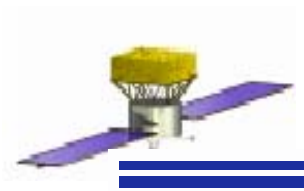


DC1 Physics Surprises

… and nothing about gamma-ray bursts

Physics Surprises:

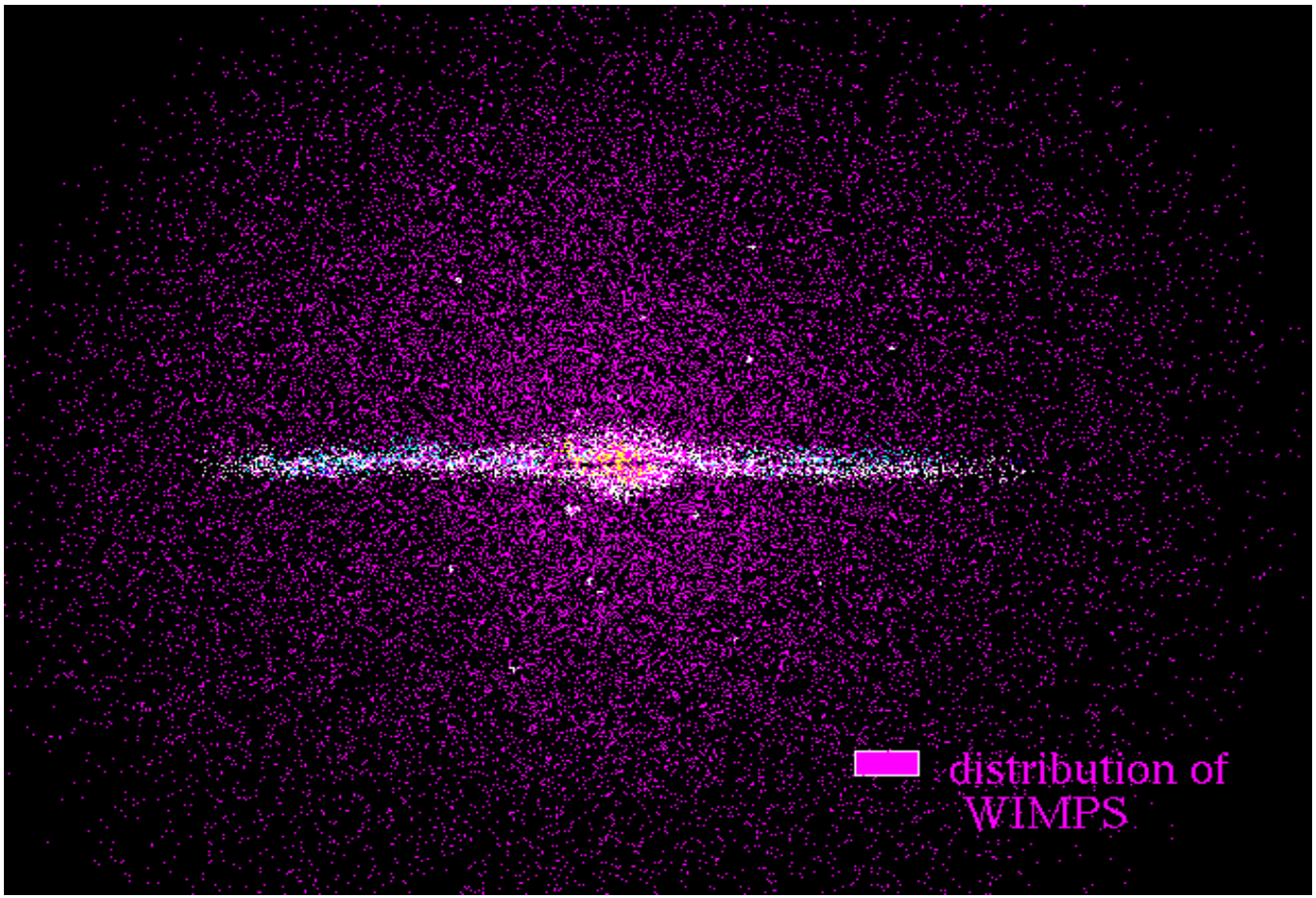
- WIMP's (from the galactic center)
- WIMP's (from elsewhere, i.e. Andromeda, Virgo, ...)
- dispersion in photon propagation
- gamma-rays from sun, moon, planets, planetoids, comets

Tools:

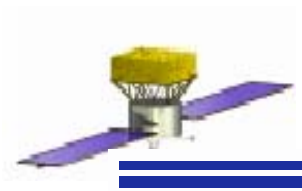
- root
- Science Tools

WIMP's

Dark matter may be Weakly Interacting Massive Particles

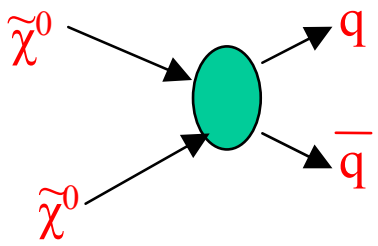


a simulation of WIMP's in the halo of our galaxy

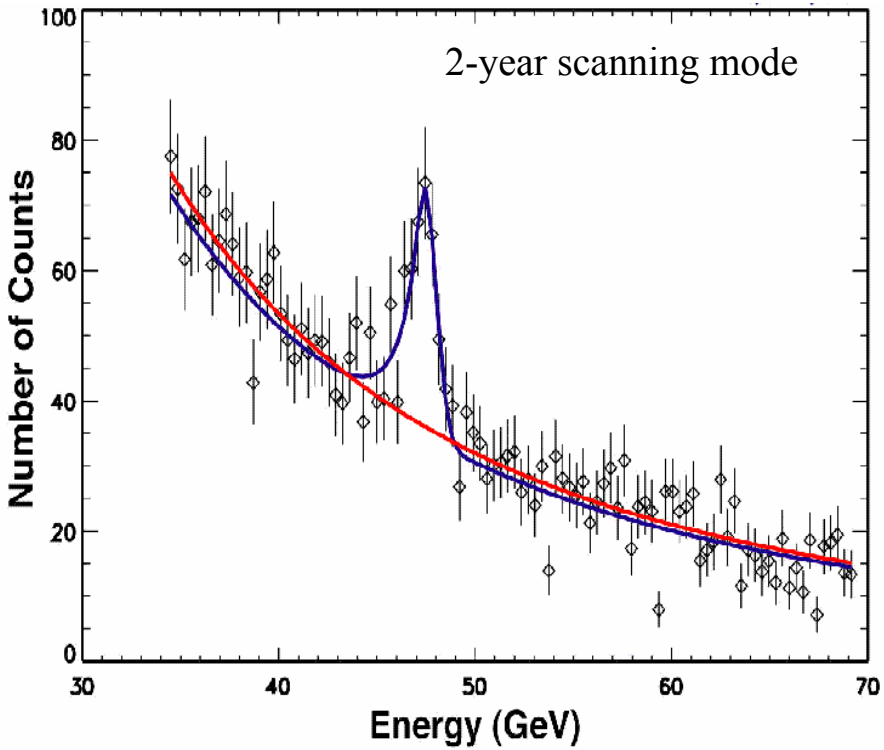


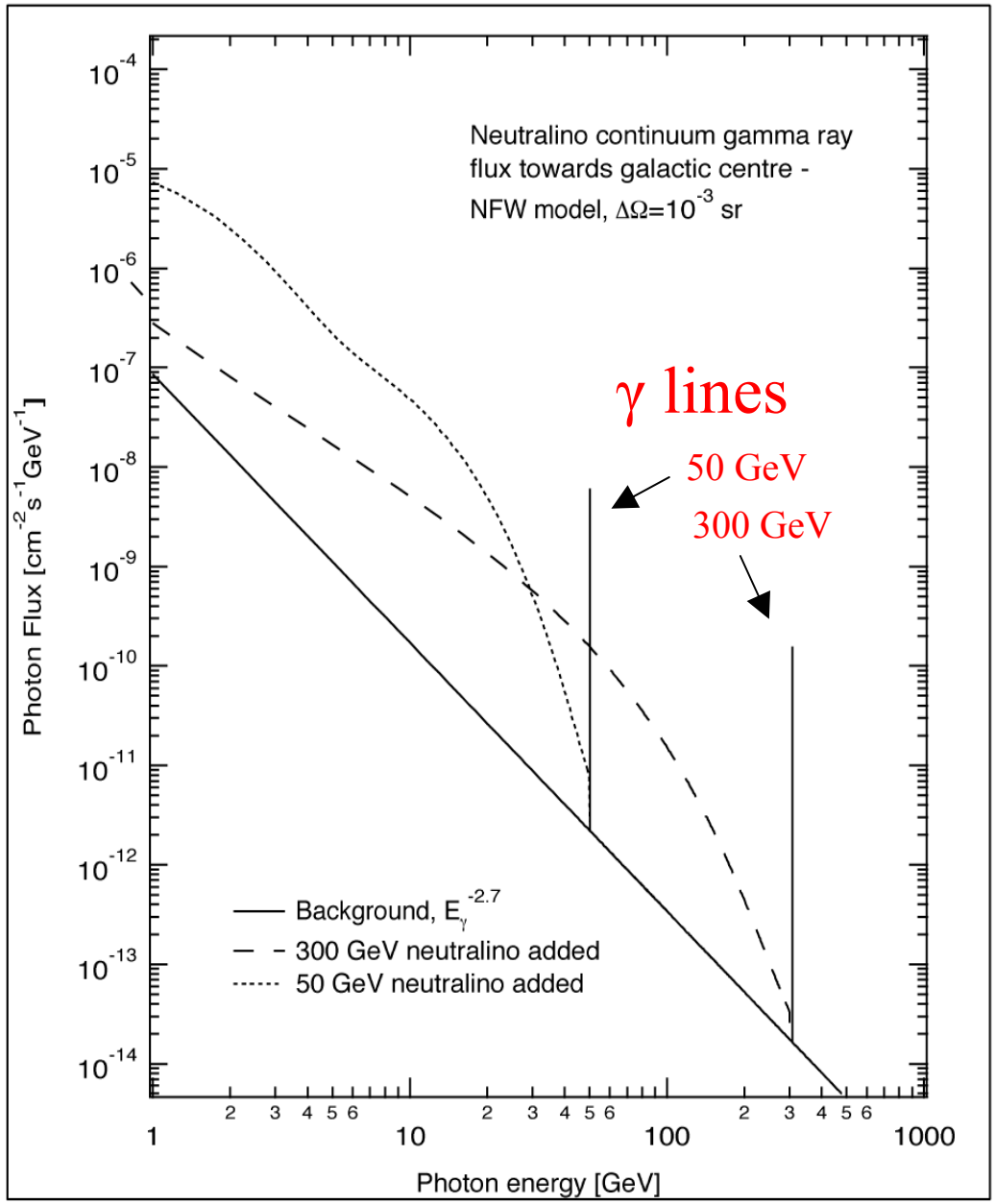
Halo WIMP Signal

Good particle physics candidate for galactic halo dark matter is the LSP in R-parity conserving SUSY

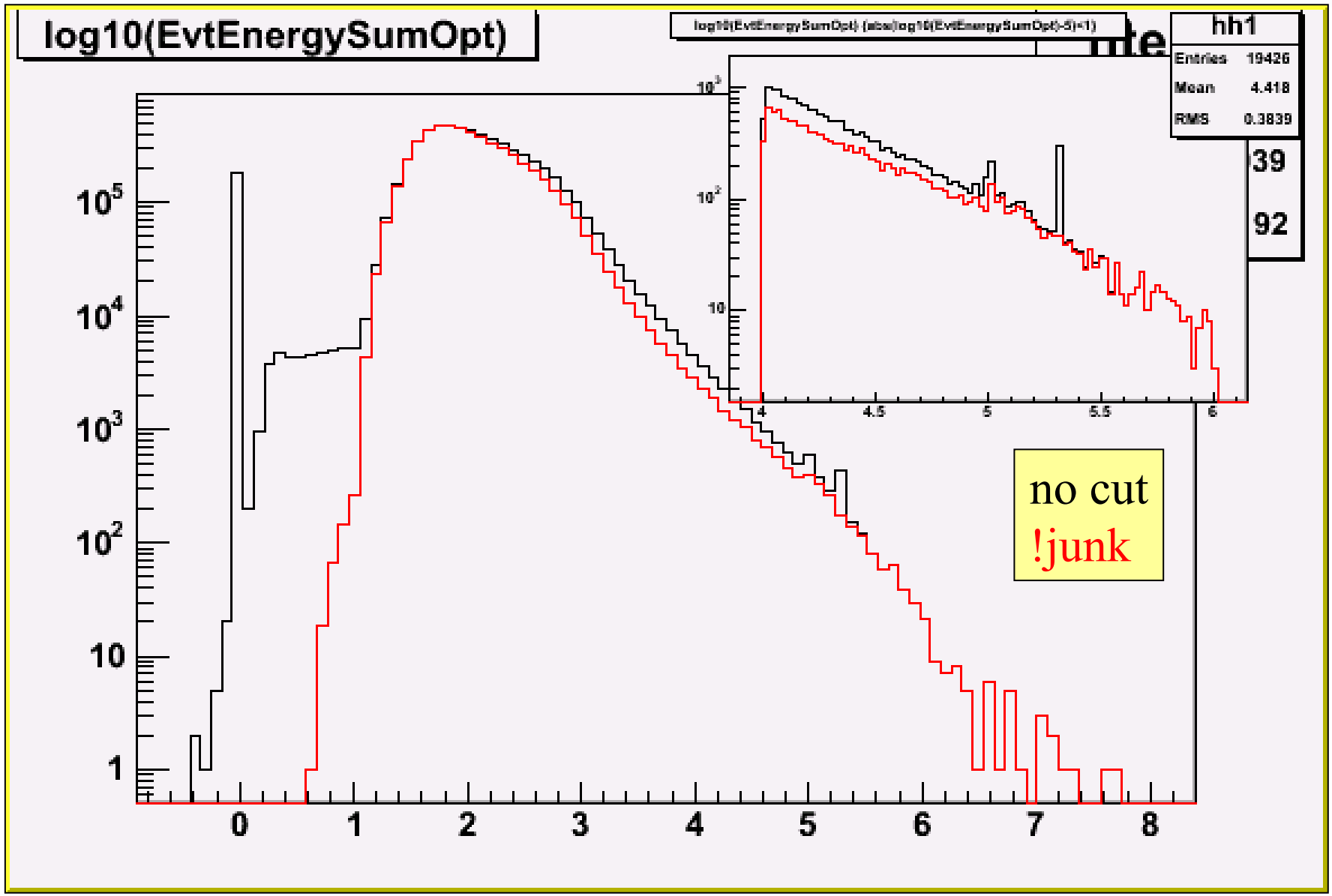


$\gamma\gamma$ or $Z\gamma$ lines



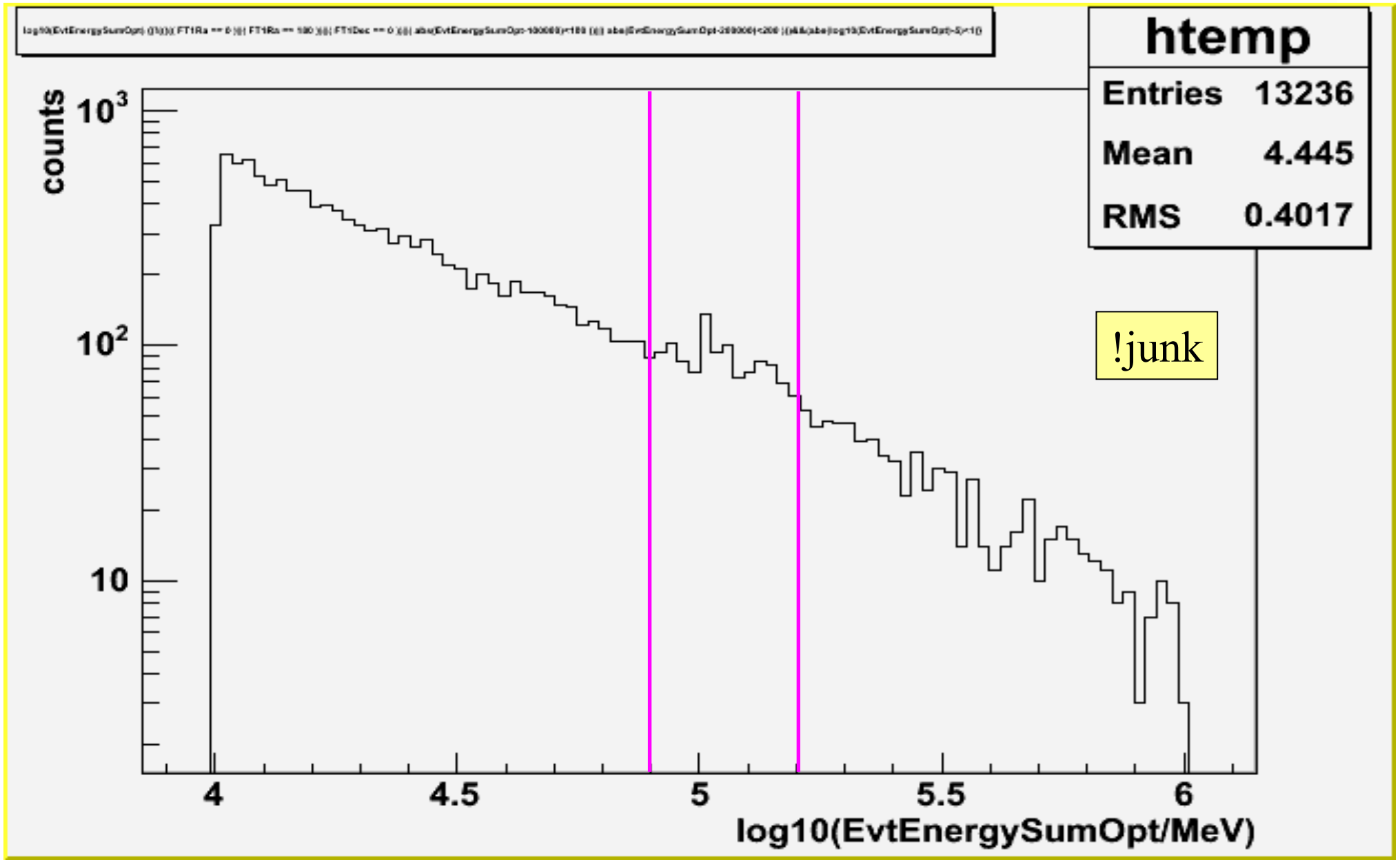


Naive Approach

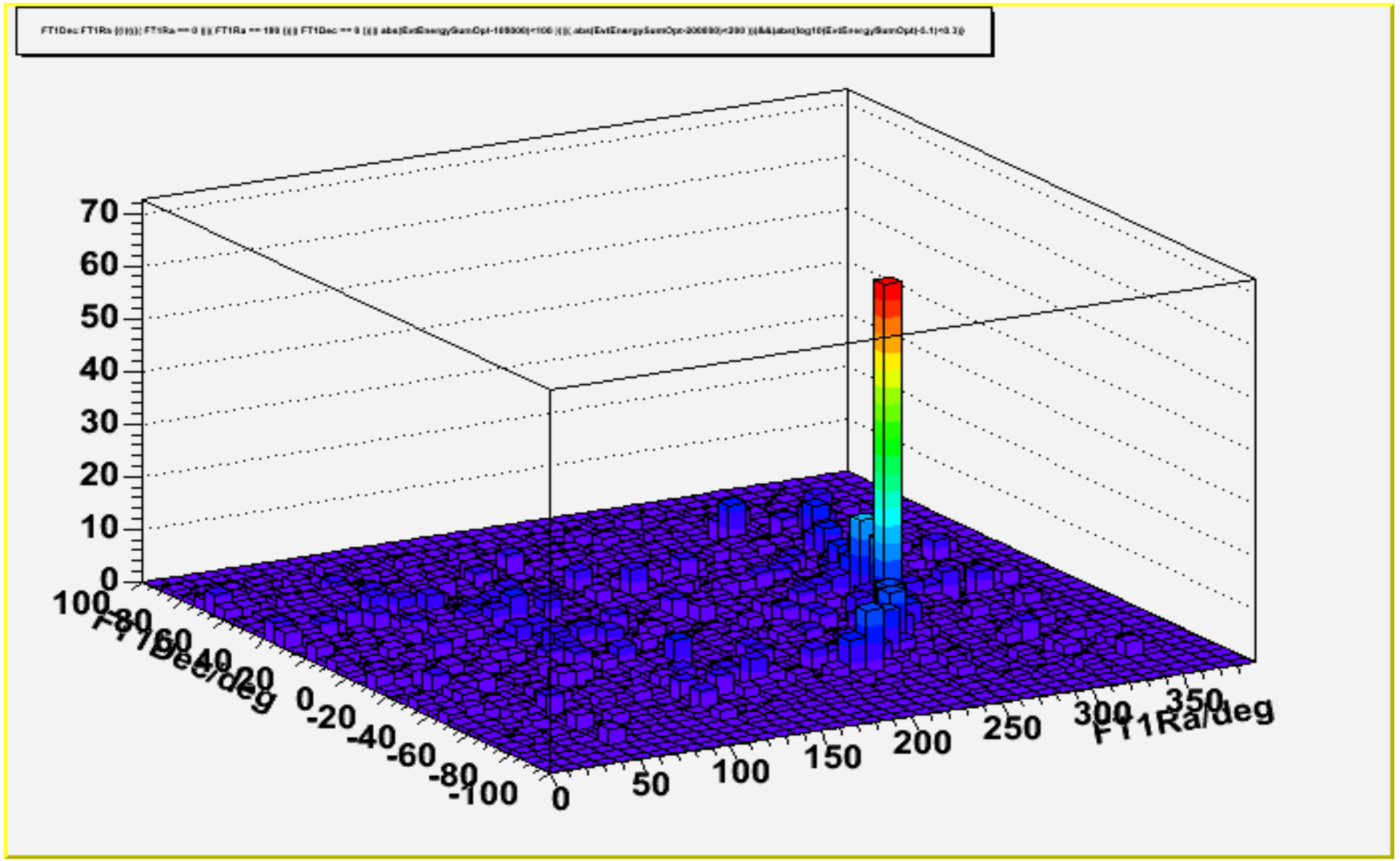


junk : = FT1Ra == 0 || FT1Ra == 180 || FT1Dec == 0 || abs(EvtEnergySumOpt-100000)<100 || abs(EvtEnergySumOpt-200000)<200

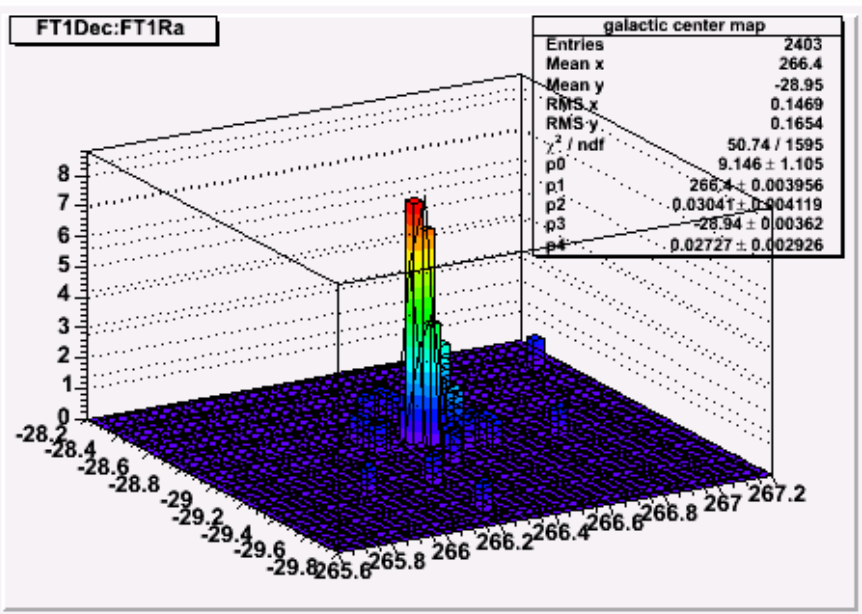
Zooming in Energy ...

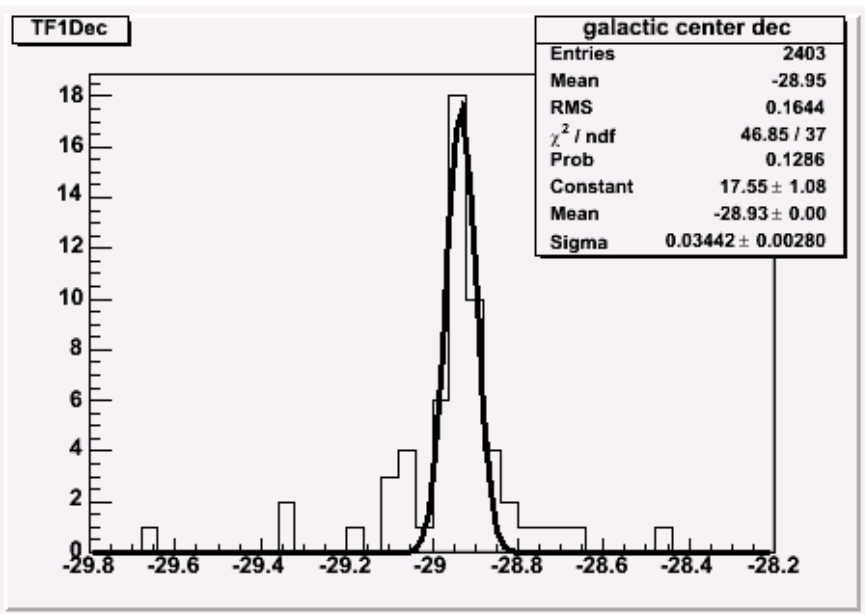


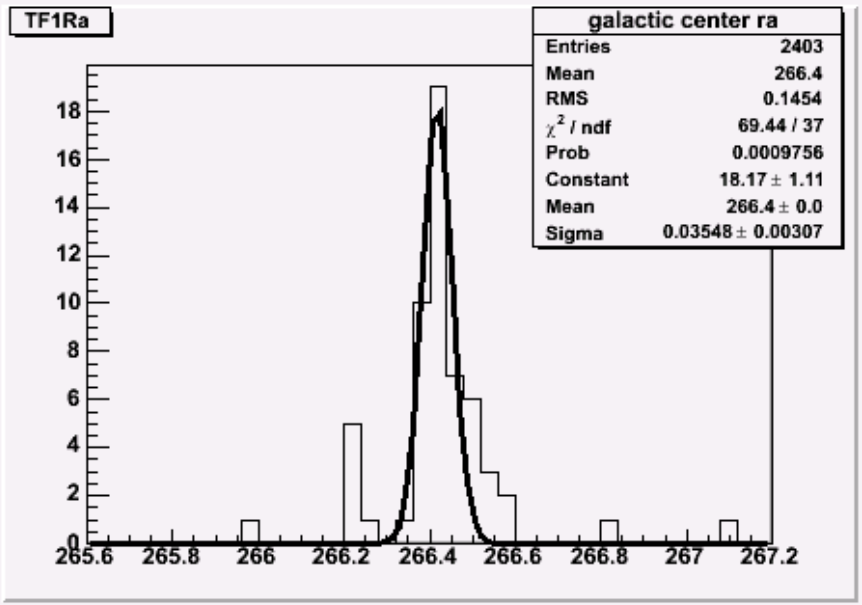
High Energy Sky Map

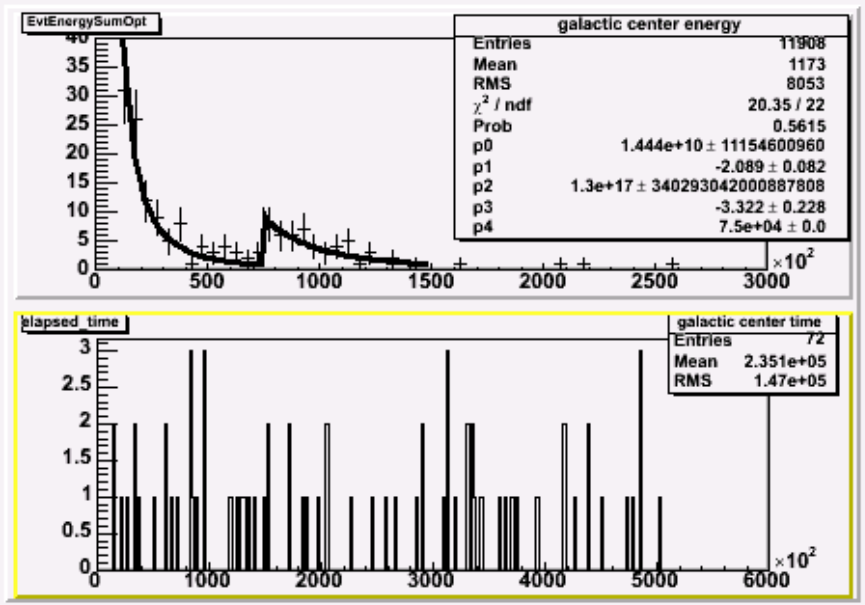


Plot of Everything ...









Results

Position:

galactic center (Seth):	Ra(2000):	266.404°	
	Dec(2000):	-28.935°	
source (fit):	Ra:	266.419°	±0.0024°
	Dec:	-28.9348°	±0.0026°

Energy:

galactic continuum:

power law, gamma = -2.09±0.08

source:

power-law (exp?), gamma = 3.3±0.2

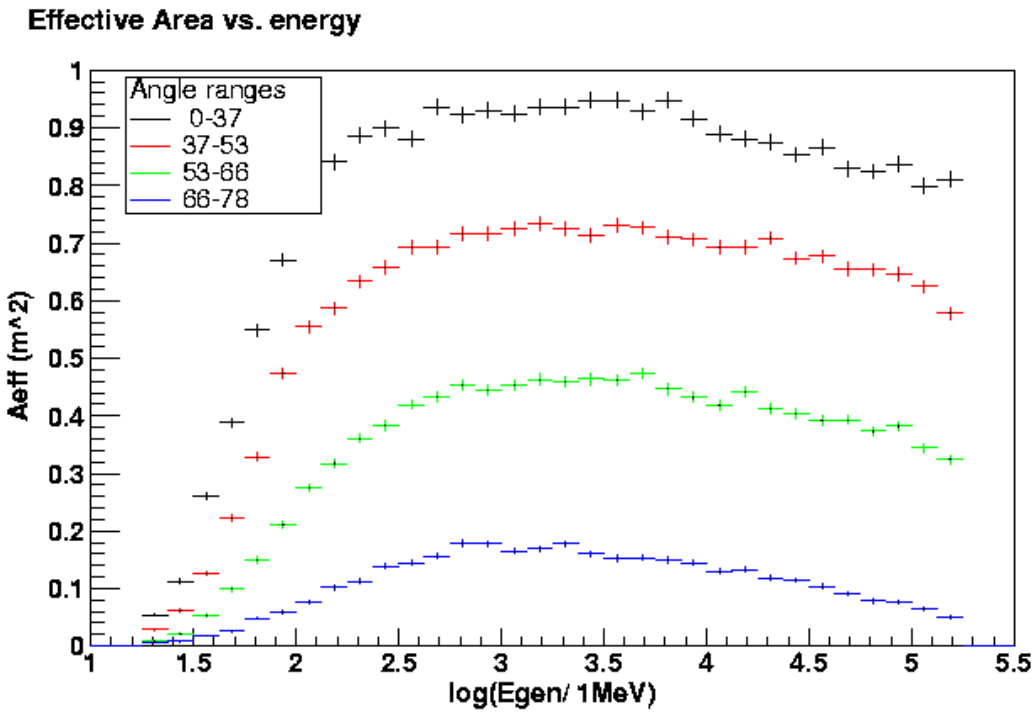
low energy cut-off: 75GeV (not fitted)

39 events

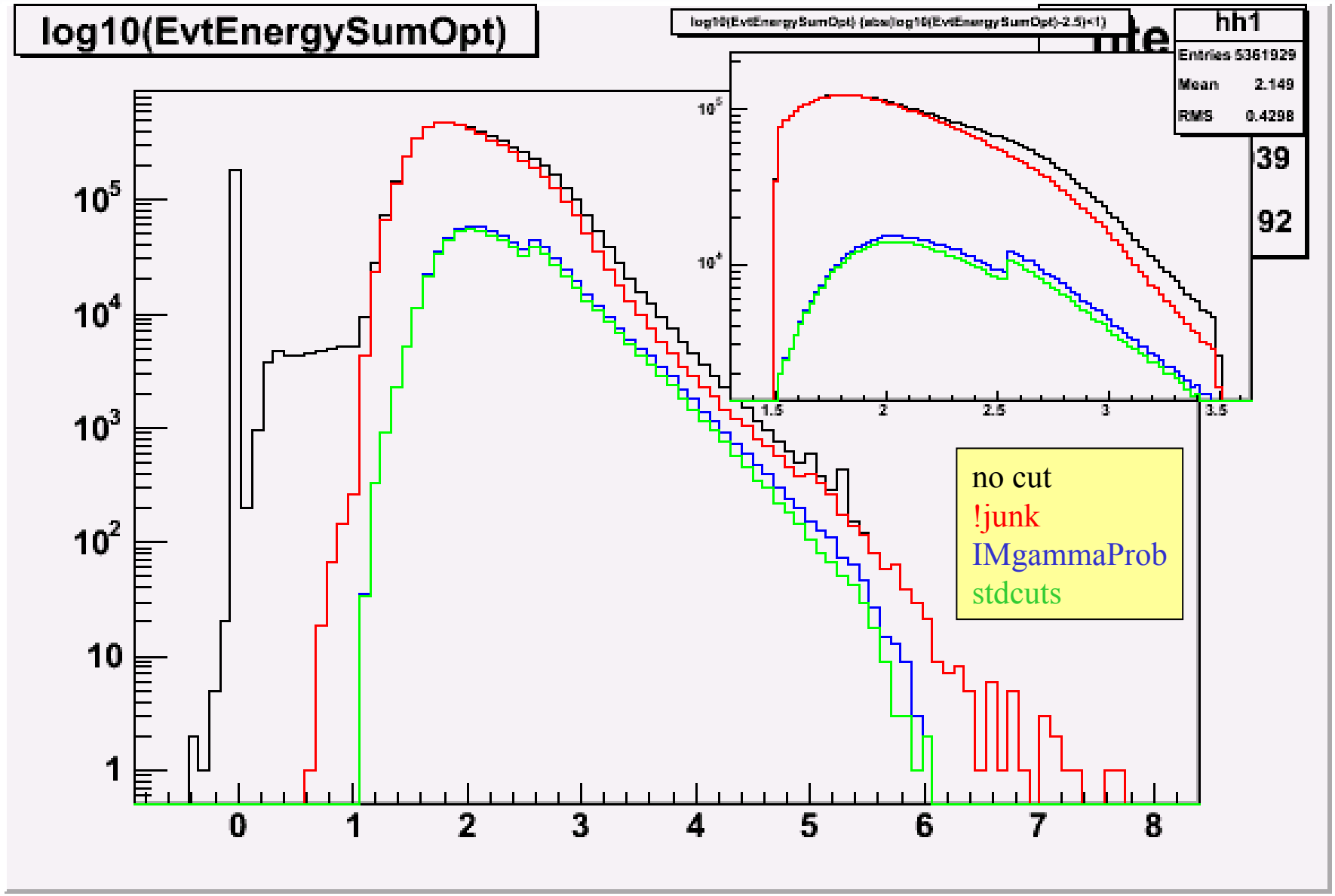
6 days

A_{eff}(100GeV) = 4000 cm^2

$\Rightarrow$flux = $2 \cdot 10^{-8}$ photons/cm^2/s



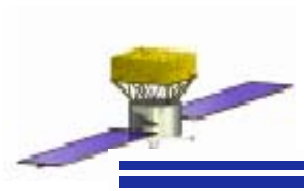
Naive Approach II



stdcuts := IMgammaProb && TkrNumTracks>0 && GltWord>3 && IMcoreProb>0.2 && IMpsfErrPred<3 && Tkr1ZDir<-0.2 && !(CalEnergySum<5. || CalTotRLn<2) && IMgoodCalProb>0.2

IMgammaProb

```
if(VtxAngle>0.0) {
    // VERTEX
    if(EvtEnergySumOpt<=350.0) {
        // LOCAL
        veto = Tkr1ToTFirst >4.5 || Tkr1ToTAve >3.5
               || AcdTotalEnergy >0.25 || VtxAngle >0.4 ;
    }
    // MEDCAL, HICAL: pass
}
else {
    // 1 TRACK
    if(EvtEnergySumOpt <= 350.0) {
        // LOCAL
        veto = Tkr1ToTAve >3.0 || AcdTileCount >0.0 || AcdRibbonActDist >-300.0
               || EvtTkrComptonRatio <1.05 || FilterStatus_HI >3.0 ;
    }
    else if( EvtEnergySumOpt <= 3500.0){
        // MEDCAL
        veto = Tkr1ToTAve >3.0 || AcdTotalEnergy >5.0|| EvtTkrComptonRatio <1.0 ;
    }
}// HICAL: pass
```



Results with Science Tools

- nothing from me
  - limitations of my laptop
  - standard (v1r0p1) ScienceTools crash (i.e. TsMap) on my RH8.0 desktop
  - new (v1r2) ScienceTools require root v3.10.02 → RH9
- Jim's study on the DC1 Wiki page (or the talk given here)
- well, there is something from me
  - Likelihood analysis of a r=10° around the GC (included some 15 EGRET sources) seemed to give reasonable results (small fit errors)
  - same for the high energies (E>75GeV) failed (galactic diffuse missing?)
  - a 21x21 TsMap runs 25 CPUh on a 1GHz 768MB Pentium III

After-DC1 Activities

Collaboration with Morselli, Lionetto (Roma2) and Cohen-Tanugi (Pisa→SLAC): development of source model(s) for LSP annihilation

Input:

- 5 parameters m_0, $m_{1/2}$, A_0, tan(β), and sign(μ) of mSUGRA (defined at GUT)
- 3 different Halo models

Output:

- mass of LSP

⇓

- branching into the different channels ($b\bar{b}$, $c\bar{c}$, $t\bar{t}$, W^+W^-, Z^0Z^0, $Z^0\gamma$, $\gamma\gamma$)

⇓

- Flux(E,r) = Flux(E) · f(r)
  - table
  - parametrization of spectrum

⇓

- source library