Propertime (Resolution) Studies: (towards) refitting particles with a (mis)aligned detector

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Goal

- Study the effect of misalignments on the propertime (resolution)
  - Run through various misalignment scenarios
    - Difficult to constrain degrees of freedom, ‘random’ (small) displacements/rotations, …
  - and determine their effect
    - See if our resolution model can (still) cope with
    - Provide feedback to those doing alignment

How?

- Start with reconstructed & selected B mesons in DaVinci
- Get the tracks which form the final state of the selected B
- Refit the tracks, but ‘lie’ to the reconstruction about the geometry of the detector
  - i.e. pick up (on purpose) a geometry description that does NOT correspond to the one used for simulation and initial reconstruction
- Rebuild the B starting from the tracks
- Re-Determine propertime
  - Could also look at other quantities

- Quick: only refit a few tracks per event,
- Statistically powerful: fully correlated samples
  - can compare difference before/after on a B-by-B case

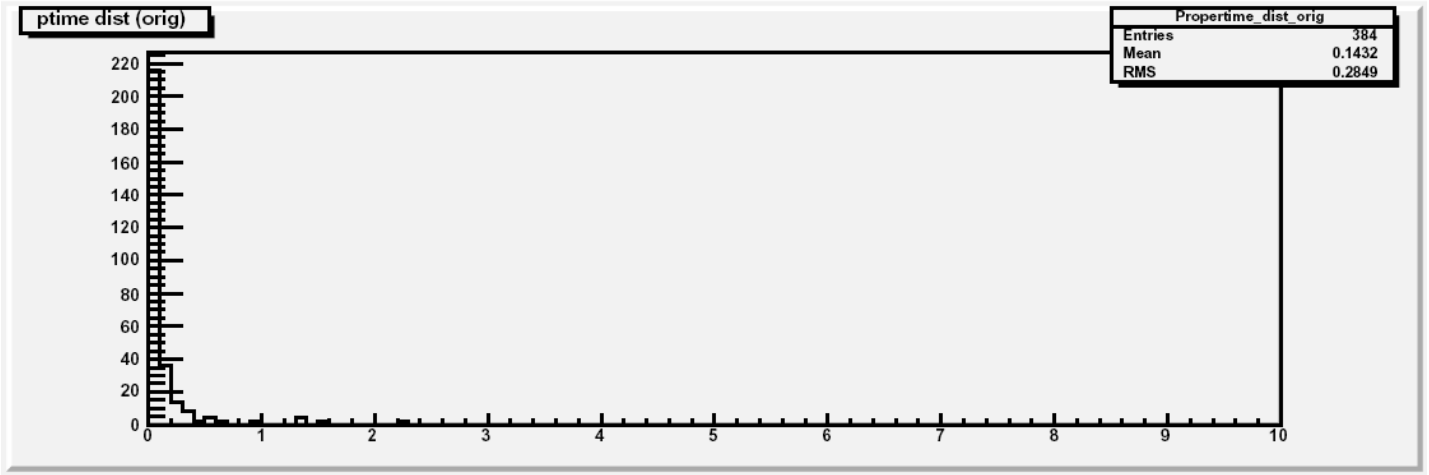
Today: Proof of Principle

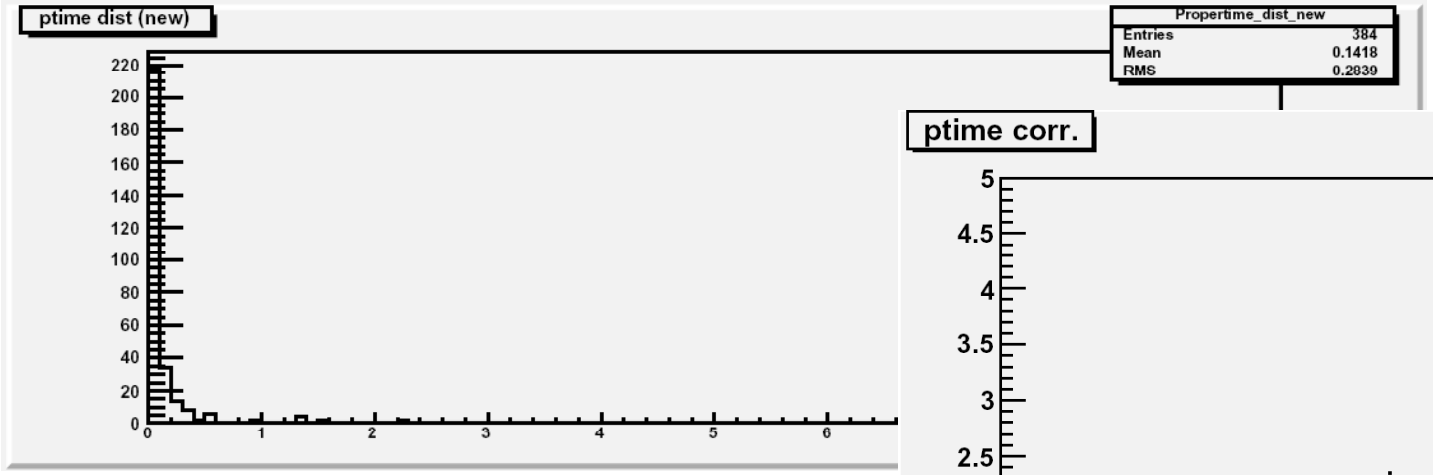
Run DaVinci and

- Take selected Bs -> J/psi(mu+mu-)phi(K+K-)
- Pick up the muon Particles
- Rebuild the corresponding Tracks, refit them
  - using the correct geometry, i.e. no misalignments
- Rebuild the muon Particles
- Pass them into the propertime fitter

- Note: what is not yet there is the rebuilding of the resonances
  - but not too difficult to do

First Plots


ptime dist (orig)
Propertime_dist_orig
Entries 384
Mean 0.1432
RMS 0.2849


ptime dist (new)
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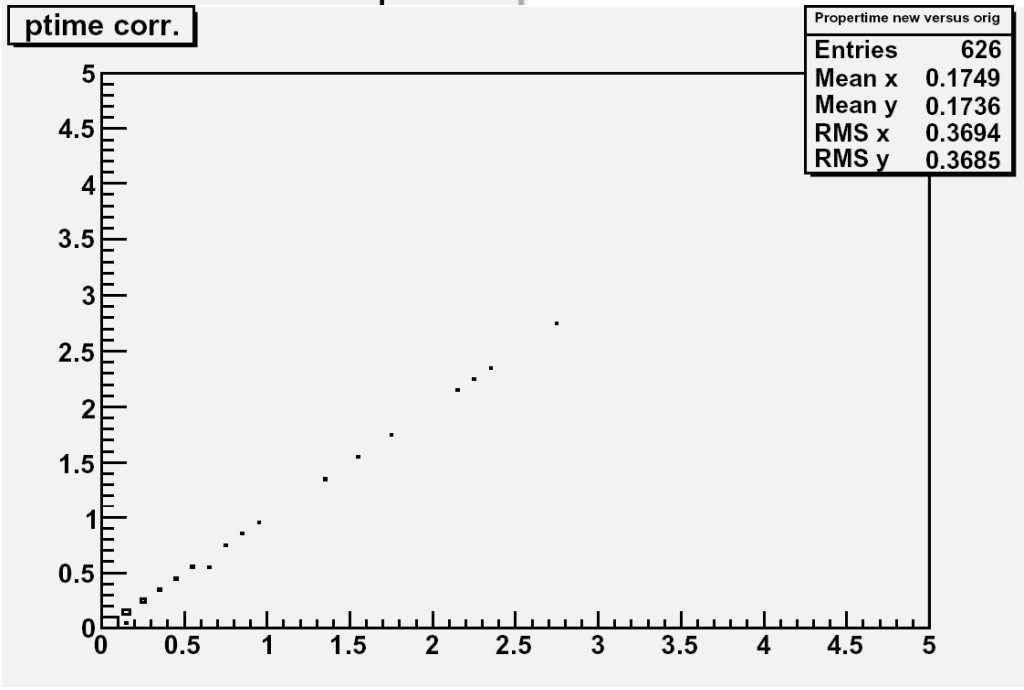
Entries 384
Mean 0.1418
RMS 0.2839


ptime corr.
Propertime new versus orig
Entries 626
Mean x 0.1749
Mean y 0.1736
RMS x 0.3694
RMS y 0.3685

Summary & Outlook

- The required ingredients
  - exist
  - or can be obtained with a little bit of work
- Looking forward to the next few steps
  - Rebuild the resonances
  - Check that difference after refit with consistent geometry are well within statistical uncertainties
  - Start looking at the differences with intentional misalignments
  - See whether the resolution model can still model the propertime resolution of a misaligned detector (within reasonable bounds ;-)