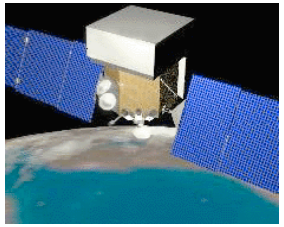
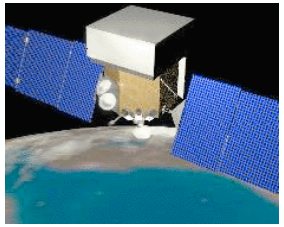


ACD Simulation Status

Heather Kelly

GSFC/SSAI



GSFC Cast of Characters

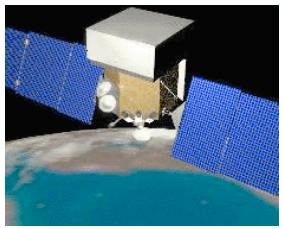
Dave Thompson (GSFC) Subsystem Manager

Tom Johnson (GSFC) Instrument Manager

Alex Moiseev (GSFC) Lead Scientist

Bob Hartman (GSFC) ACD Scientist

Analia Cillis (GSFC/NRC) Simulations



What has happened lately?

Upgrade digitization routines.

Major overhaul of digitization data output

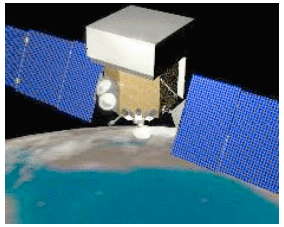
- Data available within Gaudi TDS and in ROOT

Doxygen documentation for both AcdDigi and AcdRecon packages

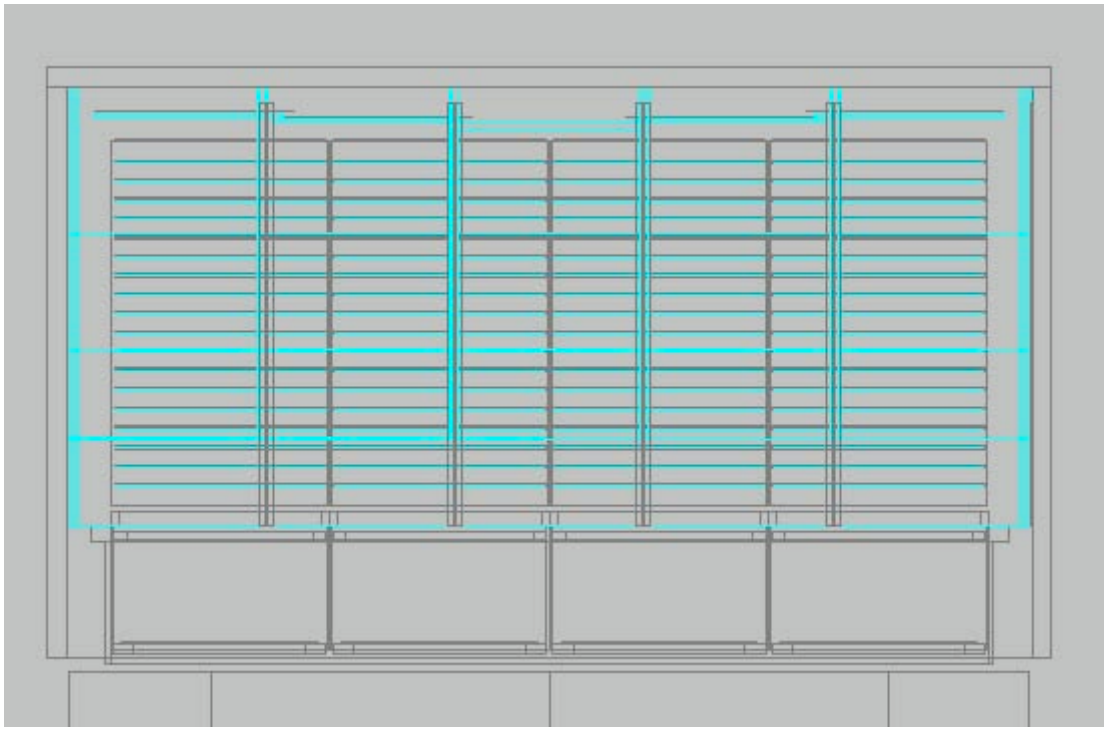
- http://www-glast.slac.stanford.edu/software/ACD

Performance evaluation is in progress.

- Now Due October 30th



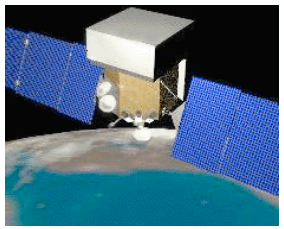
Current ACD Simulation Geometry



No side tile tilt or curved edges along the top

Base Electronics Assembly (BEA) is not included

Support structure and thermal blanket need to be updated.



Output Classes

AcdDigi

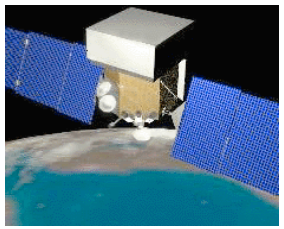
- Every AcdDigi corresponds to one detector associated with 2 PMTs.
- Each AcdDigi contains:

2 PHAs
2 Sets of Discriminators
  low
  veto
  CNO
Energy deposited in MeV

AcdRecon

- One AcdRecon object per event.
- Each AcdRecon contains:

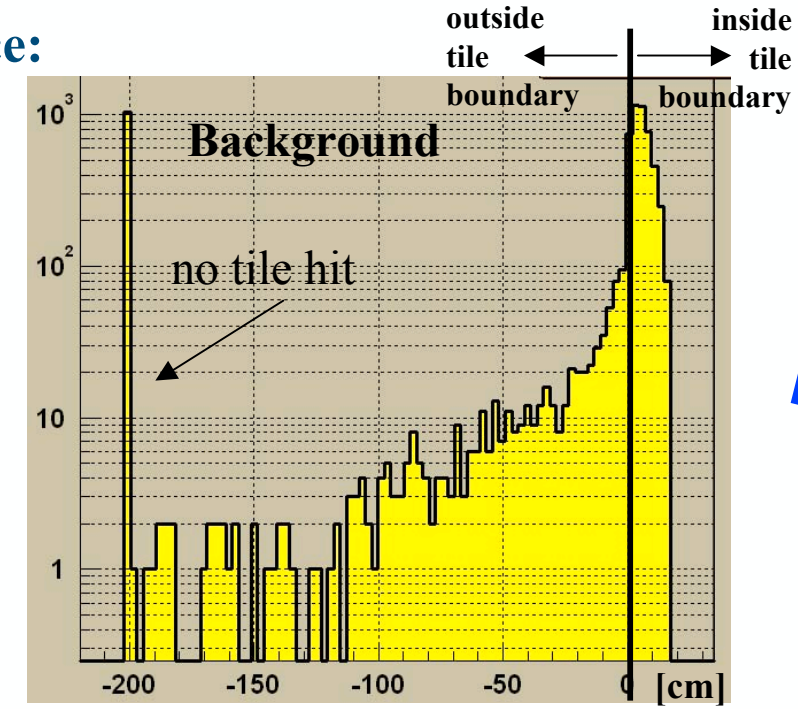
Total energy deposited
Count of ACDs above veto threshold
DOCA
List of DOCAs for top, sides
Active Distance
List of Act Distance for top, sides
Collection of recon energies

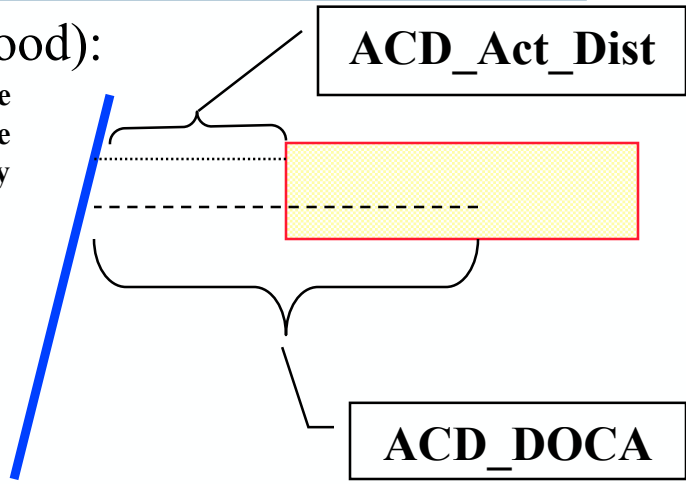


ACD Recon

Primary outputs (both originally designed by Bill Atwood):

1) Active Distance:
measures distance from edge
(done once for entire ACD, and by region)

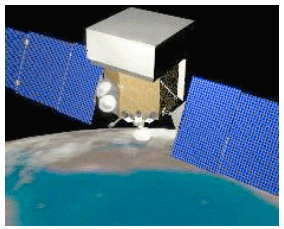




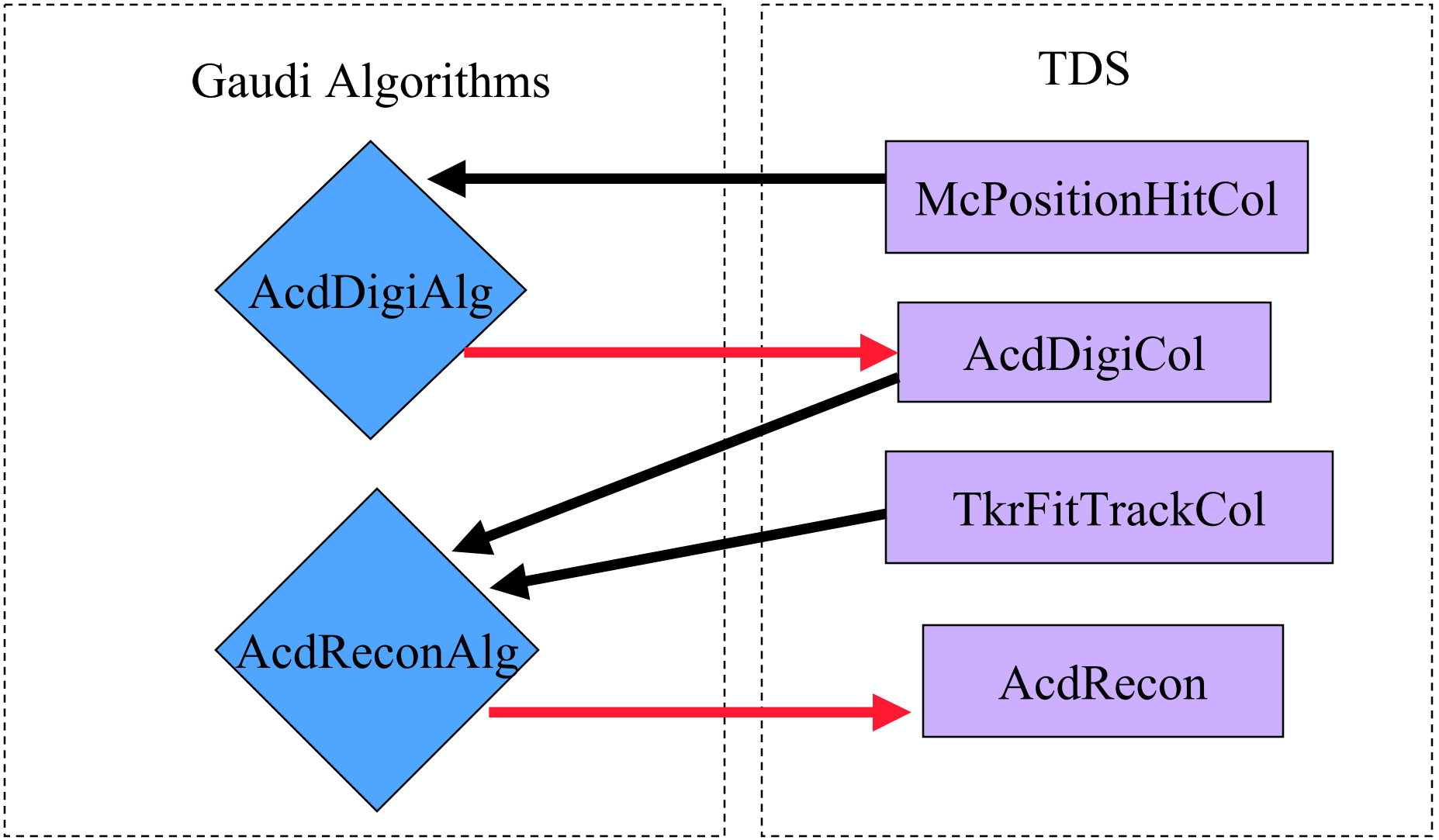
Note: As work to make the ACD digitization more realistic is nearly finished, will now update recon output

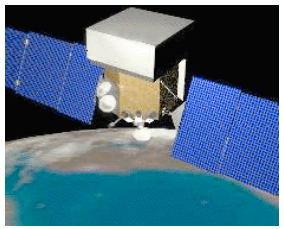
2) **Distance of Closest Approach (DOCA):** measure distance from the center of a tile. Done also for different regions of the ACD, since tile size varies.

Recon also provides: energy deposition estimate and counts of tiles above threshold by region.



Overview


Gaudi Algorithms
TDS
McPositionHitCol
AcdDigiAlg
AcdDigiCol
TkrFitTrackCol
AcdReconAlg
AcdRecon



AcdDigi History

AO days before PDR

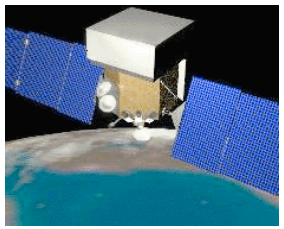
- ACD response solely based on MC energy depositions

pdrApp

- ACD response produces one PHA for every tile where conversion from MC energy deposition is based on constant conversion factor
  X MeV => Y PHA

Now

- 2 PMTs per tile and discriminators – including edge effects, Poisson fluctuations and Gaussian noise.

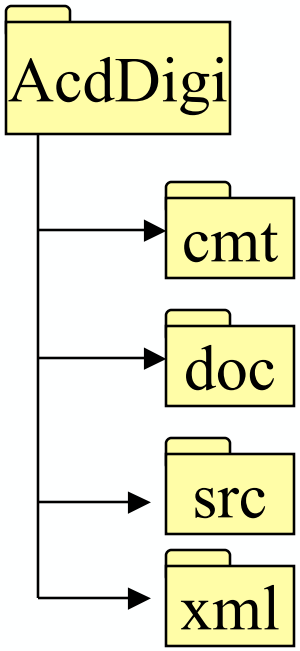


AcdDigi Package

Two Gaudi algorithms

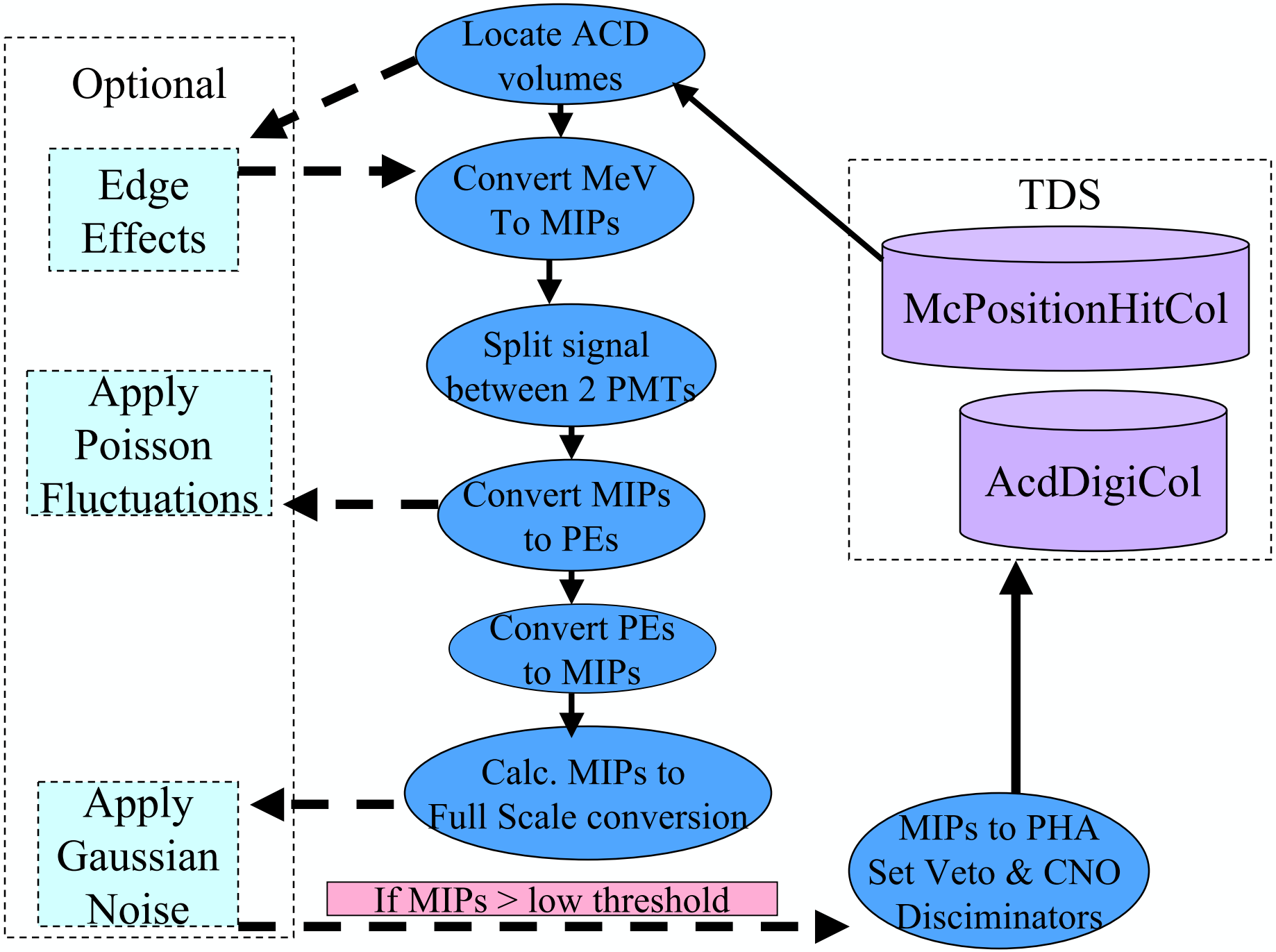
AcdDigiAlg – uses McPositionHitCol, optional edge effects

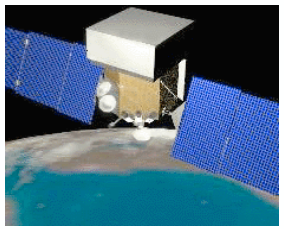
AcdDigiOrgAlg – original PDR alg



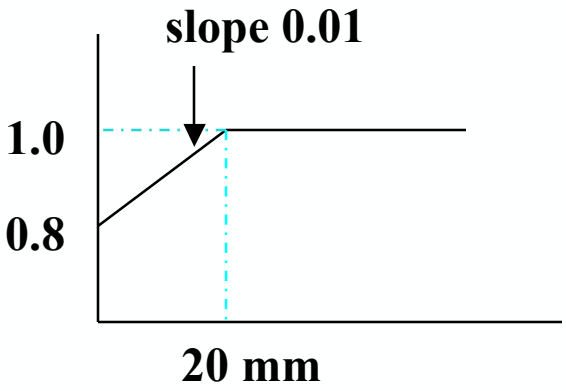
Gaudi Algorithms and AcdUtil class

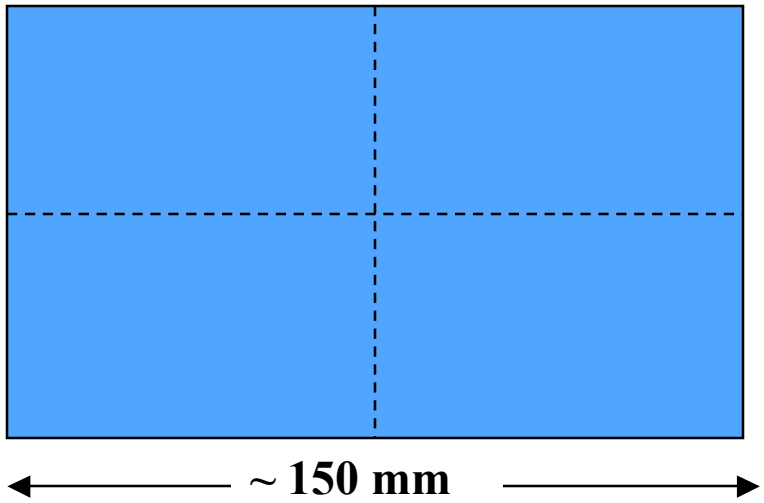
acdDigi.xml – input parameters


Optional
Edge Effects
Apply Poisson Fluctuations
Apply Gaussian Noise
Locate ACD volumes
Convert MeV To MIPs
Split signal between 2 PMTs
Convert MIPs to PEs
Convert PEs to MIPs
Calc. MIPs to Full Scale conversion
If MIPs > low threshold
MIPs to PHA Set Veto & CNO Disciminators
TDS
McPositionHitCol
AcdDigiCol

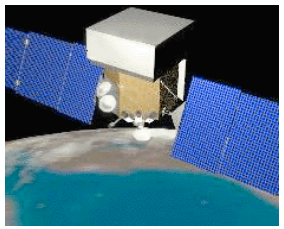


Edge Effects





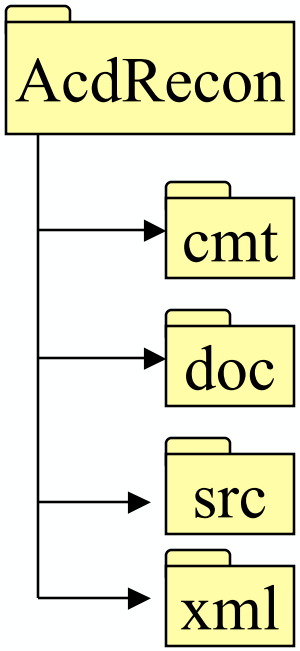
Depending upon where a particle hits an ACD tile, the amount of energy "seen" will vary.
This is modeled by a simple linear function, where positions further than 20 mm from an edge are unaffected.



AcdRecon Package

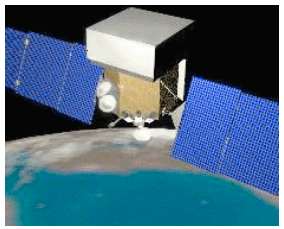
Currently based on original AcdRecon from glastsim and pdrApp with some updates.

AcdRecon output will be updated soon.

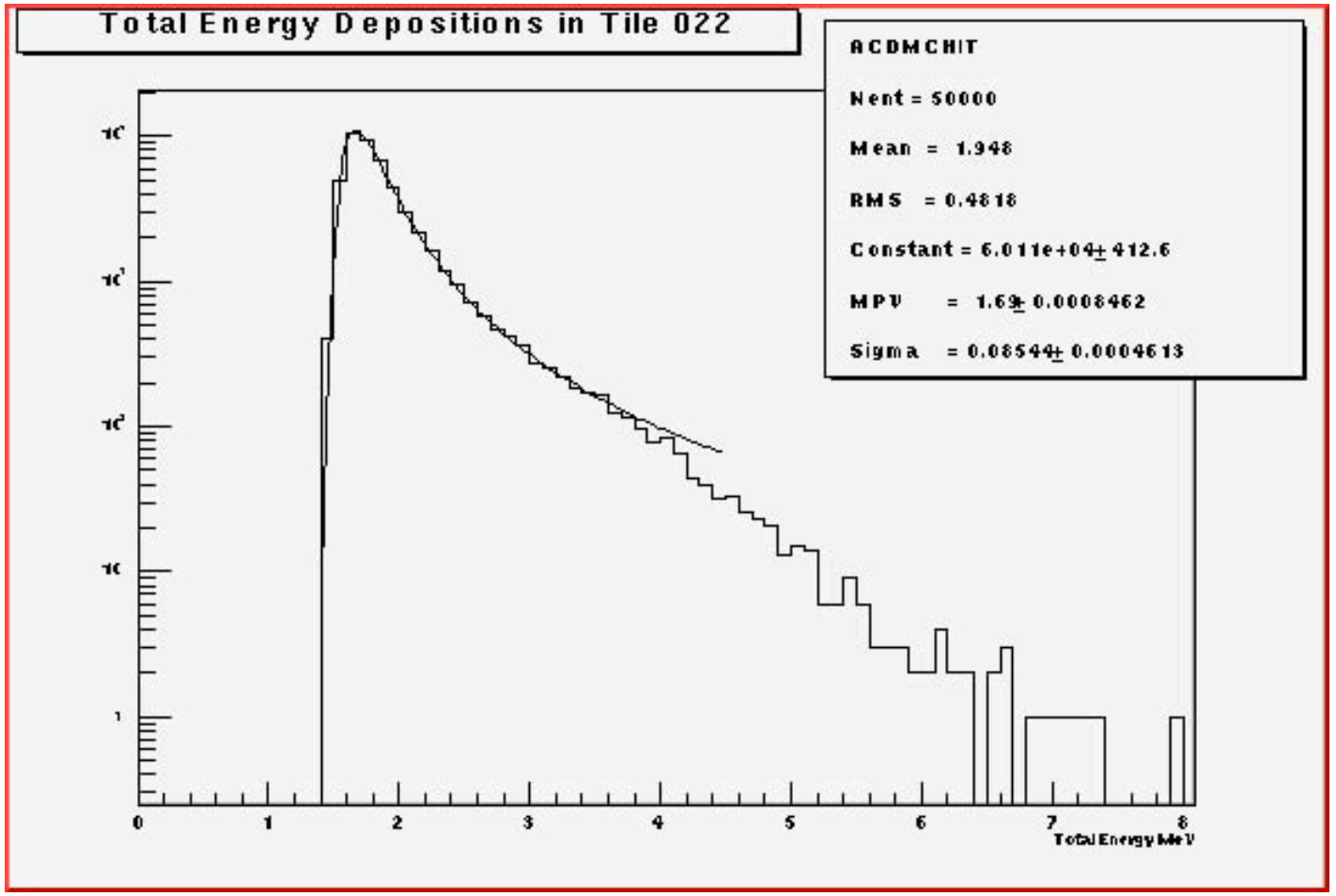


AcdReconAlg and AcdDisplay

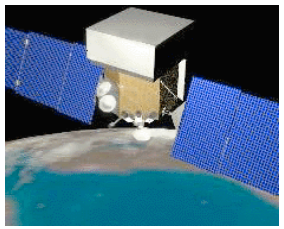
acdBFEM.xml – input parameters



Look! A Plot!!



300 MeV mu+ normal incidence - center



To Do List

- Modify Geometry last update from Nov 2001.
  - Side tile tilt, BEA, upgrade blanket & micrometeorite shield
- Overhaul AcdRecon data output
- Treat ribbons as detectors
- Finish Performance tests
- Calibration