Fast t0 extraction with CDC Information

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Thomas Hauth

INSTITUTE OF EXPERIMENTAL PARTICLE PHYSICS (ETP) · FAKULTÄT FÜR PHYSIK

News since last talk

- Developed module CDCHitBasedT0Extraction
  - Runtime is < 4ms per event (with Phase III background)
- Improved the stability of the t0 extraction fit even for few hits (single track in CDC)
- Now, only hits which have been assigned to a track are used for t0 extraction now
  - Makes the procedure very stable to background influence
- Added to the default reconstruction path

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25% Phase III Background

- Close to background rates expected at Phase II
- Success rate: t0 fit failed and extracted t0 between -70ns and 70ns

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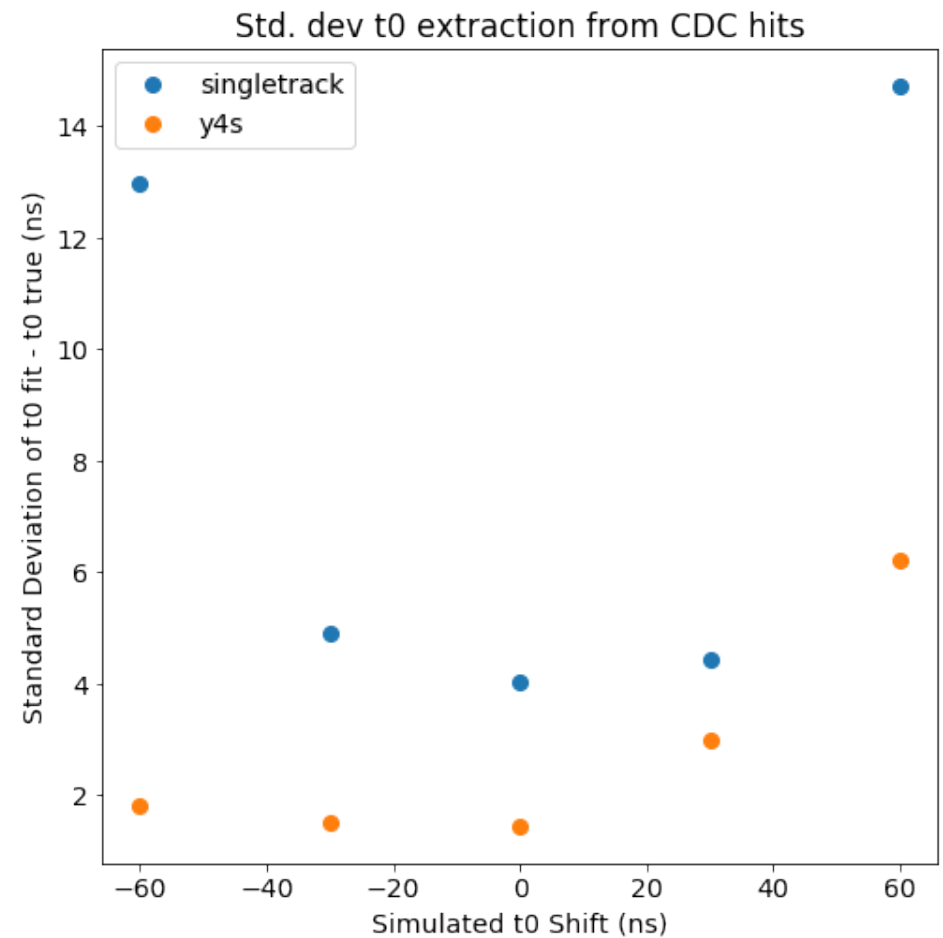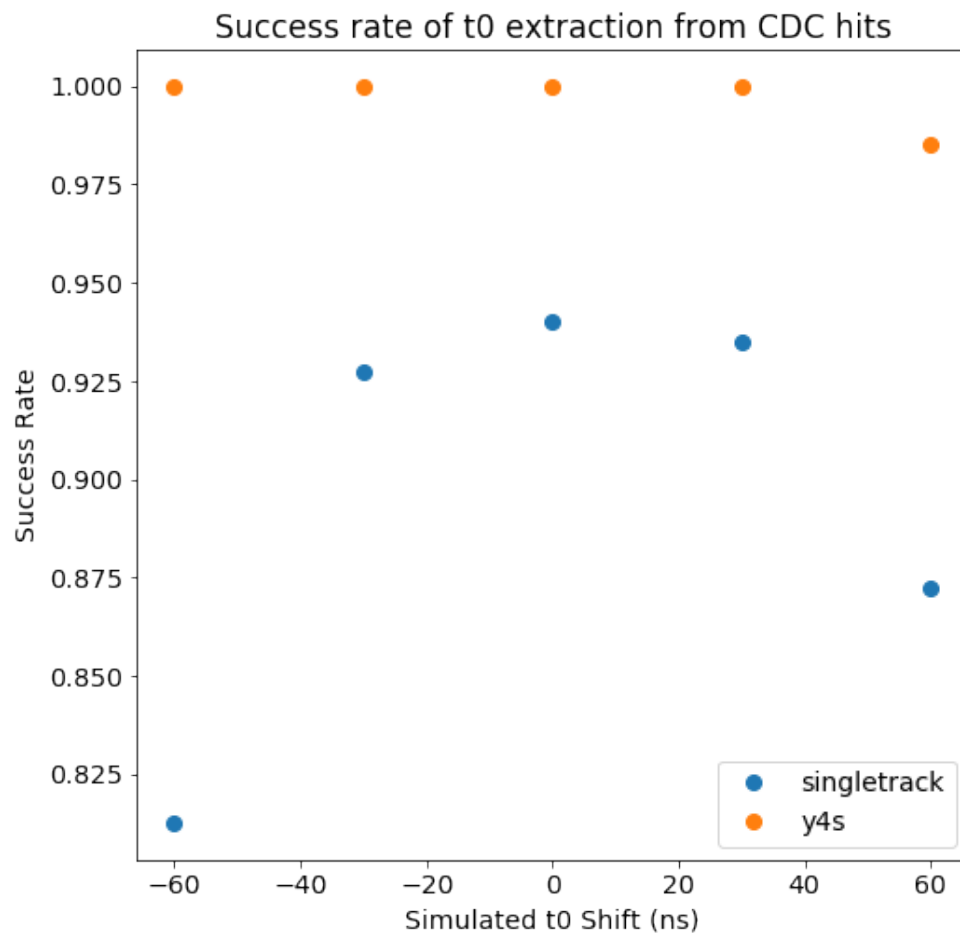
Full Phase III Background

- Still working very well
- The uncertainty on the extracted t0 is large for single track, esp. for large t0 shifts
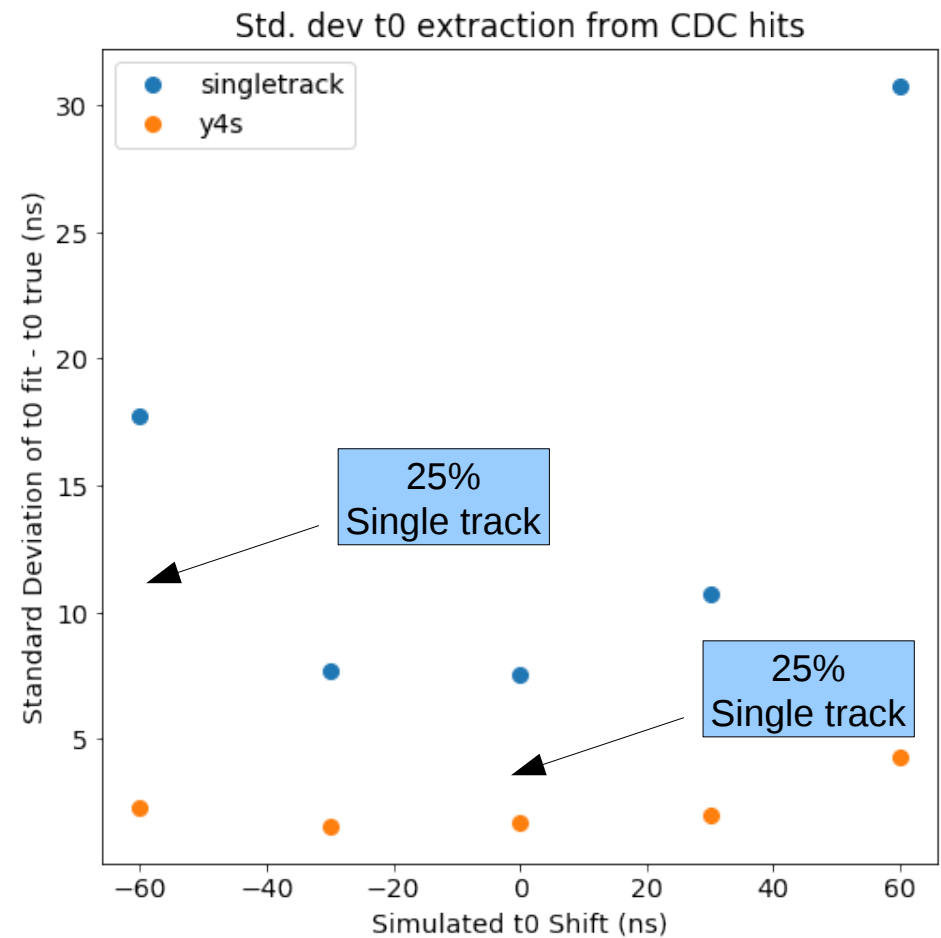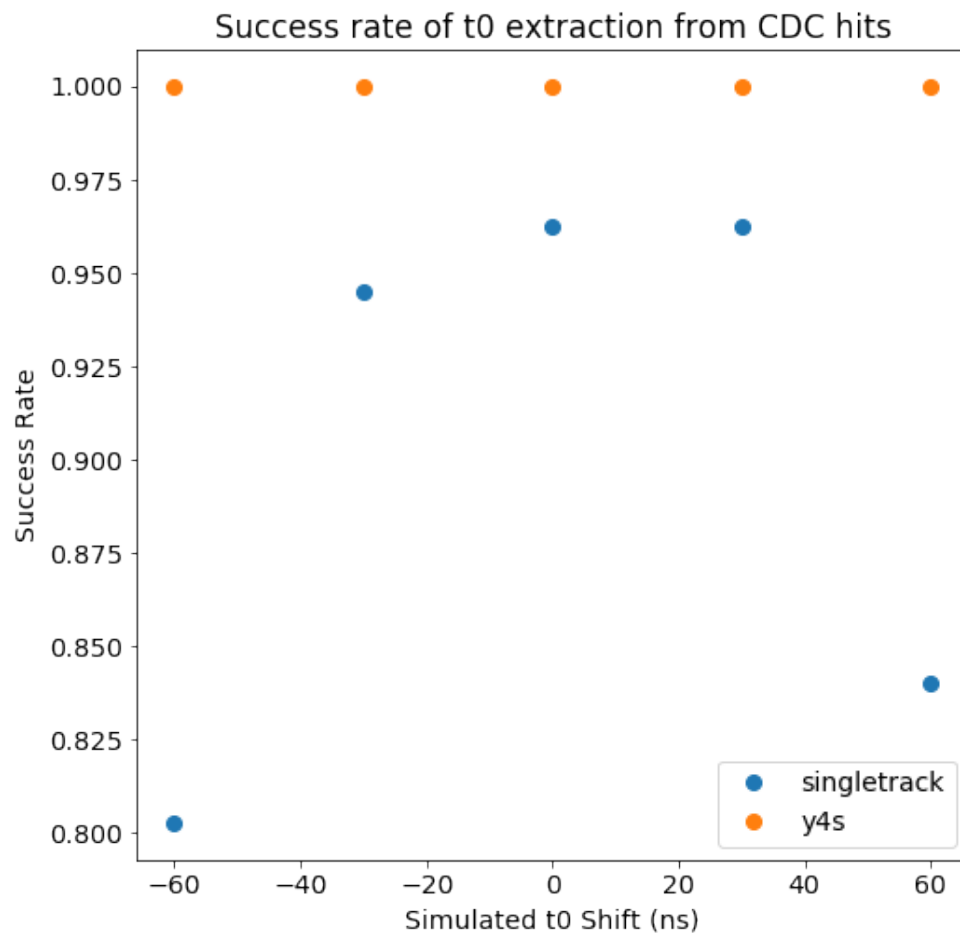
Open Items

- Use the Genfit t0 fitting method seeded by the result from the fast t0 extraction
  - The procedure should be must faster to converge on the correct t0
  - The quality of the fitted t0 should be better, especially for large/small t0
  - Fallback to the full grid search of t0 in case the fast extraction did not work
- Test method with August 2017 cosmics measurements

Backup

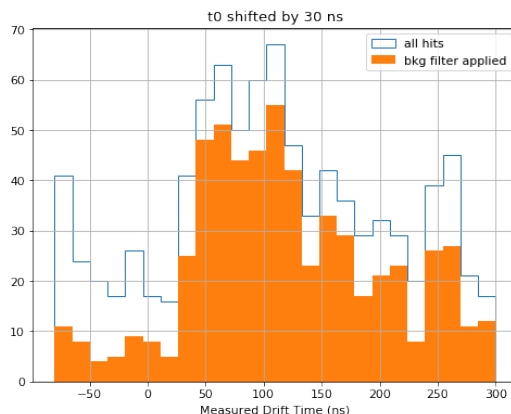Institute of Experimental Particle Physics (ETP)

Method to fit T0 distribution

- Fitting the hit time measurement directly is difficult due to few entries and fluctuations (tried Sigmoid function)
- Difficult to properly extract the t0 time (steep rise of distribution)
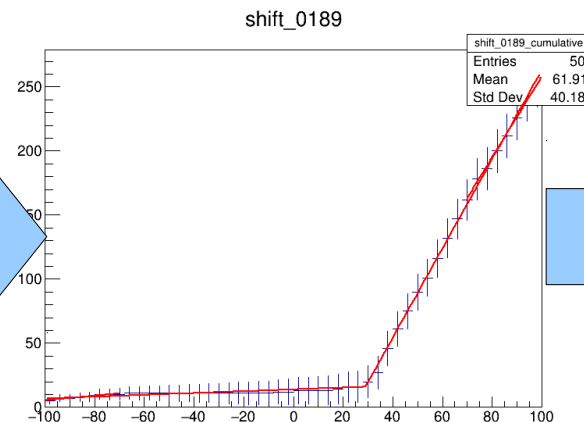- Better method: Create a cumulative histogram and fit this with segmented (non-steady) line:

$$f(x)= a(x+|x+t0|)) + b(x-|x+t0|) + c$$

Sig Part   Bkg Part

Cumulate → Fit f(x) → T0 Estimate