

2005-10-11

NS: POCA function in Helix does not work for negatively charged tracks.

JM: Added Jira item.

NG: Hmatrix upgrade. Hoping to get something from Karsten. Haven't gotten him to dial in. Will just patch it. Hope that transverse stuff would be added and make update all at once. Okay with doing incrementally. Should standardize on fixed-cone. Easy to find minimum that gives good Eres and separation. Could calculate from compact description from moliere radius. Could calculate opening angle based on the detector.

SM: Assuming hits behind main cluster won't adversely affect the hmatrix. Help by adding energy to the photon to improve the result. Might need to tune the cone to optimize it. Looks like if fit cone to the main cluster, then pickup a fraction of (???) to improve Eres.

NG: Has been some progress (claims) from Geant4 group that modifications to multiple scattering have been made for EM bug. In almost all of Tatsumi's plots, looking at scintillator/lead. In some sense, don't care, because want to make sure it works in very thin silicon.

SM: Geant4 team sees same problem?

NG: Not as pronounced, because ratio of absorber/sensitive thickness ~ 1 , while our sensitive is much thinner.

Done any other photon analysis, e.g. efficiency as function of p_T ?

SM: Trying to tune-up the track-finding.

Added section to code for selecting a different clusterer, e.g. fixed cone, etc.

NG: Updates on calorimetry from Ron?

RC: Close to having general cluster analysis package?

In the process, a few utilities have been added.

Make a Final State particle list. Sounds trivial, but it varies a lot by application. Tried to put in several options.

Generator final state particle list for FastMC, trying to generate reconstructed particle list.

Simulator final state particle list, end of the chain. Everything that happens before the calorimeter. Options on particles not from endpoint. RZ cylinder option to ignore all beyond some RZ.

Tested-out and seems to work.

Uses MCParticleClassifier.

Fill lists with cluster information about final state MCParticles.

Another list that holds information for every cluster, holds MCParticle info.

NG: Updates from Uriel?

UN: Only SiD models are working. Not working because crashes.

NG: Send us crash to debug.

UN: Don't have code to match track to a cell by position.

RC: Others have asked for this, too. Have a volunteer to do it. (Matthew Charles)

UN: Also have a person who is writing this code. Can provide help on this.

Which tile to remove the hit from for charged tracks.

Already have code that does it at 75% efficiency.

SM: E/H. Increase the H portion by using Uranium or some dense absorber. Could also decrease E with low Z material. In RPC, place G10 in front of the gas may reduce E in E/H for RPC version of calorimeter. Problem will be that don't want to reduce E, because already way too low. Looked at different in response N, Nbar, klong. Optimize for RPC version, only way to do it is reduce E. Some tradeoff there.

Having meetings 1/week with FNAL, Adam Perra. Starting at the beginning. Looked at contributions of jet algorithm/fragmentation to pflow. Look just like results at Chicago meeting. NICADD also showing up (Lima).

NG: SiD meeting Dec 16 + 17 at FNAL.

NS: Helical swimmer bug. Bug in Helix class using POCA. Along Z, it goes into infinite loops. Radius is negative.

Put full CCD simulation into CVS. Probably need to regenerate JavaDoc. Cell ID is not implemented. Need to tie to the IDDecoder class.

ReconstructedCCDHit implements SimTrackerHit.

TJ: CCD digi. Takes tracker hits, "mangles", and puts back in?

NS: Lots of work but just ends up as small effect.

TJ: Track finding?

NS: No.

From each reconstructed hit, have pointer to the parent.

Put into event the new class ReconstructedCCDHit.

NG: Should extend TrackerHit instead of SimTrackerHit?

TN: Question of whether SimTrackerHit extends TrackerHit?

Probably should so that TrackerHit codes work with SimTrackerHit.

Wouldn't need different tracking code.

RP: How would implement error matrix for hit that comes out?

NS: Error matrix should not part of tracker hit in any way.

Errors = measurement errors.

Correlated. Not just a property of single hit.

Errors in multiple scattering are correlated.

Can't calculate until know the history. Can only be done in the fitter.

NG: Measurement uncertainty should go in track.

TJ: Digitized CCD hits point back to original?

NS: Just has parent.

TJ: If write out, the information will be gone. (???)

NS: Only works when doing reconstruction within the same program with access to transient MCParticle info.

NS: Not combining. Transform SimTrackHit in analysis chain.

TN: Merging?

NS: Merging and separation.

TJ: What to do when merge two hits?

NS: If merge two hits, particle that contributed hit is assumed to be the parent.

TJ: Downside of using SimTrackerHit. Allows to point back to multiple MCParticles.

Different concepts: digitized vs. non-digi, MC vs. non-MC, etc.

Need to separate these concepts.

NS: Could have list of parents.

TJ: If don't make extend TrackerHit, then this information is lost, while if do extend, then can save information.

NS: Can implement TrackerHit.

SimTrackerHit should be extension of TrackerHit.

TN:

TrackerHit - "real" info

SimTrackerHit - info from simu

ReconstructedTrackerHit - covariance, processed raw hit

NS: Generic fitting, should use generic TrackerHit.

TN: Common should go in RawTrackerHit.

Simulated then implement SimTrackerHit.

Reconstructed then implement ReconstructedTrackerHit.

NG: Associate MC parentage, use a MCTrackerHit class.

TrackerHit and RawTrackerHit are supposed to be just data w/o MC connection.

Could then extend it to include MCParticle info.

New LCIO class or extended collection class that maintains the pointer list.

TrackerHit and RawTrackerHit do not have MCParticle info.

RP: RawTrackerHit documented?

TJ: Should make proposed diagram of tracker hit classing. And maybe propose the change to LCIO.

NS: Trying to debug SLD-based track fitter. Still do not have any other track finders.

Added additional constructor to fitter which builds track parameters. Uses the B-field.

Need to define/redefine track parameters.

Helix swimmer assumes positive tracks are curving clockwise.

Using D0 signed impact parameter.

If reference point inside the helix, impact parameter is positive. If outside, it is negative.

Will depend on the direction of the B-field if swimmer will use center-finding algorithm.

Should not do assumption about B-field direction when defining the helix.

Give momentum and angles and it defines helix. Also, another option with track parameters and will define helix.

TJ: Any reason not to do this?

NS: When construct, use negative omega.

TJ: When transform from track parameters to helix parameters, there is some assumption made about how to do it.

NG: In this case, probably okay, because $+z$ = positive B-field.

MR: Able to reconstruct W's with Eres = $30\% / \sqrt{E}$ using cheater with nuclear interactions turned-off. (Hadronic interactions in the tracking region.) With nuclear interactions, degrades to 45%. Study various effects.

NS: Track finder reconstructs a lot of gammas and neutrons.

MR: Switch in tracking cheater where can track back to FS particle or just use the charged. Conversion pair given back as track info for photon that has been converted. Keep track of all this in recon cheater. Don't have intension of undoing photon conversions or π^0 decays. The programs are working /functional. Some analysis of nuclear interactions: number of neg/pos/neutral particles per event. 2D scatter plots don't look as bad as 45%, but definite degradation with nuclear interactions included.

NG: Steve doing "perfect pflow" for several years. Should work with me.

SM: We should correspond about it.

MR: Eflow is cheated.

NG: Steve has numbers for contributions from neutrals, charged, etc.

MR: How well reconstruct inside detector as opposed to calorimeter only?

Protons and neutrons, silicon ions from interactions in tracking region.

Various ways of handling nuclear interactions. Can try to reconstruct charged particles and throw out, but can't subtract the neutrals. Need to try and reconstruct the shower.

JM: Overview of [Example Maven Project](#).

MR: Doing SiD reco. Want to do GLD and LDC.

NG: Need to vet LDC and GLD models with conveners.

MR: Not advertising as true LDC and GLD models.