# FastSim Status

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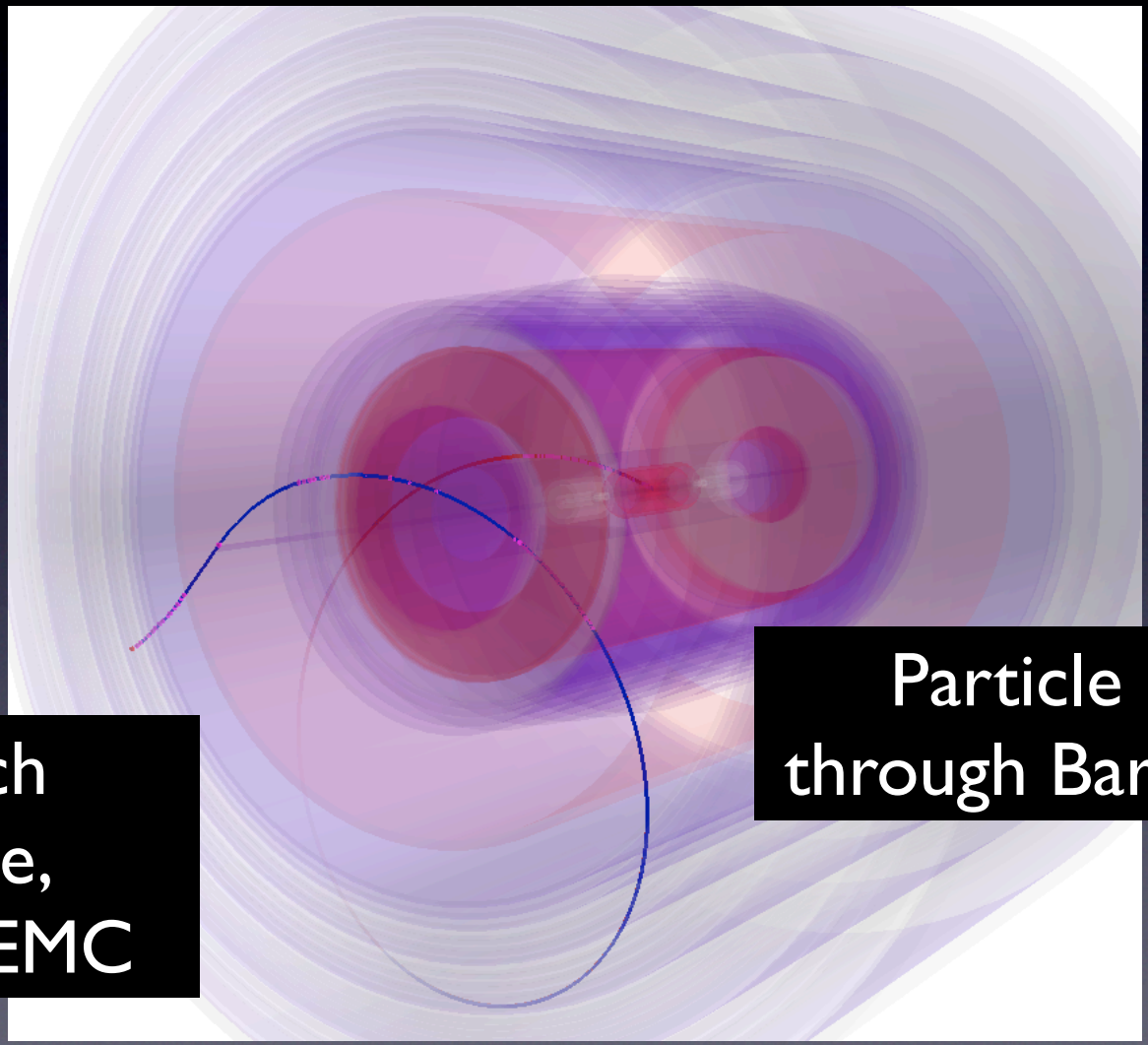
# FastSim Improvements

- Neutron interactions modeled in Bruno/G4
- Pair electrons filter (Svt dE/dx)
- Faster, more accurate EMC time response
- dE/dx merged hit filtering
- Detector-based PID selectors
- Hadronic and Semileptonic Signal cocktails
- Various low-level code improvements
  - background frame reading, hit merging, ...
- Navigation

# Old Fastsim Navigation

- Old model: particle simulation navigation loops over detector elements in a fixed order
  - order set by configuration
- Works when particles have a well defined path
  - outwards through cylindrical shells (SuperB)
- Fails when particles come from ‘unexpected’ directions, or when elements have no fixed order WRT particle direction
  - Dch endplate vs backwards Emc
  - Loss of efficiency near ‘edge’ of Dch
  - Missing dirc info for particles looping to the endplate

# Problems with large ‘gap’

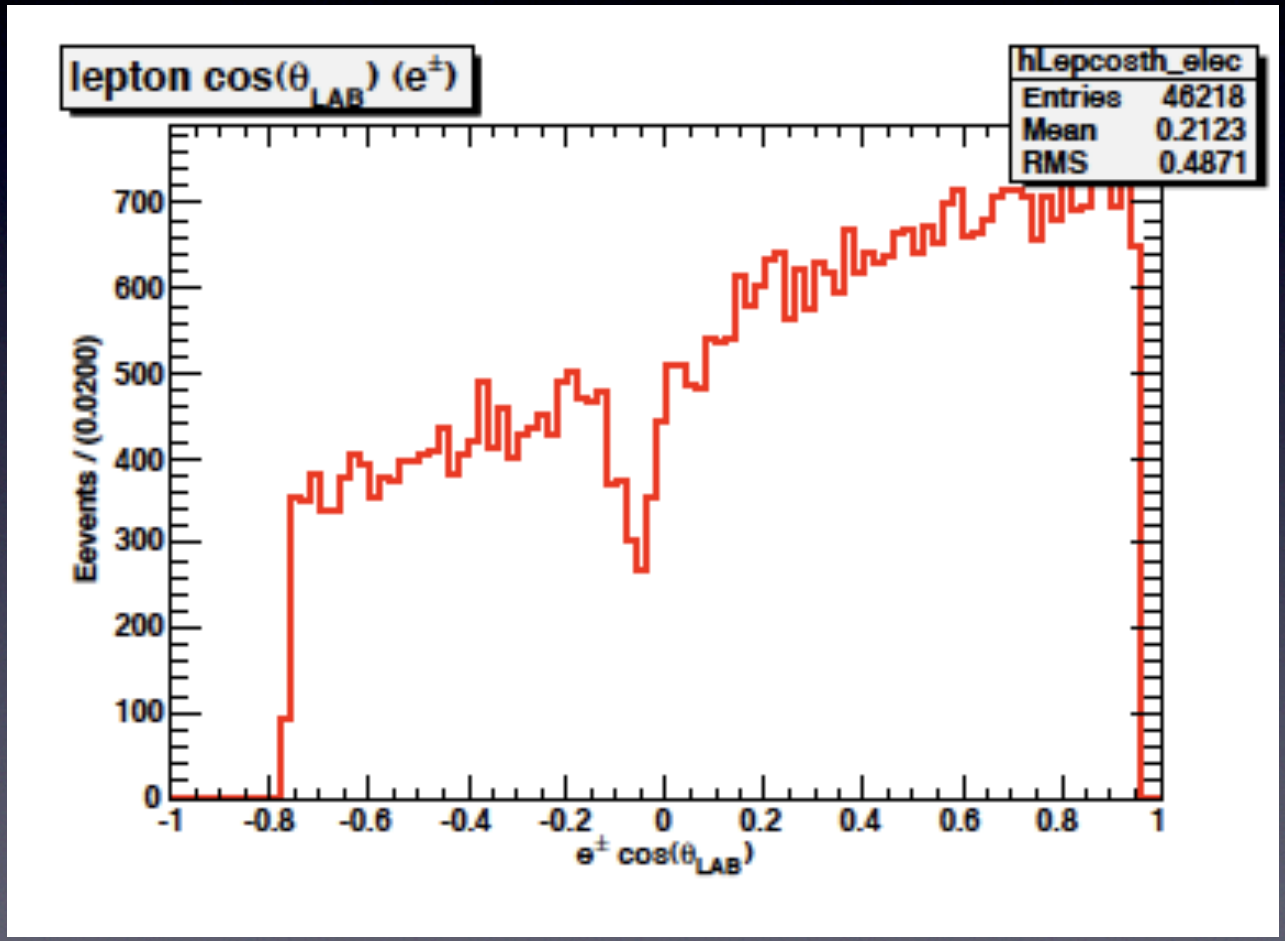


Hits Dch endplate, forwards EMC

Particle passes through Barrel, Iron...

# July Data Navigation Problems

- Inefficiency in PID selection vs Cos(theta)

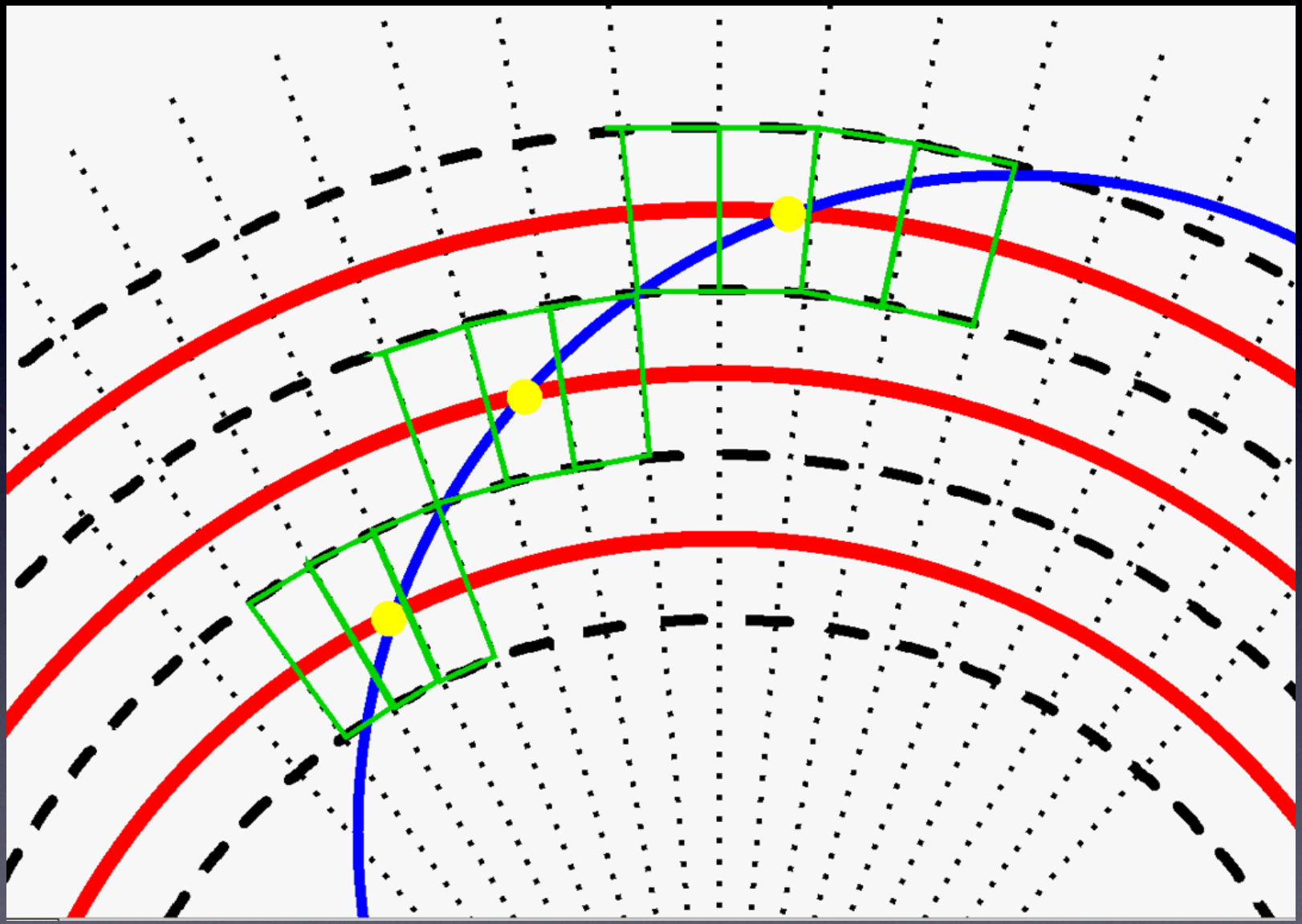


# New Fastsim Navigation

- Detector space is divided into volumes
- Volumes are divided into voxels
  - cylindrical geometry
  - subdivisions in ρ,Z,ϕ,  defined in configuration
- Voxels reference enclosed detector elements
- particles are tracked through voxels
  - deterministic
  - independent of any assumptions
- Particles interact with elements within voxels
  - No geometric assumptions about element order inside a voxel

# Open Fastsim issues

- Generalization of hit merging
  - Currently only cylinders due to ‘stereo’ problem
- Generalization of calorimeter measurement
  - regions hard-coded, no depth segmentation
- Missing Dch hits at top of looper arc
- Alternative Forward PID?
- MC truth used to filter background dE/dx
  - better to use detector quantities?
- Low-momentum energy loss and scattering



# Status and Conclusions

- Fastsim was developed actively in last period
- Open projects remain in Fastsim
  - applicable to SuperB physics studies and other experiments