GLAST and High Energy Electrons

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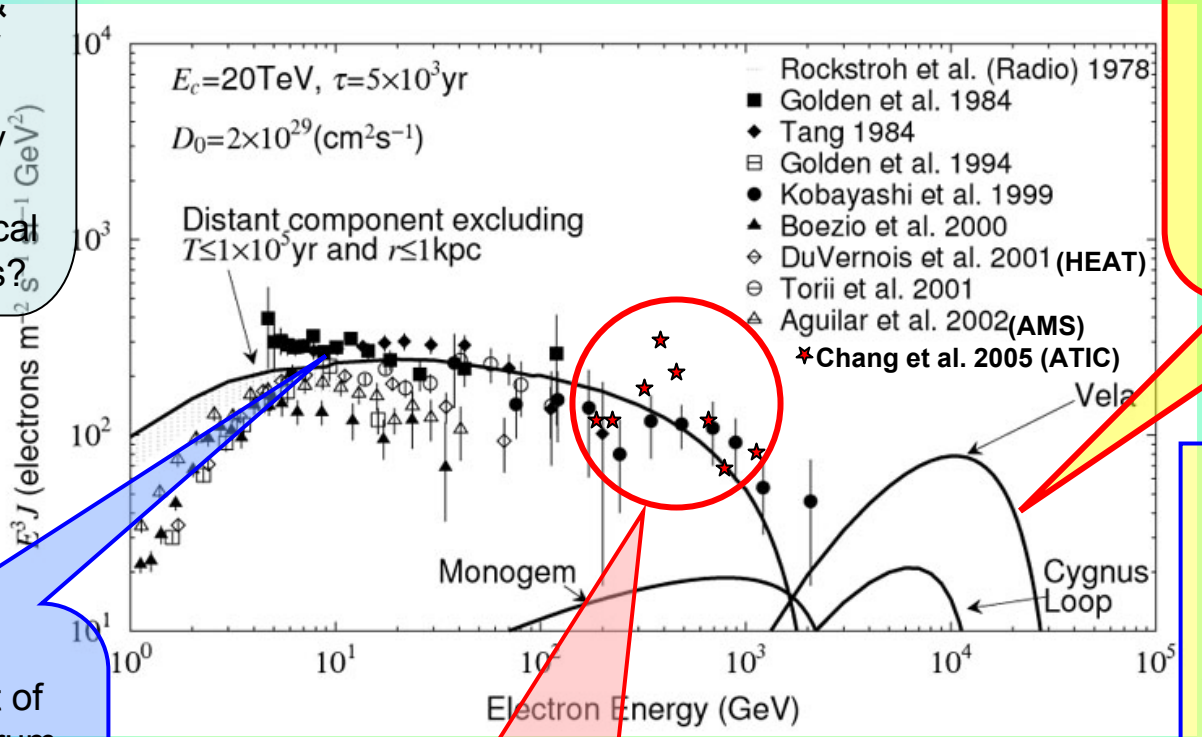
What can be learned from HE electrons (> 10 GeV) ?

Search for anisotropy in HE electron flux (see e.g. Ptuskin & Ormes, XXIV ICRC, Rome, 1995 : nearby sources, streaming of local magnetic fields?



HE electrons origin: Search for the signature of nearby HE electrons sources (believed to be SNR) in the electron spectrum above ~ TeV

Precise measurement of electron spectrum above 10 GeV (CR diffusion model; IC gamma ray flux model, GALPROP)

Search for Dark Matter Signatures (KKDM) – above ~100 GeV (see e.g. Baltz & Hooper, 2004)

Earlier presentations:

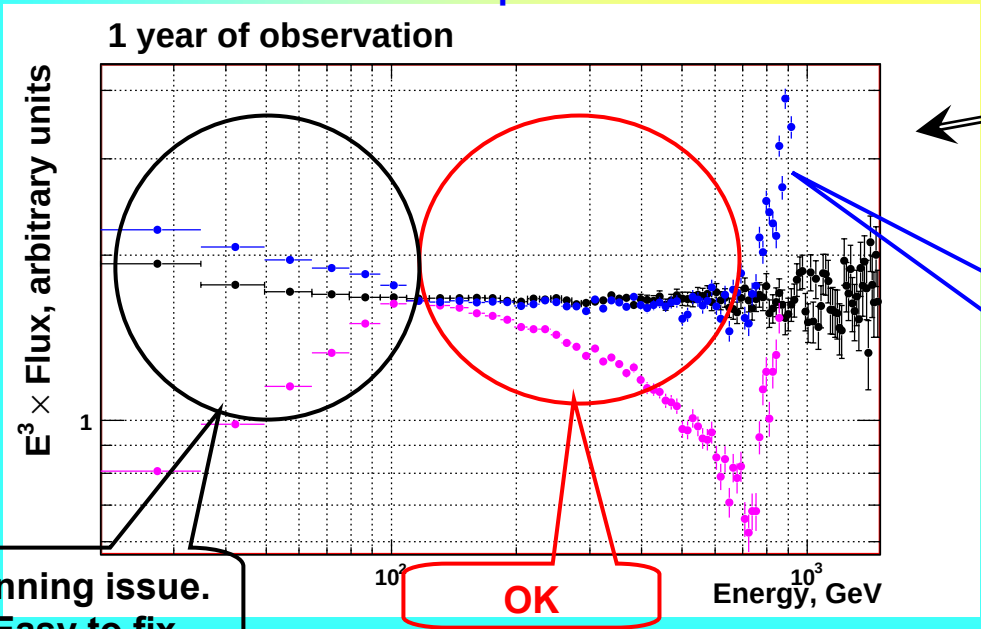
1. **J. F. Ormes & A. Moiseev, GLAST Collaboration Meeting, 1997**
2. **J. F. Ormes, A. Moiseev, et al. XXV ICRC, Durban, 1997**
3. **I. Grenier, GLAST Collaboration Meeting, 1999**
4. **A. Moiseev, J.F.Ormes, GLAST Collaboration Meeting, 2006**

- All listed topics require the accurate measurement of electron spectrum
- LAT is already a good measurer of the electron energy. Events with E>10-20 GeV will be recorded and transmitted to ground with minor onboard filtering
- In order to measure the flux of electrons, we have to identify and remove ~3 order of magnitude more abundant CR protons. This is the main problem!

What we already achieved:

We developed the cuts which select electrons with <3% of the residual proton contamination and determined LAT sensitivity to electrons in energy range 10 GeV – 1200 GeV

Example: LAT Reconstruction of single power law electron spectrum



incident electron spectrum – black points

Measured – pink points

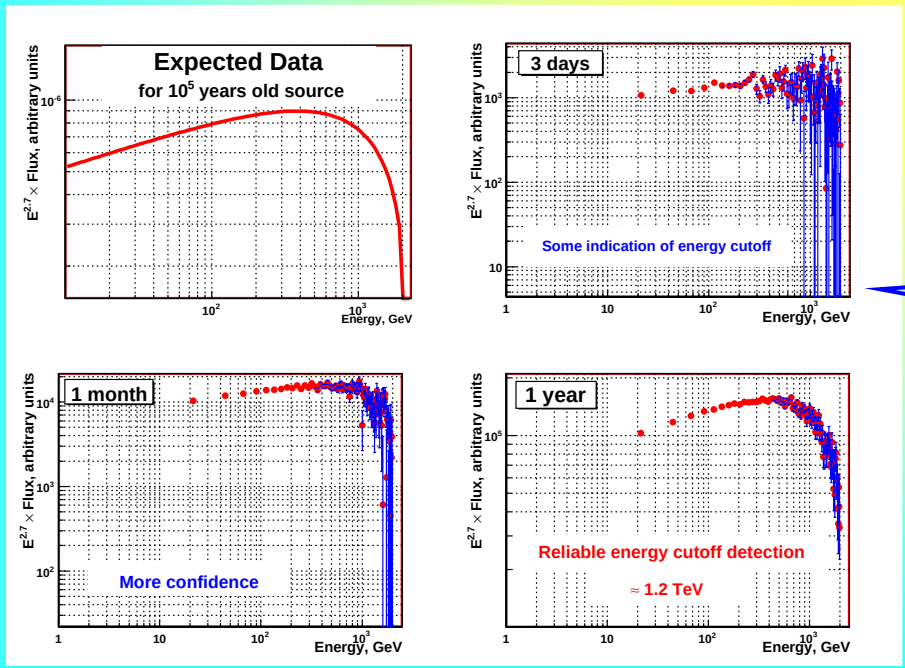
reconstructed spectrum – blue points

Problem with energy reconstruction above ~ 700 GeV. Needs work!

Binning issue. Easy to fix

Summary :

1. We can select high energy electrons from LAT data, in energy range from 10 GeV to ~ 1 TeV, with the residual proton contamination of < 3%
2. We achieved the sensitivity to electrons of ~2 m^2sr at 100-300 GeV; but it rapidly goes down at >500-600 GeV. Hopefully will be improved with the use of Classification Tree
3. Expected number of detected electrons >10 GeV is ~ 1.5M per month
4. Serious problem in increasing the upper energy limit is the energy reconstruction by the calorimeter. Here we are dealing with saturated CsI crystals (E_{max} in crystal ≈70 GeV). Needs work!



Example of how the single burst-like source spectrum, detected by LAT, would look like

Expected results are exciting!