ACTS (C)KF Improvement

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DESY

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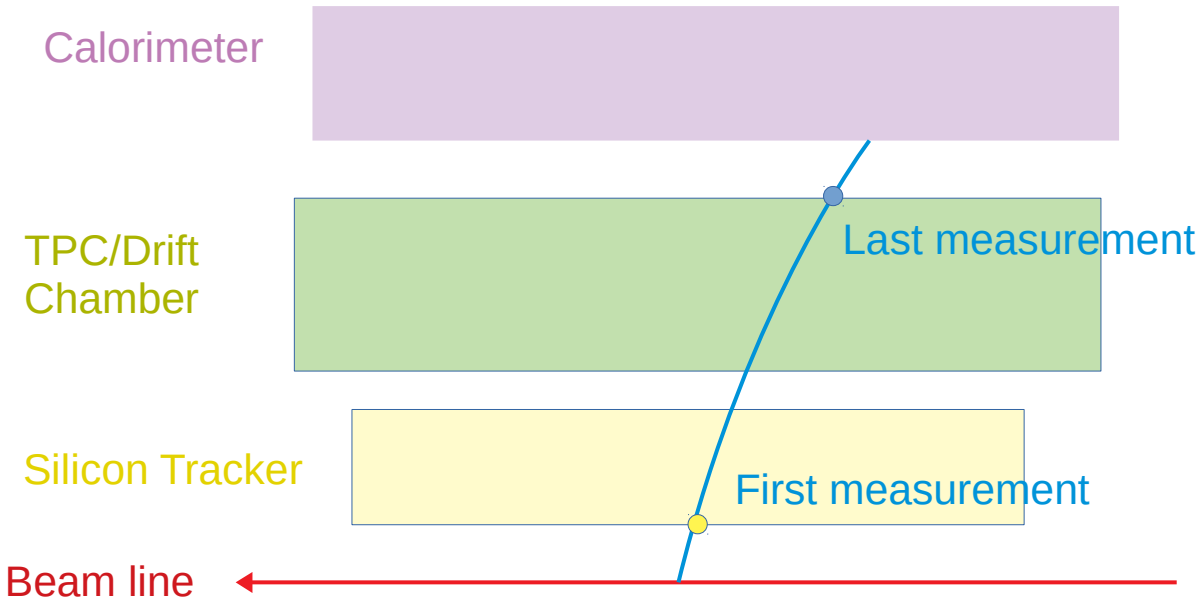
Track extrapolation

- The KF target surface could be either at IP, Calo entrance or anywhere, but currently the fitted track parameter is always obtained by extrapolating the last smoothed track parameter to the target surface
  - Should do the extrapolation by using the nearest fitted track parameter?
  - Extend to multiple target surfaces?
- Issues to connect the trackers with large gap or resolution difference?
  - e.g. sPHENIX silicon tracker and TPC

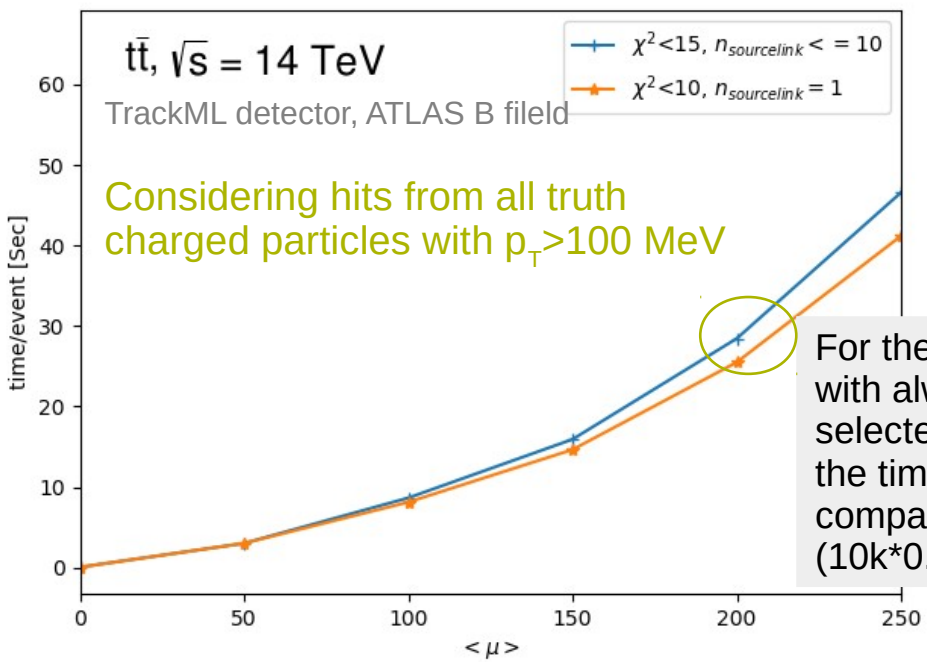


- Needs to test with real-quality seed to understand how much the track extrapolation is dependent on the seed quality
  - e.g. difficulty to use TPC seed (bad position resolution) at sPHENIX

CKF timing performance improvement

- Most time is spent on looping all source links on the surface to select the compatible source links
  - Is it possible to group the source links one a surface so that only partial source links will be considered?
- Current selection is based on residual between predicted parameters and calibrated measurement
  - Residual between predicted parameters and uncalibrated measurement might be faster? (to avoid using std::visit)

CKF time/event vs. <μ>



For the sequential filtering with always one cluster selected on the surface, the time (~25 s) is still a lot compared to track fitting (10k*0.2ms/track = 2 s)

Number of hits on one module