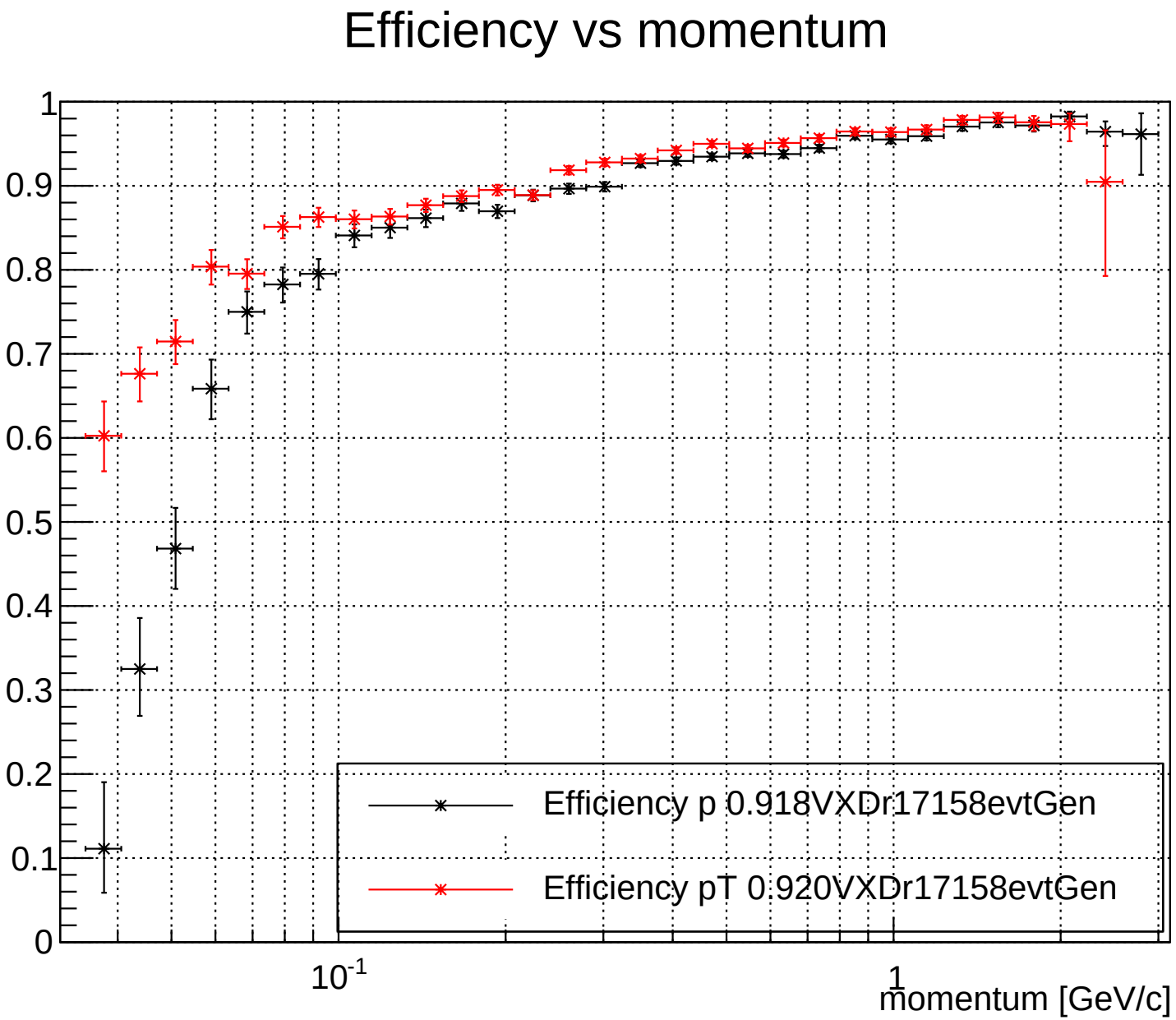
fake rate	finding efficiency	clone rate	hit efficiency
0.0496	0.9209	0.0071	0.8811

- Last part to be changed: improved way to train sectorMaps (mostly compatible with v2.0)
- Will be replaced by the VXDTF 2.0 - packages asap

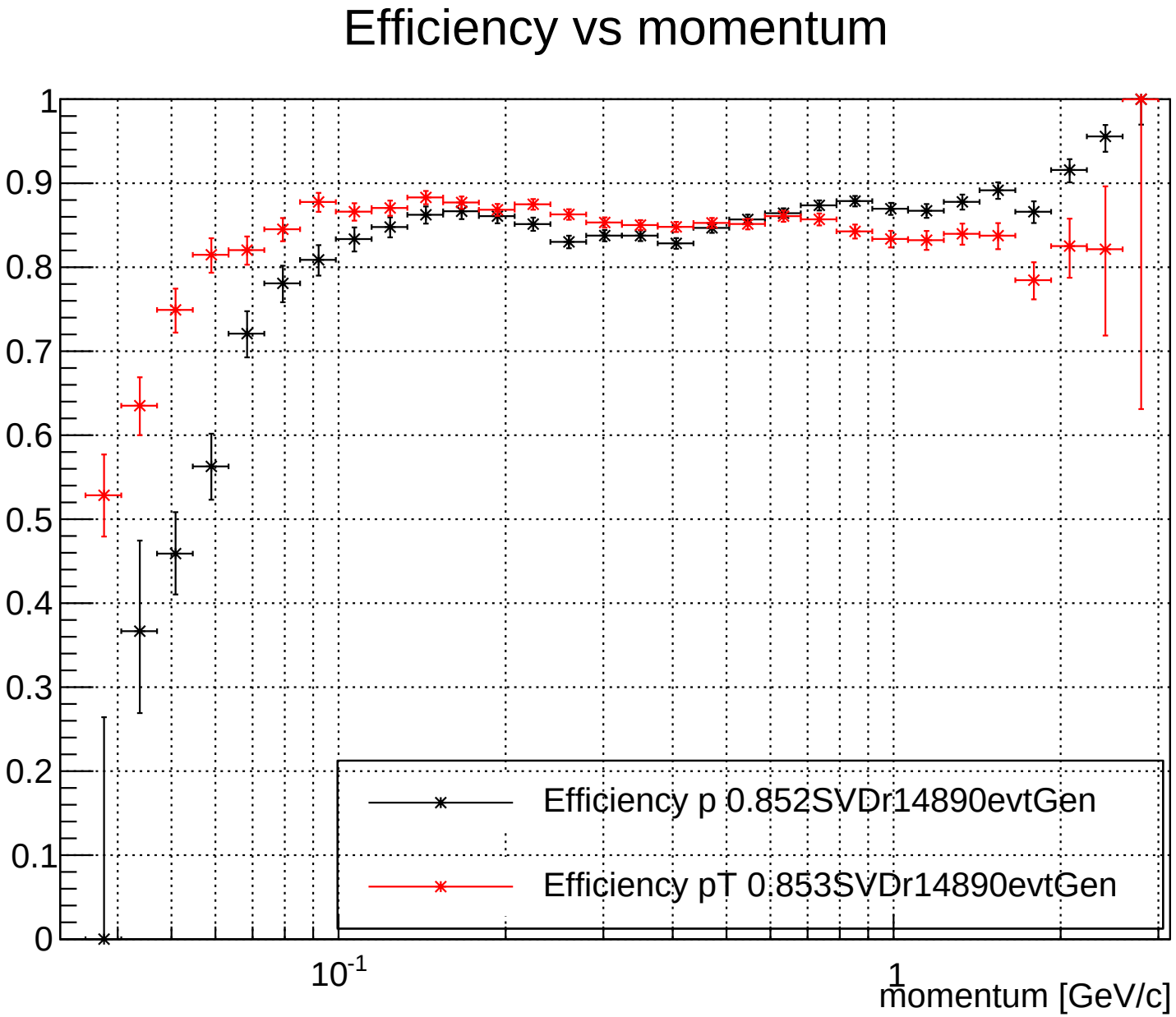
State of efficiency (vs p & p_T) as of January 1st - (VXD)



State of efficiency (vs p & p_T) as of August 31st - (VXD)



State of efficiency (vs p & p_T) as of January 1st - (SVD)



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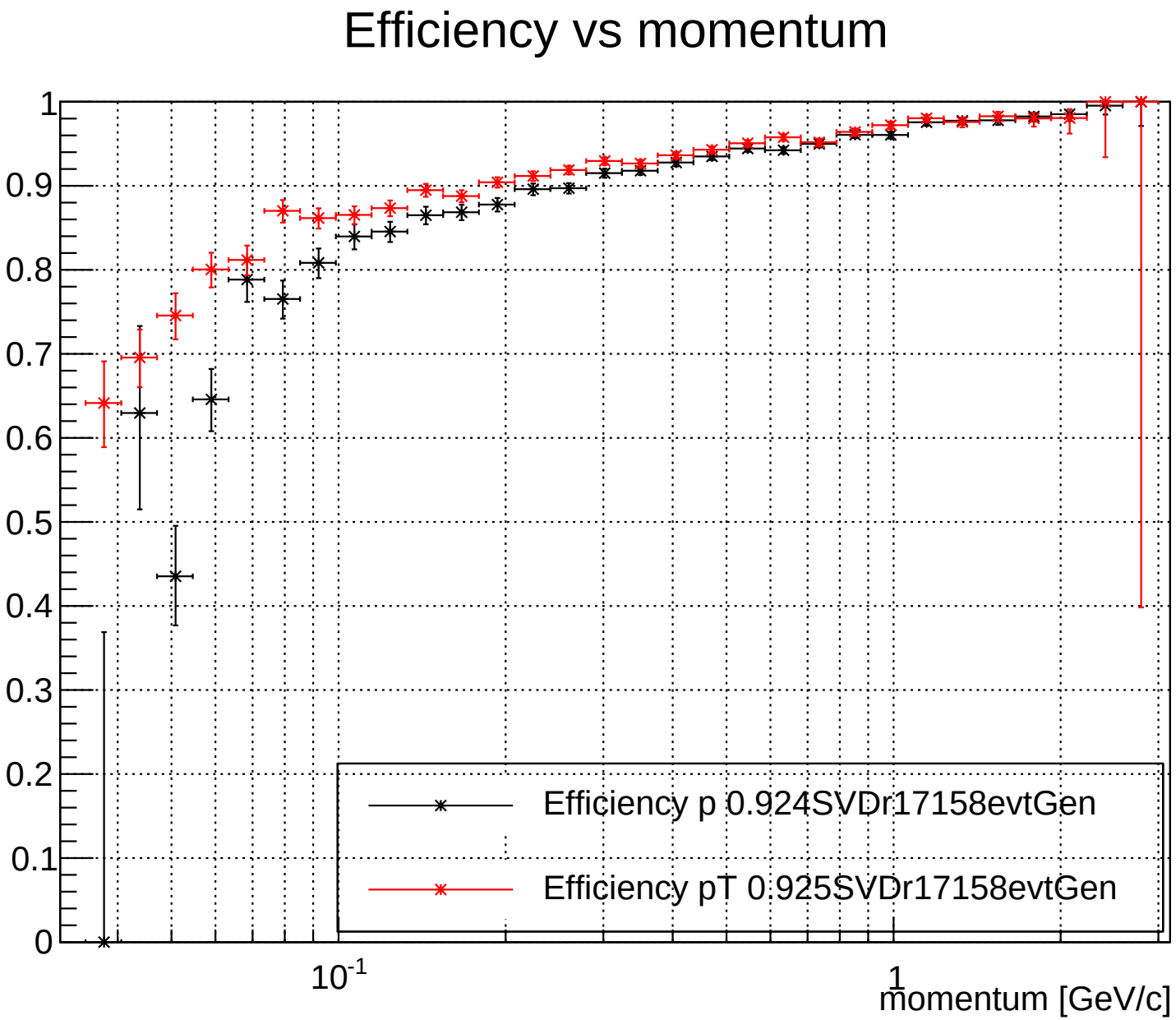
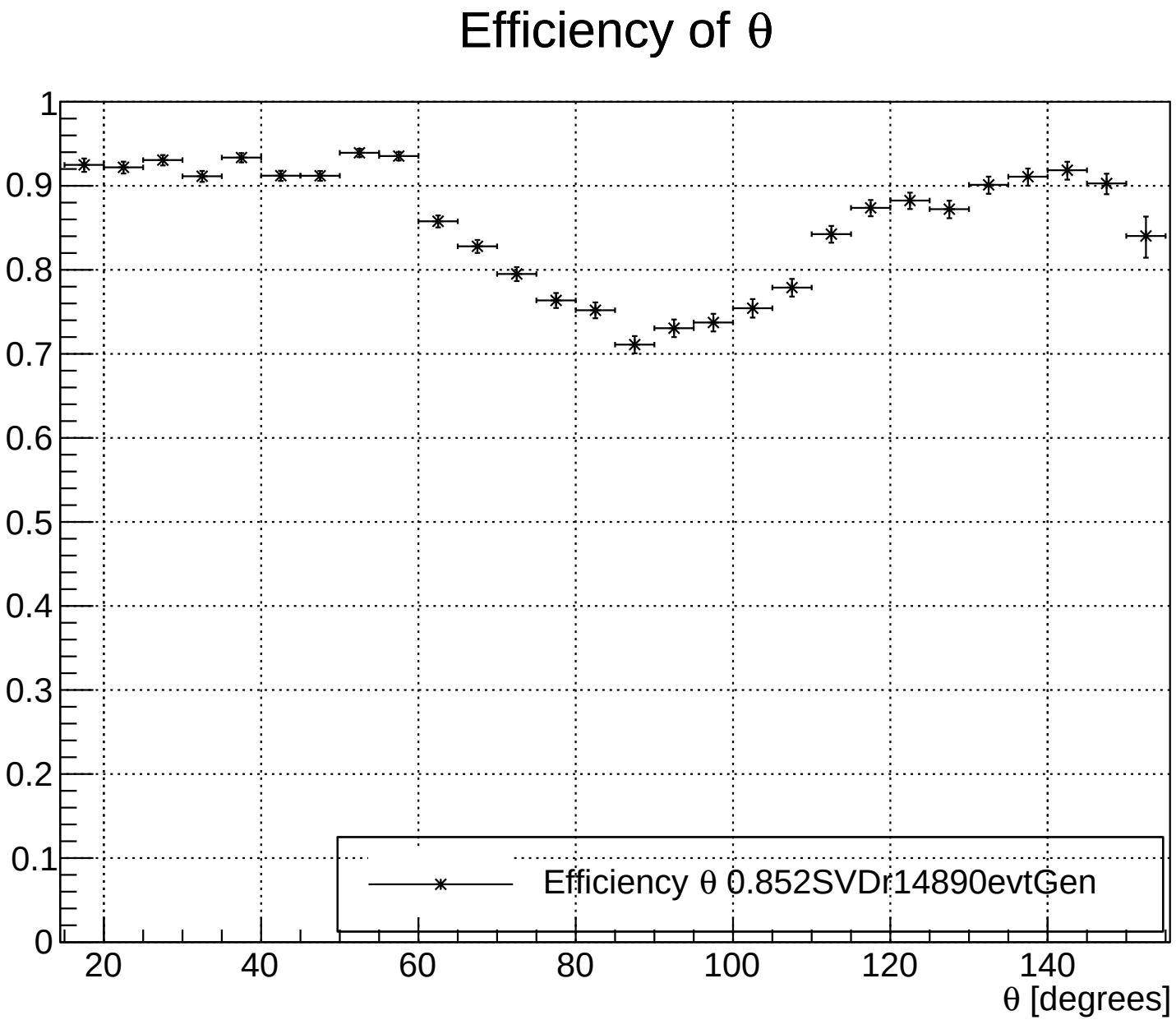


State of efficiency (vs θ in grad) as of January 1st - (SVD)



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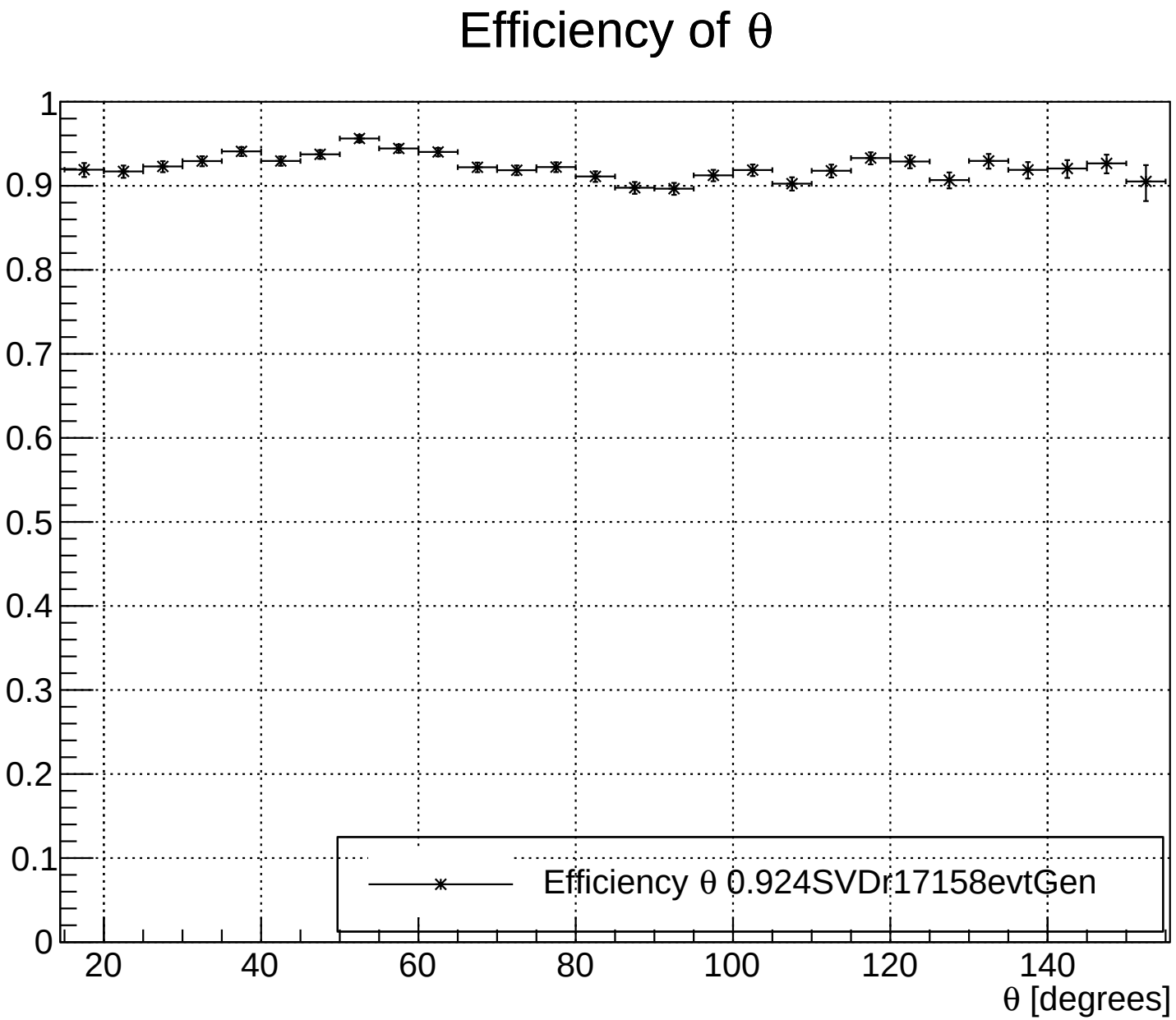
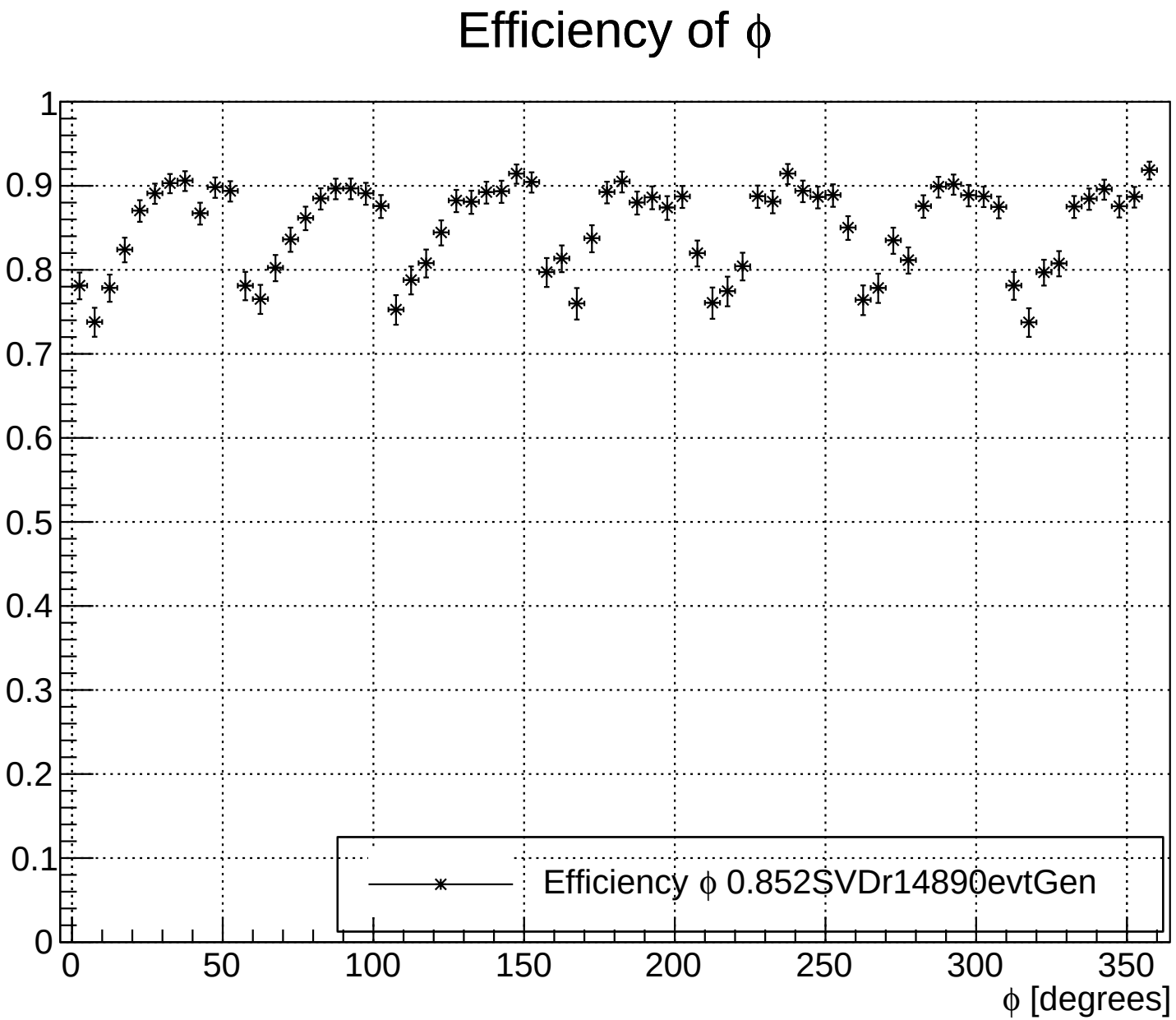
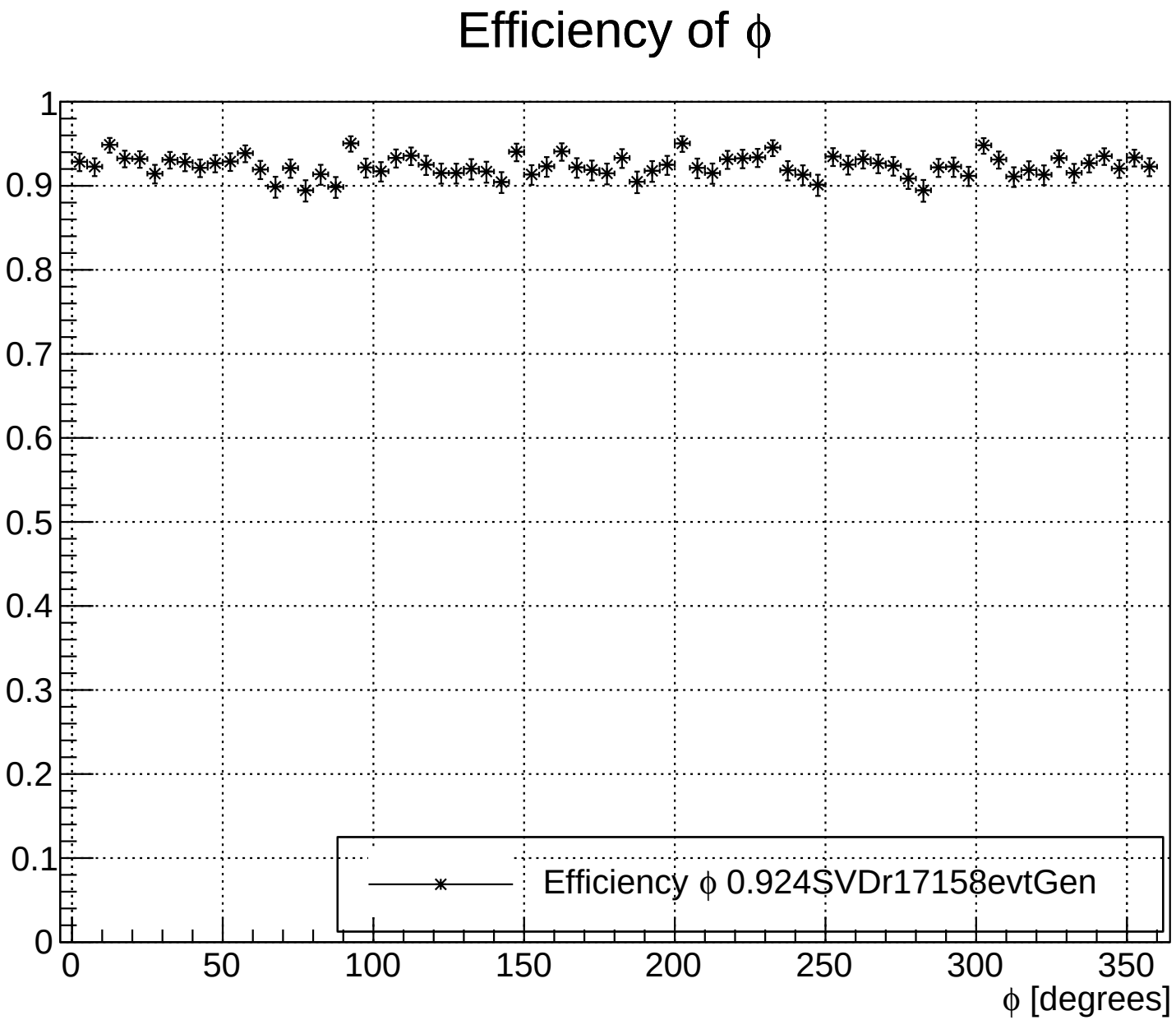


State of efficiency (vs ϕ in grad) as of January 1st - (SVD)

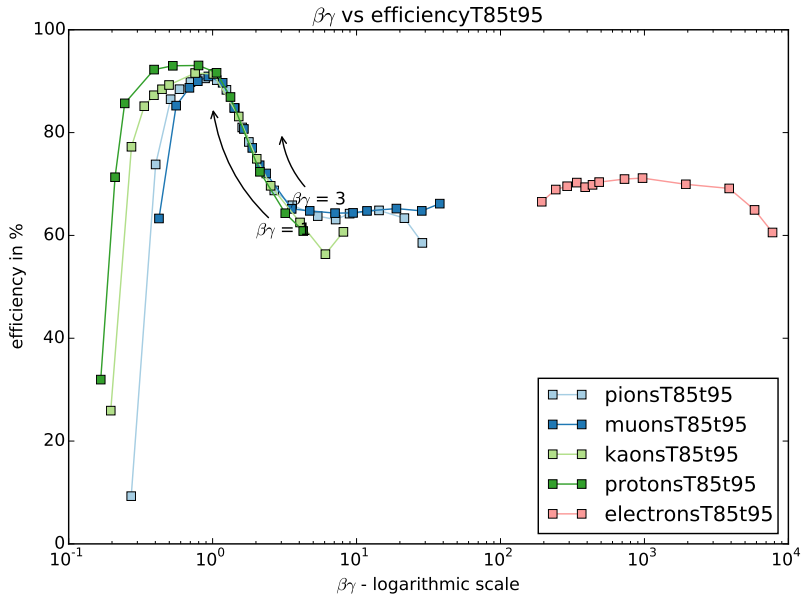


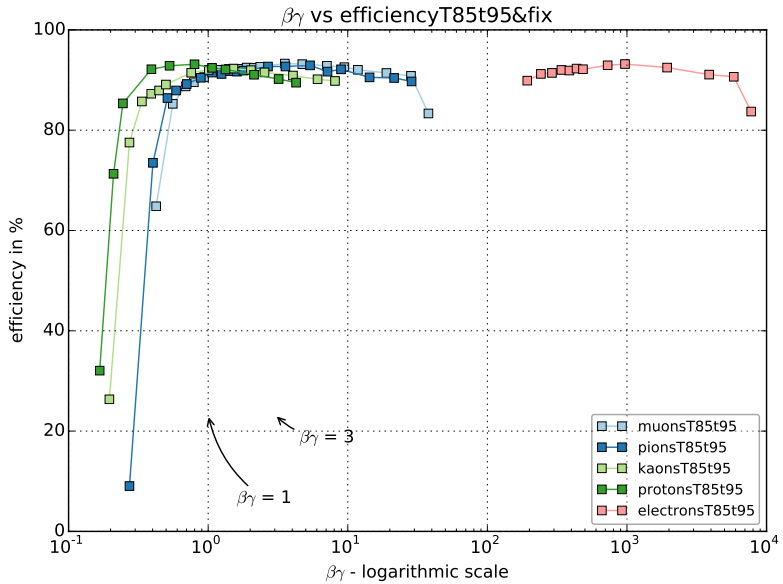
State of efficiency (vs ϕ in grad) as of August 31st - (SVD)



$\beta\gamma$-dependent behavior - (SVD only)

reason for the θ 90° issue, to tough settings for the SVD Digitization and Clustering
$\rightarrow$ threshold too high for minimum ionizing particles





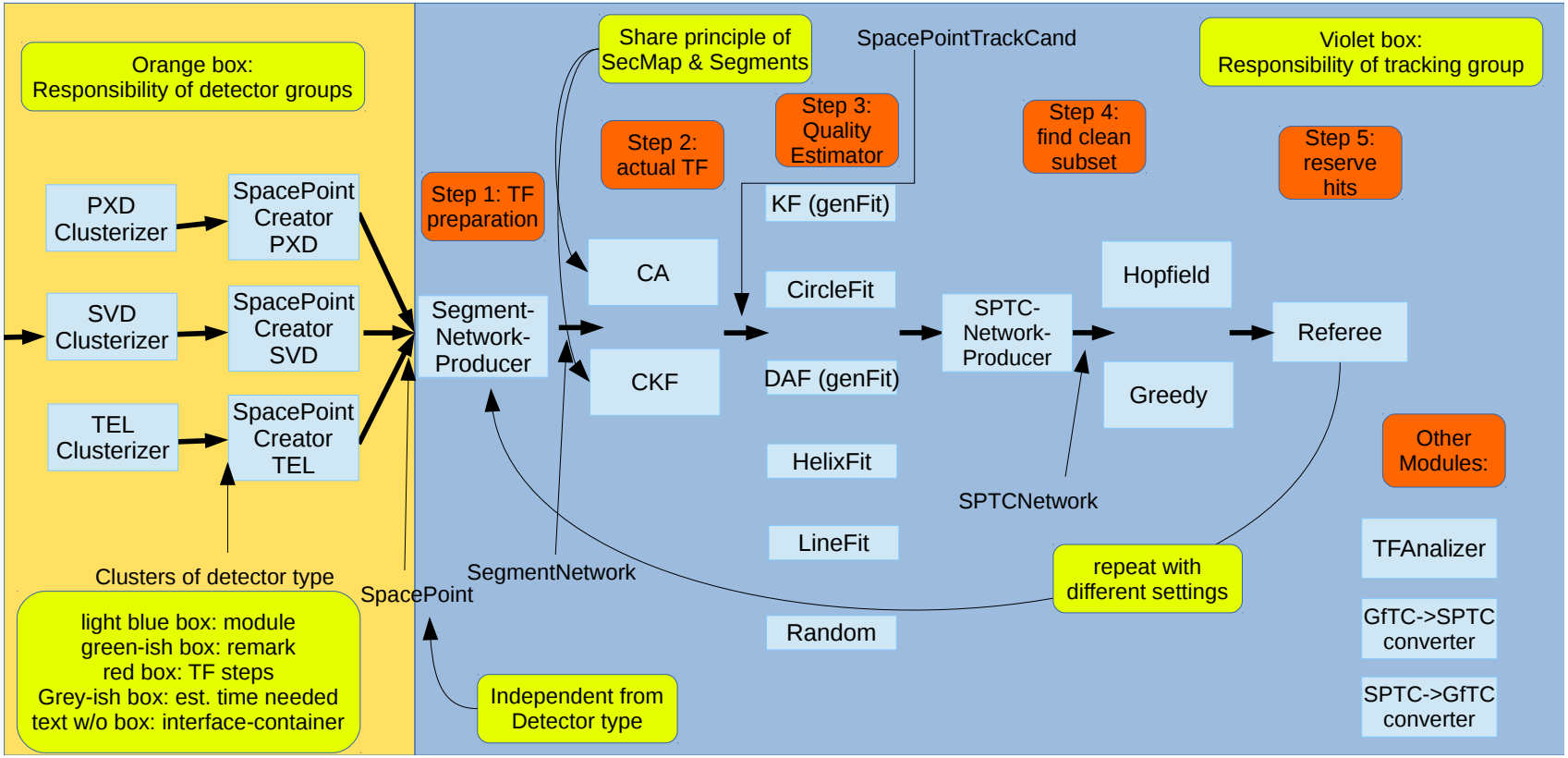
efficiency per particle type in $\beta\gamma$ within range $85° < \theta < 95°$
left: before the fix
right: after the fix

Reasons for VXDTF 2.0

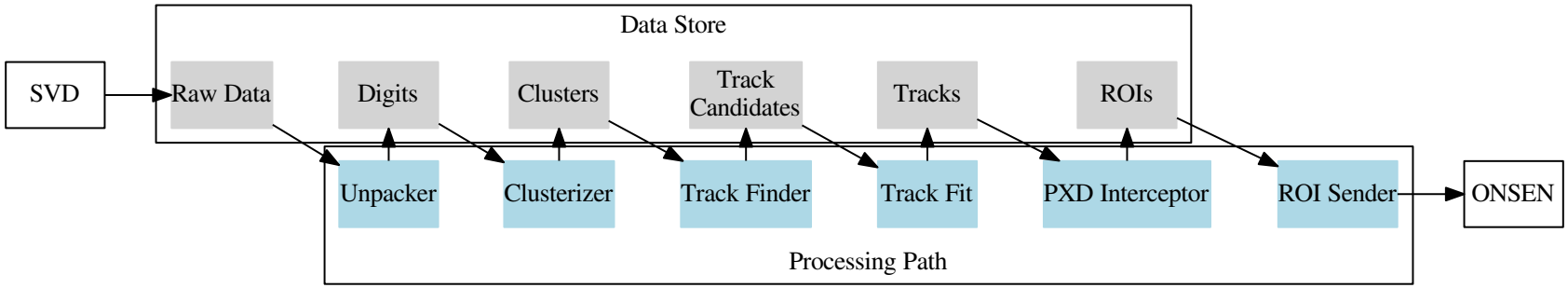
Why do we need it?

- The "old" VXDTF performes quite reasonable (high efficiency, fast) now, but:
  - The old code is hard to maintain (monolithic design)
  - Bug-searches are tedious since only a small part of the code can actually be tested without the full tracking chain
  - In short: The code does not fullfill production quality expectations
- The real advantages of the redesigned structure are:
  + Very modular design allows fast prototyping with other tracking algorithm-concepts (CKF, DAF)
  + The code is easy to maintain including a high code test coverage
  + Encapsulated algorithms for independent code optimization

Future state of the trackFinderVXD-approach (event-part)



redesign is still ongoing and will take roughly until end of year to be finished



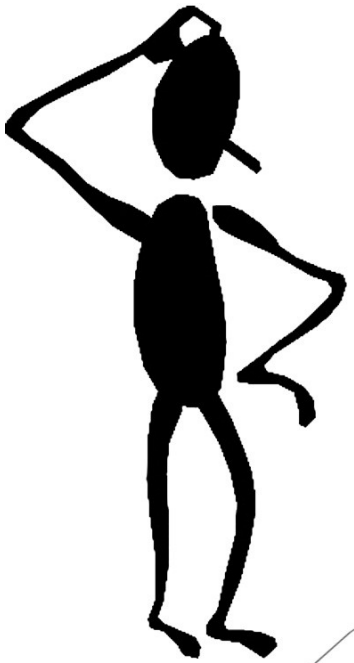
Tracking on HLT

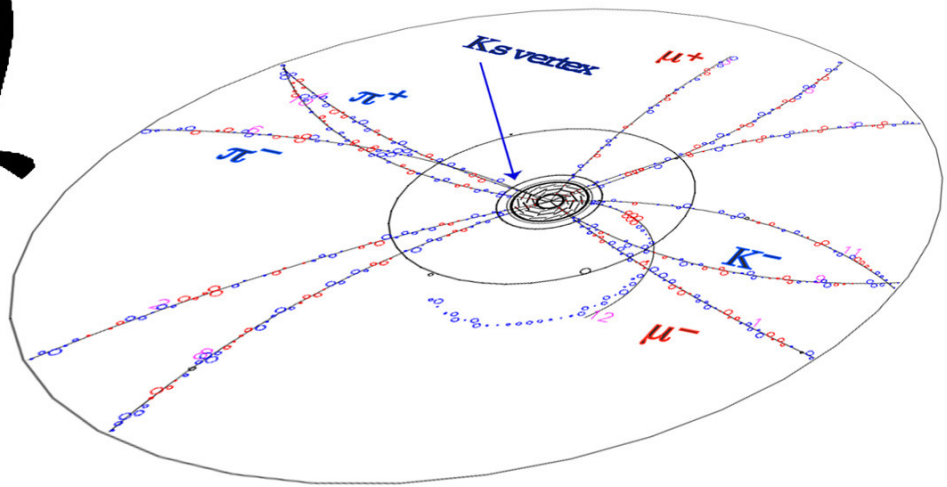
- No show stoppers known so far
- Whole chain (Clustering, TF, ROI-finding) already worked the last time: `http://inspirehep.net/record/1367396`
- Some rechecks necessary
- Some files yet to be provided (geometry, sectorMap, unpackers for different SVD-modi?)
- Most probable (HLT-)TF to be used in that beam test: VXDTF 1.0
- VXDTF 1.0 performance should be better next time (see efficiency improvements)

What will be done next

- SectorMap-Training improvements for both old and new VXDTF
- Finishing VXDTF 2.0 core development
- Working on my thesis
- End of contract: March 14th, 2016 (6 months and 5 days to go)

that's all, folks!





Any suggestions, ideas or requests?

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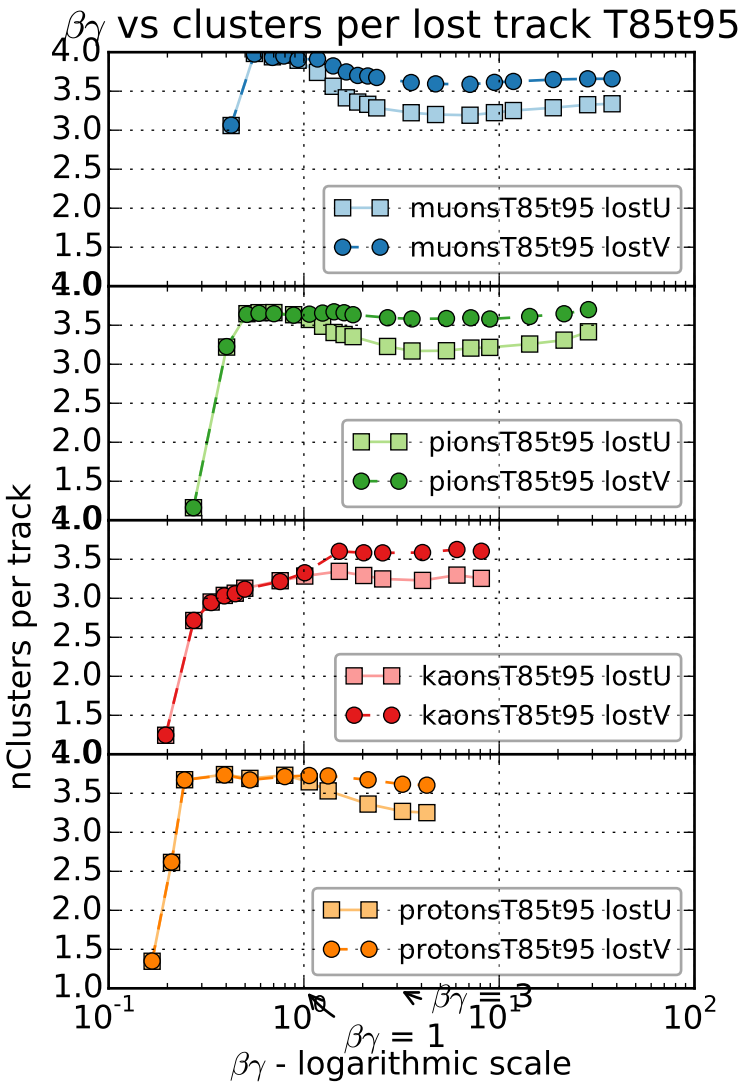
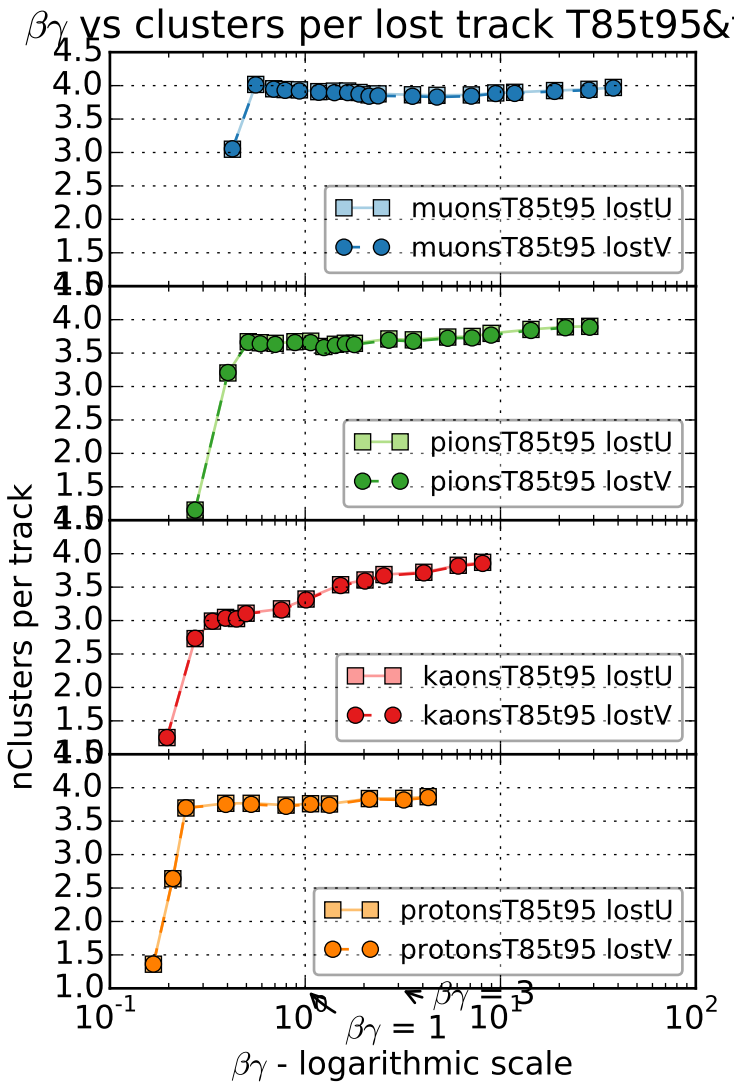
$\beta\gamma$-dependent behavior - (SVD only)





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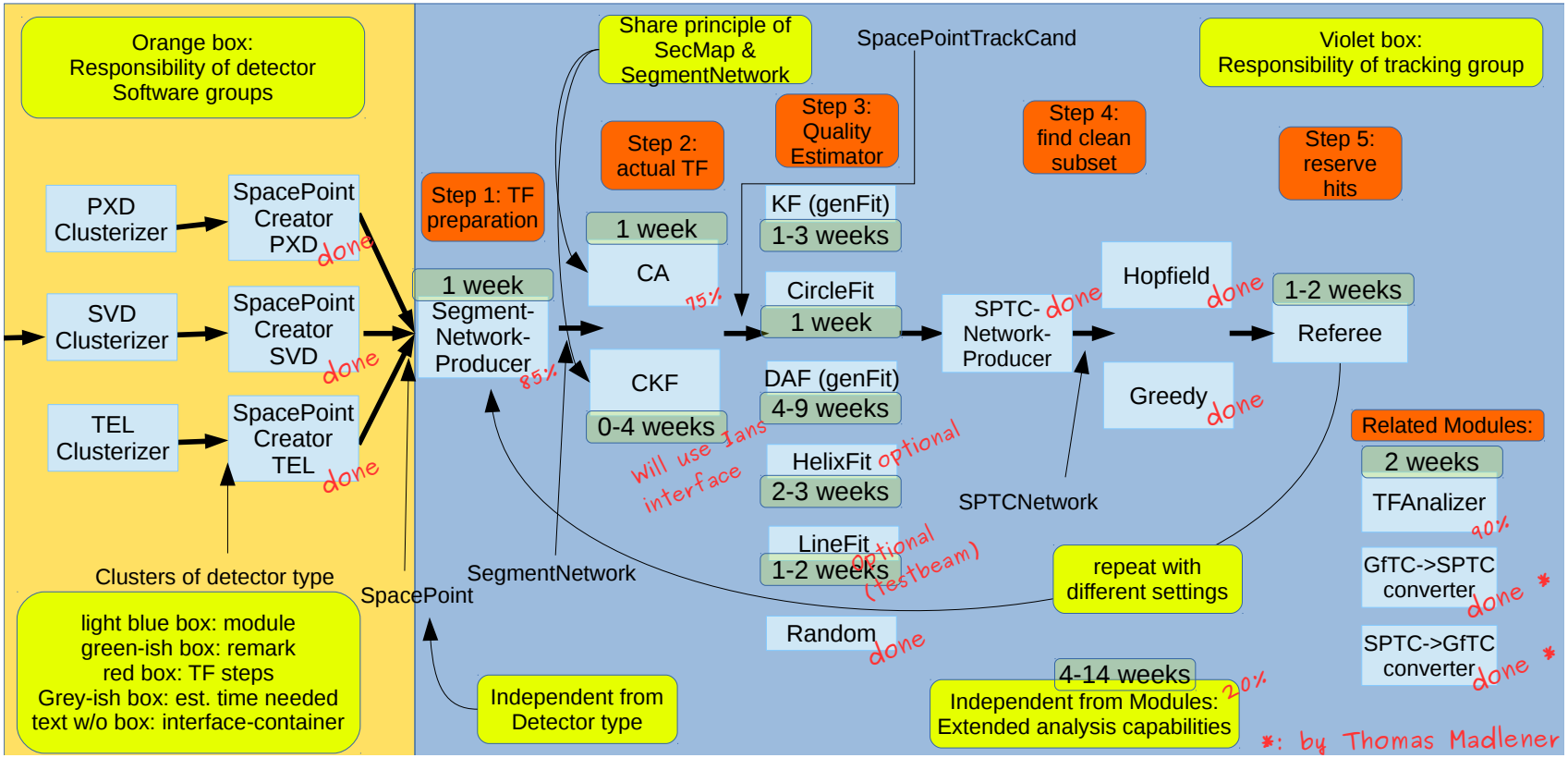
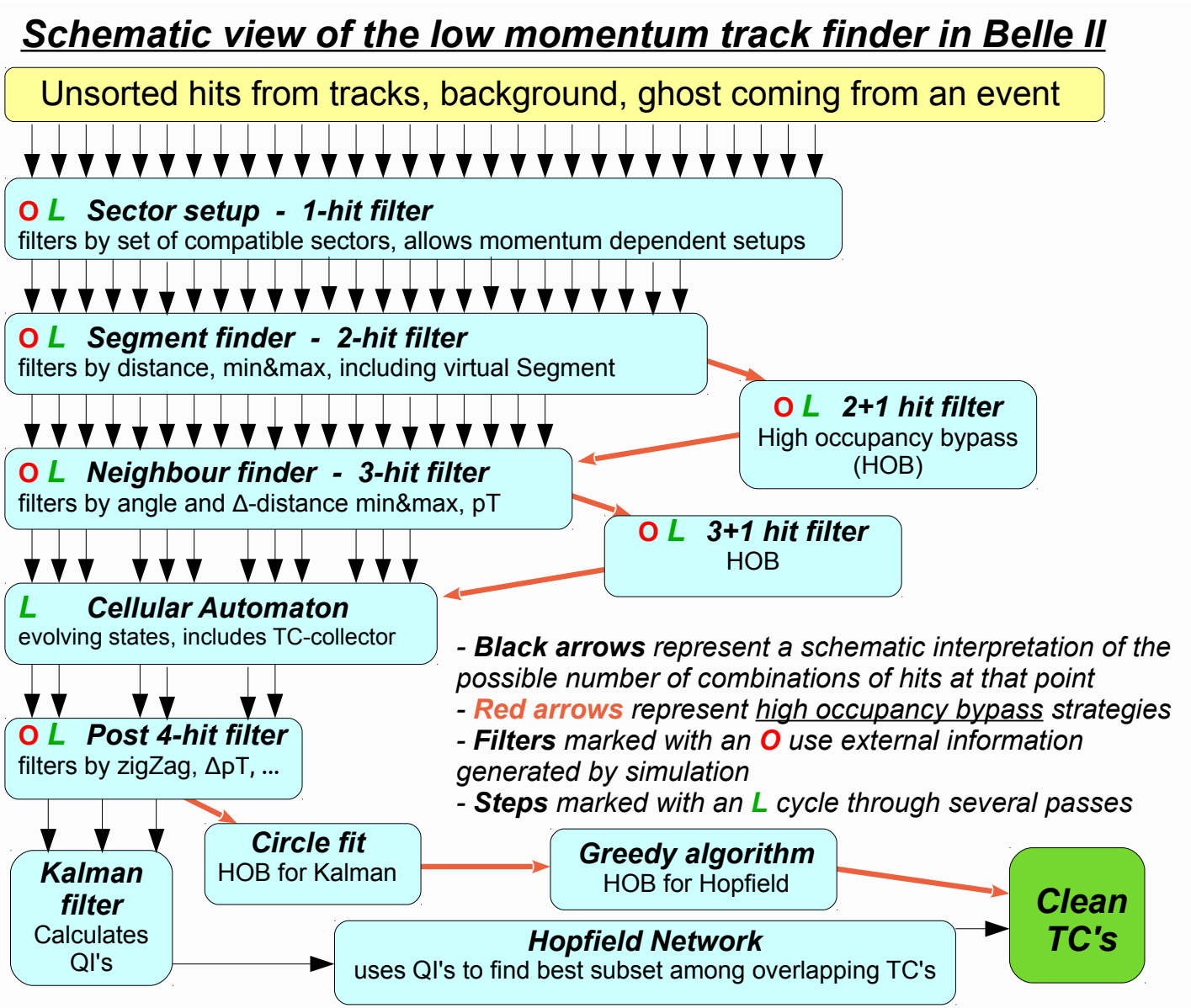
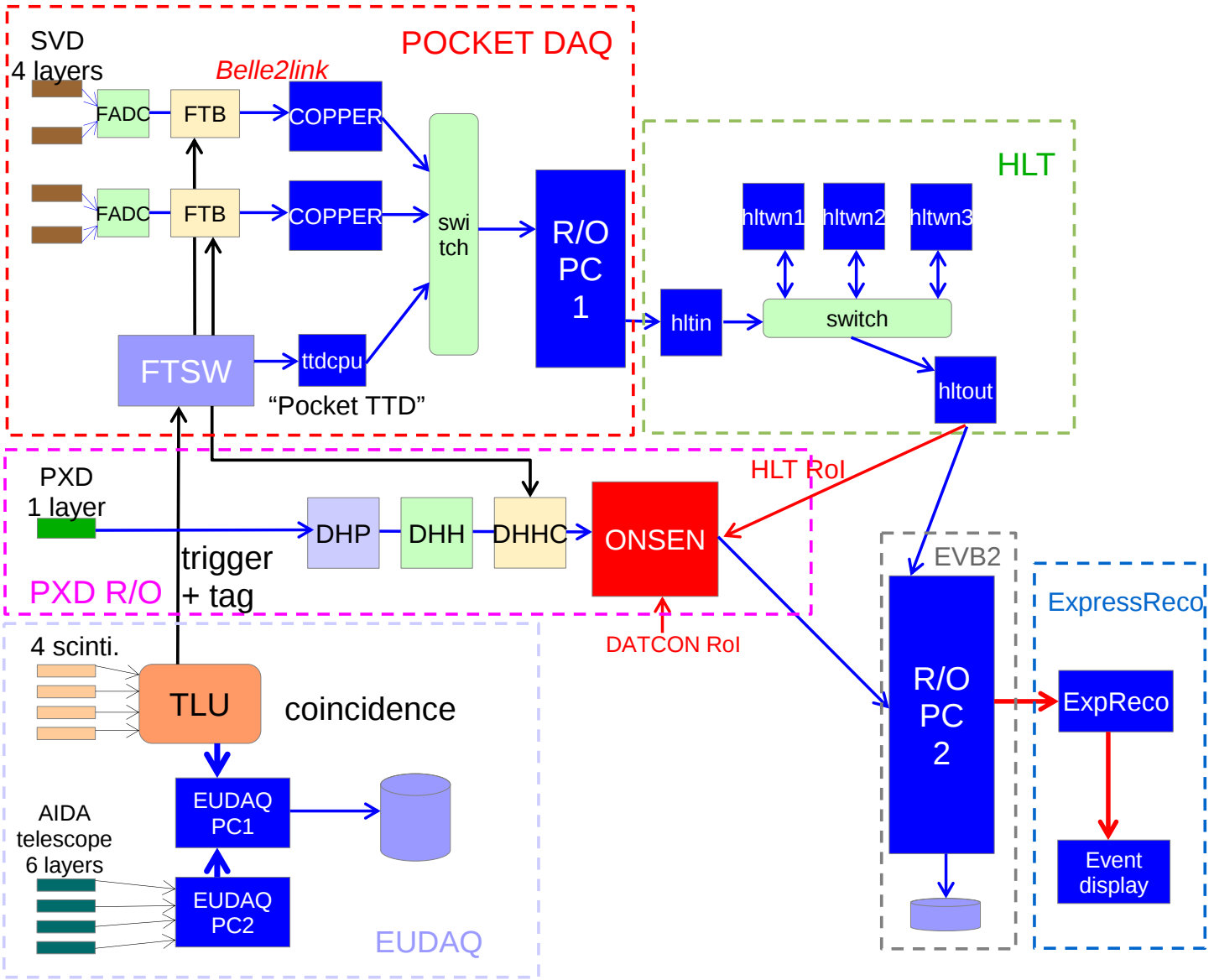


state of August 31st, 2015

- done, but not directly listed above: 3-, 4-hit- and tracklet-filters, many nice containers like DirectedNodeNetwork and MinMaxCollector.
- estimated time needed for essential stuff: 6-9 months, redesign only: 2-3.5 months

Flow chart sketching the data flow within VXDTF 1.0





DAQ of last combined beam test (figure created by R. Itoh-san)

COPPER: COmmon Pipeline Platform for Electronics Readout
FADC: Flash Analog-to-Digital-Converter
FTB: Finesse Transmitter Board
FTSW: Frontend Timing Switch
TLU: Trigger Logic Unit
HLT: High Level Trigger