FtfDirect & TreeFitter

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PndFtfDirect

- Use directly in your simulation root macro
- Currently needs the external ".mac" file
- Usage similar to PndDpmDirect foreseen
- Coulomb elastic option planned (code from Anastasia)

Usage right now:

```
TString macfile = gSystem->Getenv("VMCWORKDIR");
macfile += "/pgenerators/FtfEvtGen/PbarP.mac";
PndFtfDirect *Ftf = new PndFtfDirect(macfile.Data());
primGen->AddGenerator(Ftf);
```

Decay Fits in Rho

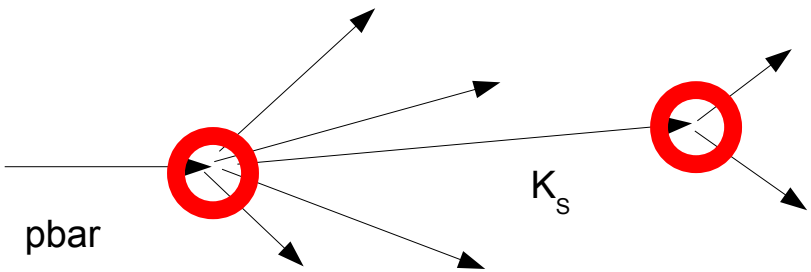
Vertex Fit Corrects final state momenta to one common point along trajectories (use PndVtxPRG)

Kinematic Fit Corrects daughter momenta to meet the mass or 4-momentum constraint

Executing fits subsequently and with locking some candidates, a leaf-by-leaf structure is created.

Example

1. Vertex fits for K_S and rest of tracks.
2. Mass constraint fit with vertex fitted K_S daughters
3. Locking K_S daughters
4. 4C fit on rest & K_S



TreeFitter

Basically fits the whole decay tree. Vertices, known masses, measured tracks & neutrals and beam/target measurement ("4C") are included as constraints. The common approach is the χ^2 fit with Lagrange multipliers.

$\rightarrow$ Very large parameter space and large matrices have to be inverted!

Solution: Kalman Filter approach

- Calculation of χ^2 is linearized
- Each constraint to the fit enters as one separate, scalar term
  $\rightarrow$ maximum matrix dimension to be inverted is usually 5 (helices).
- Do not confuse with our track fitting!

Existing TreeFitter

- BaBar & LHCb have a TreeFitter, written by W.Hulsbergen
- The author provided us the latest stable code.
- Our goal: Implementation into PandaRoot

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Decay chain fitting with a Kalman filter

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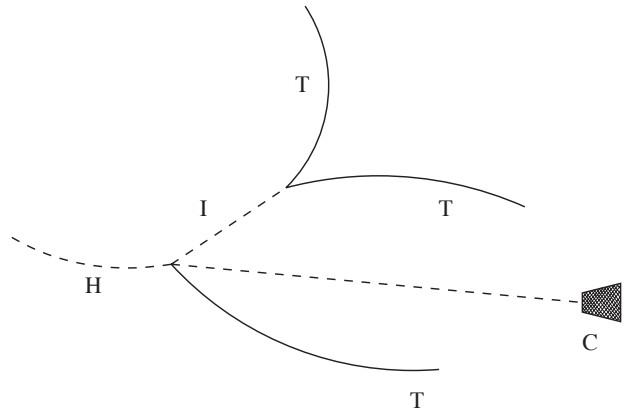

Fig. 1. Schematic picture of a decay tree with three charged particles reconstructed as track segments (T), one photon reconstructed as a calorimeter cluster (C), and two composite particles (I for 'internal' and H for 'head').

Status

- ✓ Obtain the code & look for showstoppers
- ✓ Matrices & Vectors: CLHEP → ROOT
- • Framework interfaces: Gaudi → FairBase/ROOT
  & LHCB → PandaRoot
- • Candidate Interfaces via Rho (calculations to be transformed)
- × Running Tests & Debugging

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Thanks.