ACD Sea Trials using Muons

The ACD is suppose to be 99.97% efficient at detecting the passage of charged particles over the front and sides of the LAT.

GlastRelease v7r1 (on glast-ts) is used.

Two datasets:

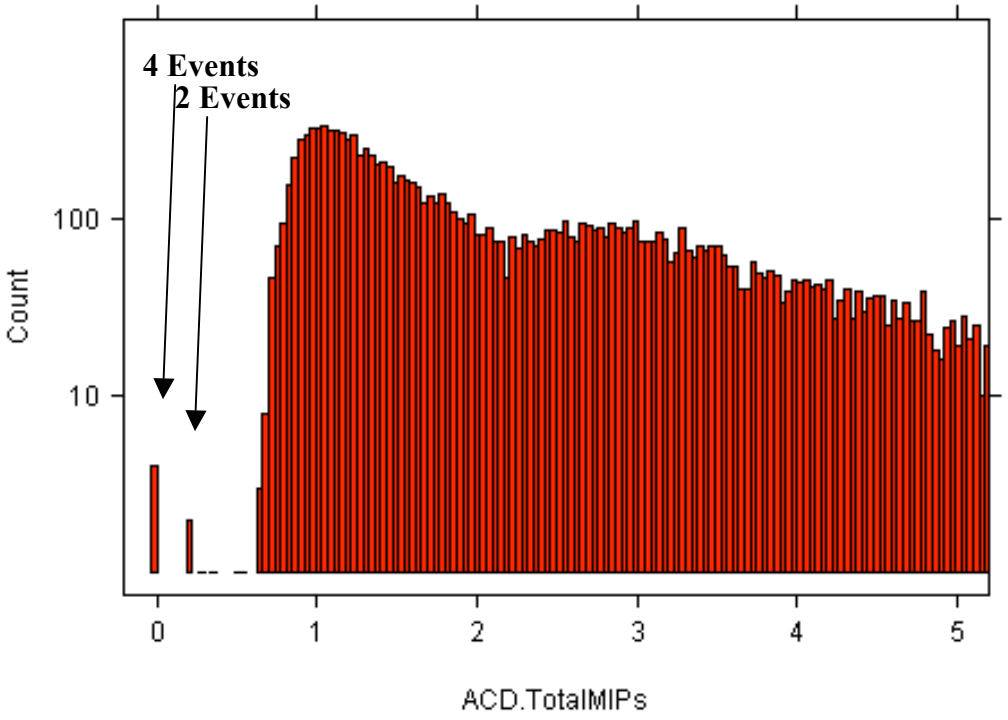
1) 10k 10 GeV μ+ at verticle incidence generated over a patch: x= 137 and y = [-187.5, 187.5]

2) 50k 10 GeV μ+ generated isotropically over the Field of View (FoV) ($\cos(\theta) < -.2$) and the usual 6 m^2 disk (i.e. full LAT coverage)

FoV Data Set Results

50k generated
25277 events in Ntuple

Requiring:
McDirErr < .005 & McZDir < -.2 &
TkrNumTracks == 1
leaves 12324 events
(I found it necessary to require just a single tracks as in the multiple track events there is an ambiguity as to which track give the Active Distance and DOCA)

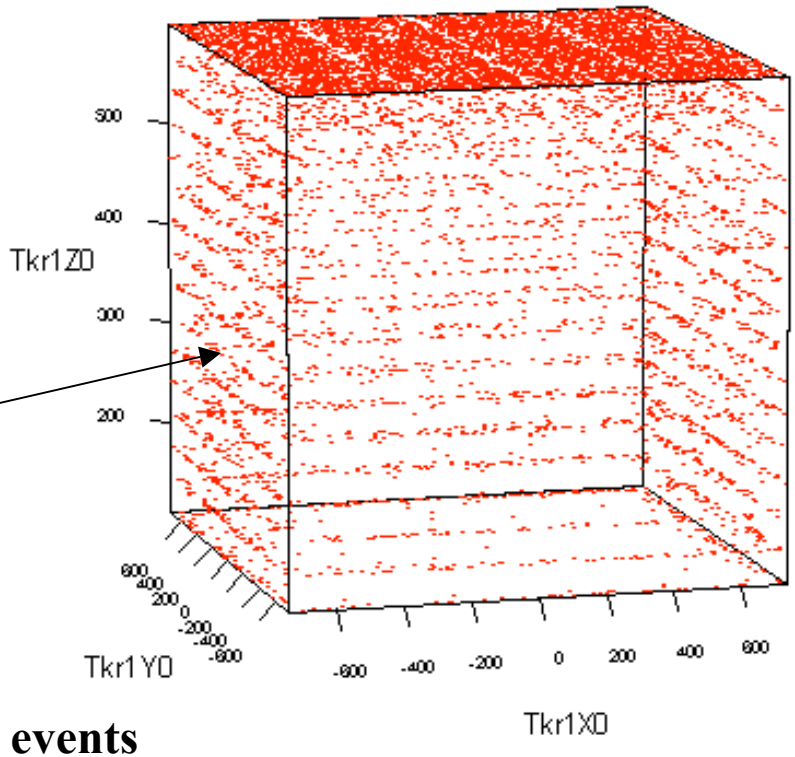


AcdTotalMips = AcdTotalEnergy/1.9 + AcdRibbonEnergy

Events with NOTHING in Tiles + Ribbons = 4 (3.2×10^{-4}) and < .3 MIPS = 7 (5.6×10^{-4})

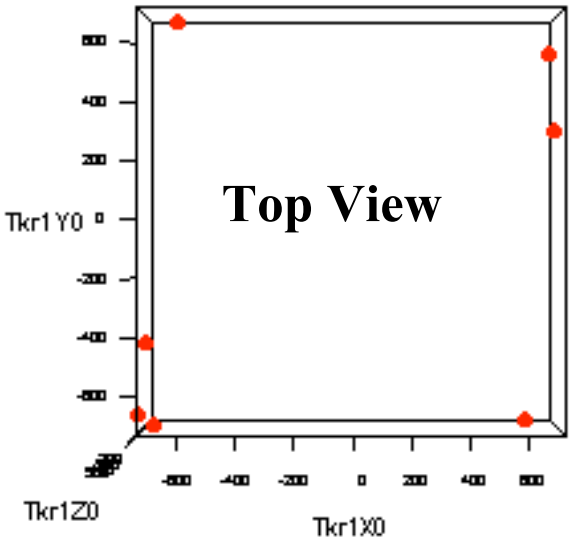
This meets the advertised ACD performance specification

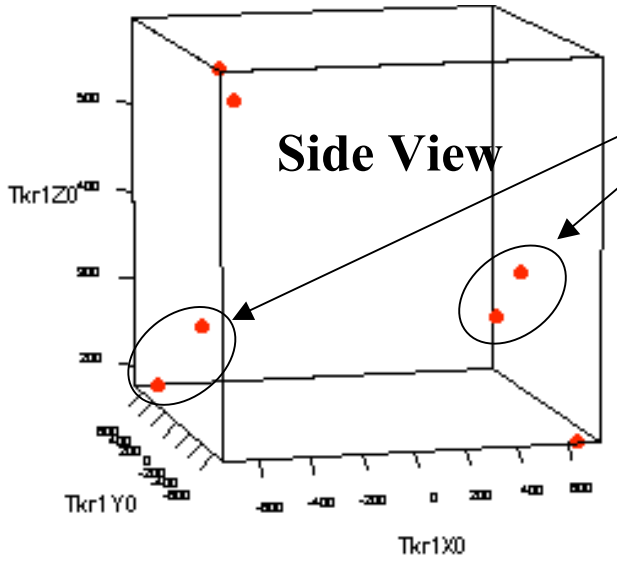
Location of all "Clean" Tracks



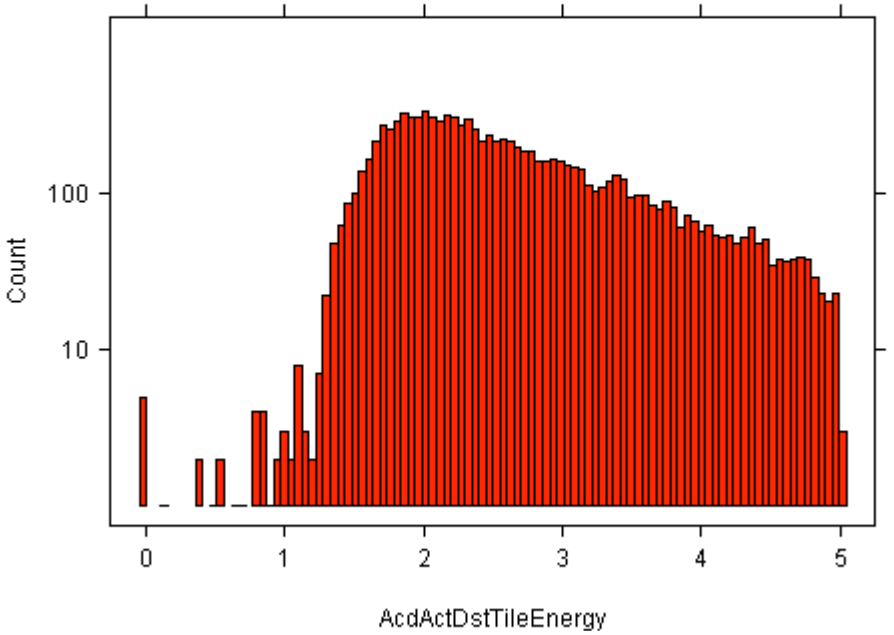
Note that the found tracks starts at the LAT Edge

Location of 7 < .3 MIP events



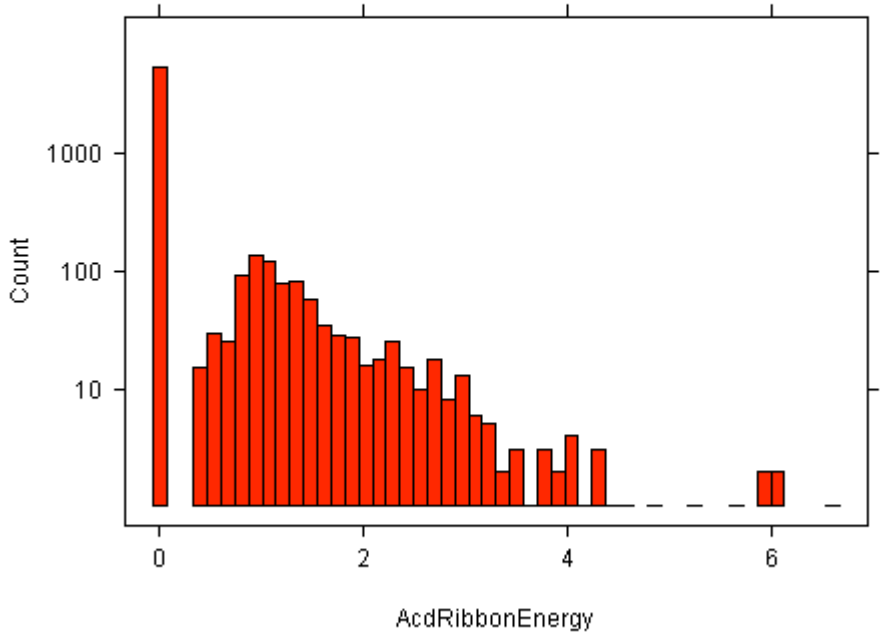


Energy deposited in Tile giving the largest Active Distance

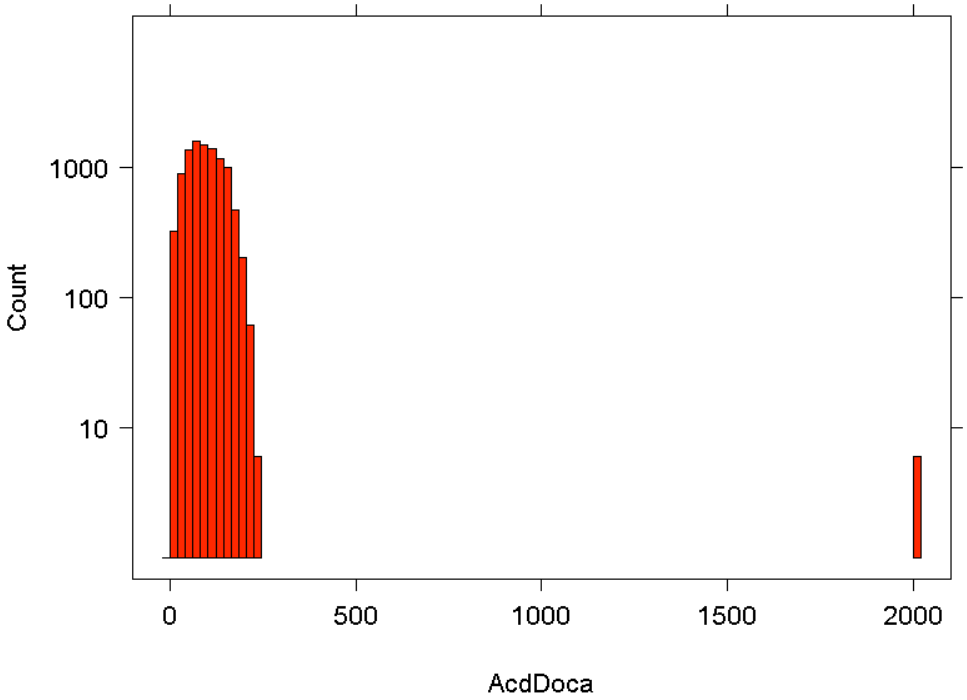


Energy deposited in the Ribbons when AcdActiveDist < 50

Note: very few events(17) with only Ribbon energy. Had to include overlap regions to get events.

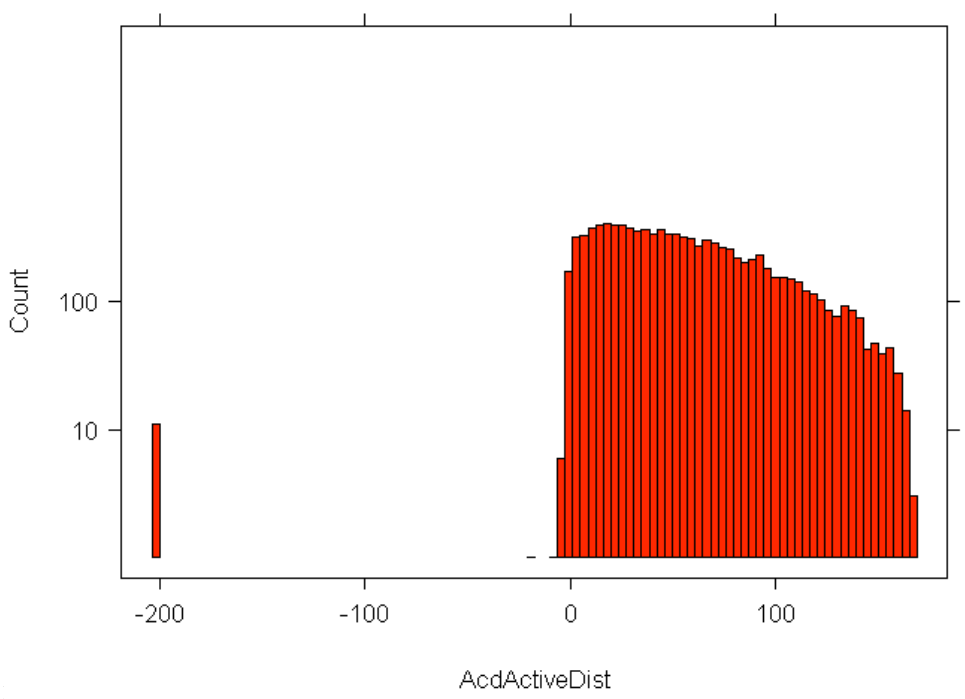


AcdDoca

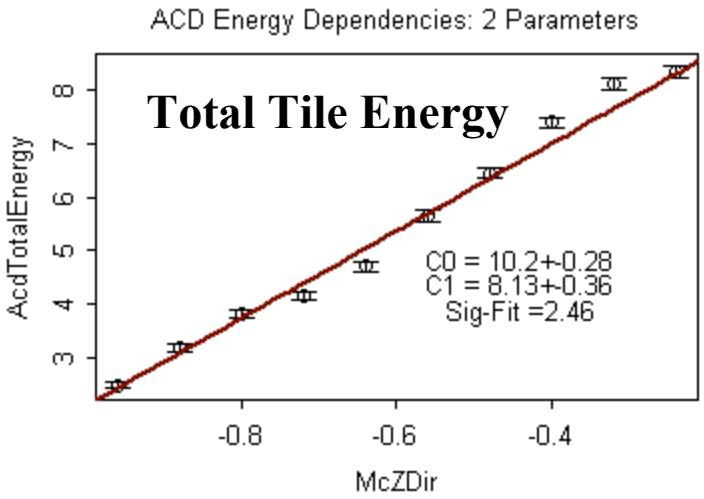


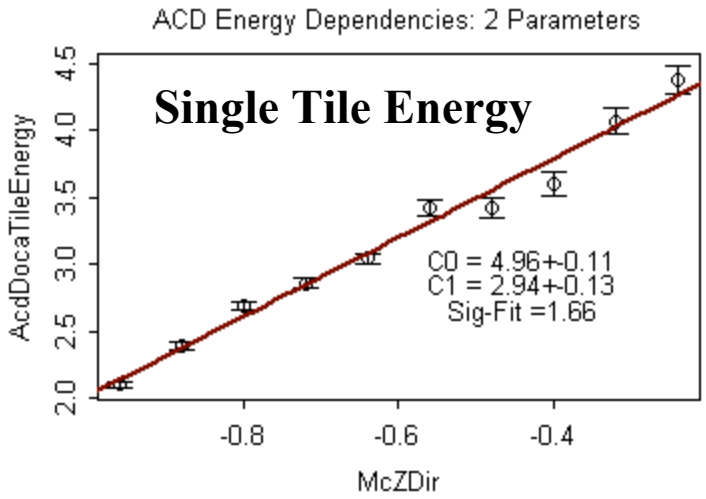
AcdActiveDist

These are sharp and clean as should be expected.



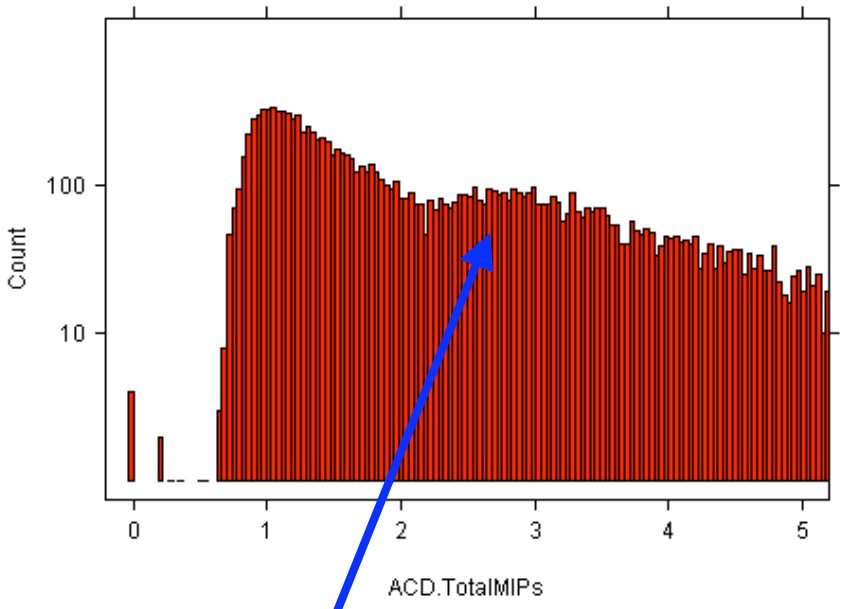
cos(θ) Dependence
(Top only)





Would expect 1/cos(θ) dependence

Suspect apparent cos(θ) dependence to averaging over 3D geometry. Need to use the correct incident angle relative to the normal vector of the hit tile(s).



The hump in energy distribution likely caused by multiple ACD crossing tracks