Semi-Analytic PID Performance

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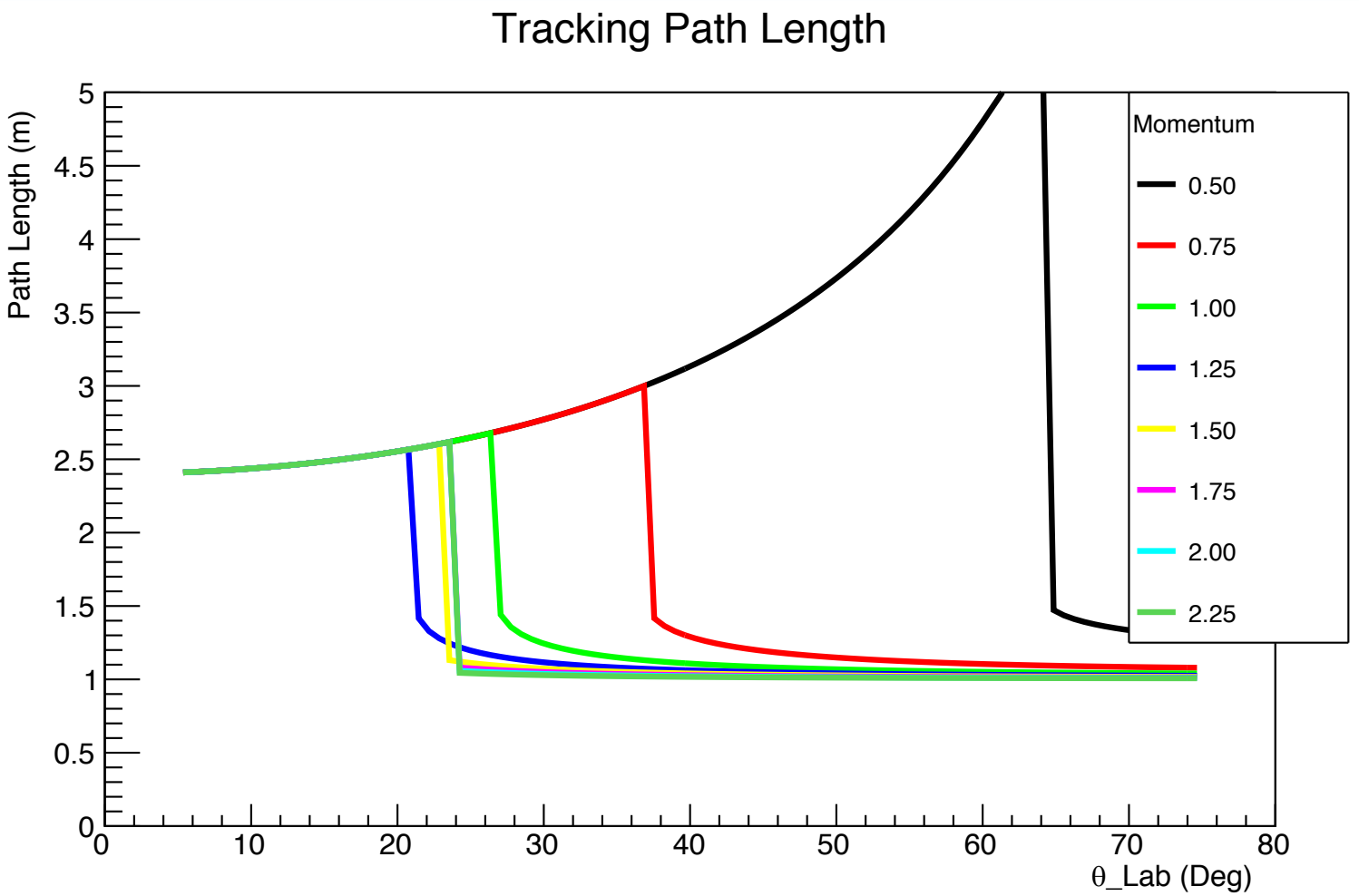
Open Charm LDRD

Code Development

- For a given particle species, and detector frame momentum 3-vector
  - Compute Path length in magnetic field
  - Estimate momentum resolution dp/p = ds/s
    s = sagitta
  - Parametric evaluation of Particle ID
- pi/K/p PID
  - Barrel: DIRC • TOF
  - Ion Endcap: Dual (Aerogel C2F6) RICH
  - Electron Endcap: Modular RICH(aerogel), TOF

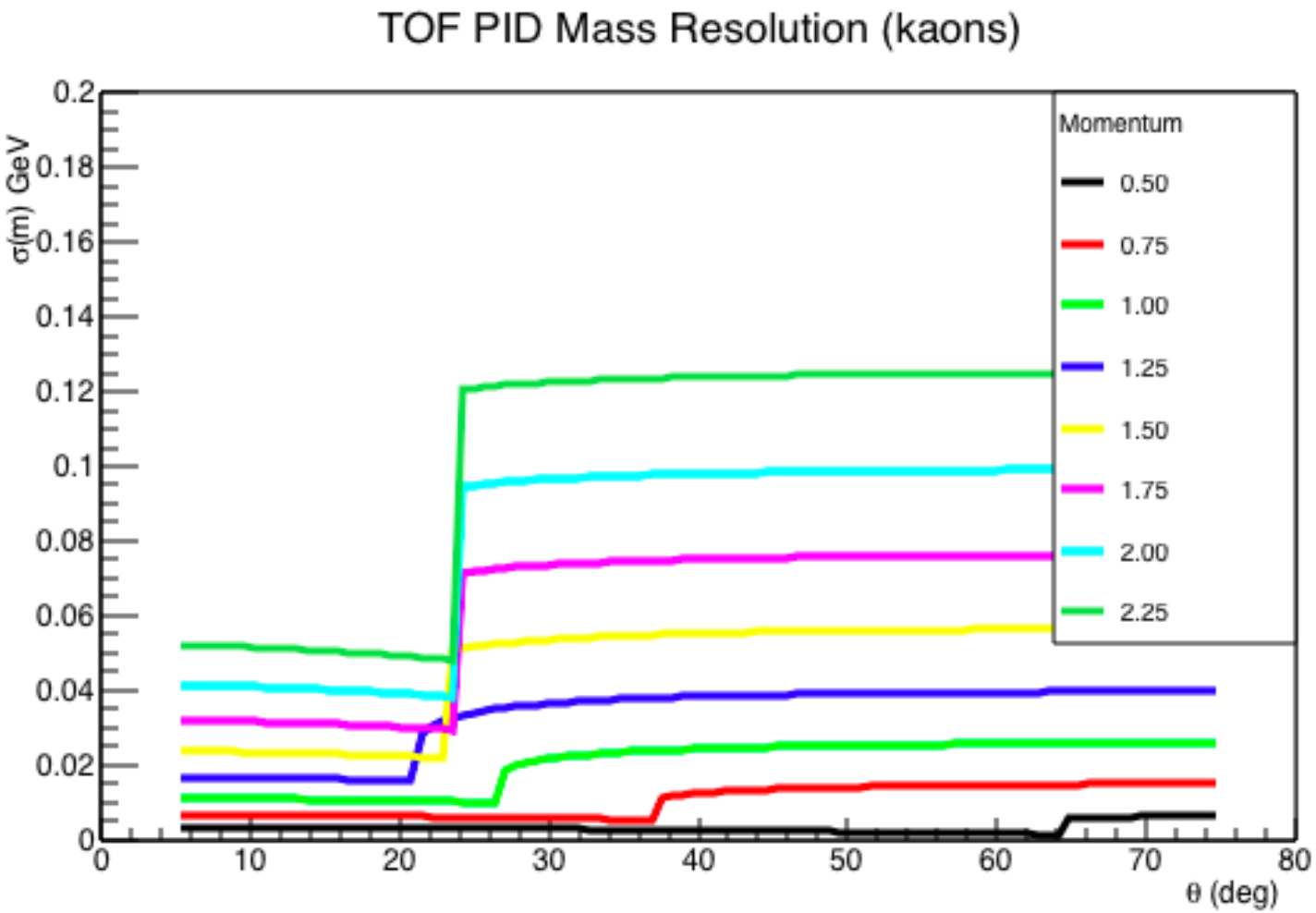
Path Length

- 3 Tesla
- 1 m radius



TOF Mass Resolution (Kaons)

- 50ps timing resolution



Multi-Detector PID Performance

- The mass resolution of several detectors combines in quadrature with the reciprocal of the resolution
- $\sigma(Mass) = 1/\sqrt{\sum_{(Det\ j)} \frac{1}{\sigma_j^2}}$
- MC analysis:
  - For each particle, generate a gaussian deviate of mean=true mass, rms = $\sigma(Mass)$, as determined by the track.

In progress

- Include DIRC and RICH parametric performance
- Generate MC PID performance for use in analyzing PYTHIA output
- Future
  - Include (non-azimuthally symmetric) tracking and PID in Forward Dipole-1 region
    - Approximately ± 80 mrad cone centered on ion beam