

# Cassiopeia A spectral analysis

19 July 2011

The following analysis of Cassiopeia A was done using pointlike with a 15 degree ROI and a LogParabola fit. The energy range used in the analysis is 100MeV to 100GeV, although the SEDs are shown only in the range of 1-100GeV since there is no reliable measure of their flux at lower energies.

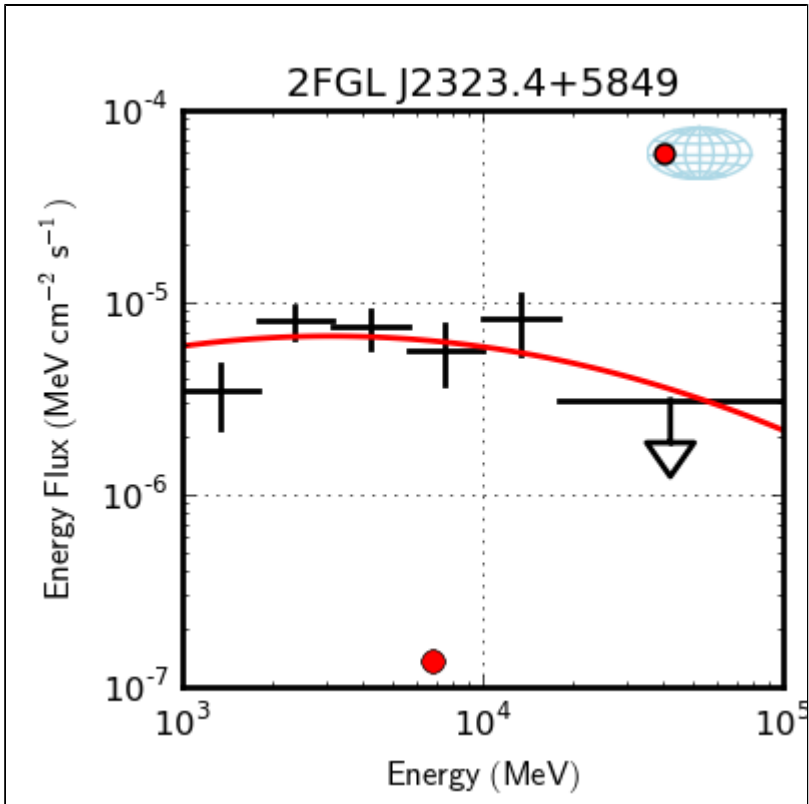
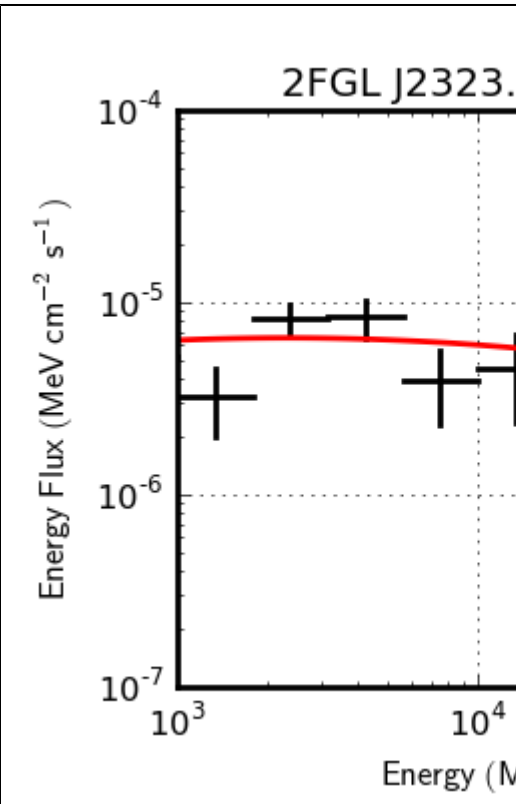
Home directory: /u/st/ariel/cassa2FGL

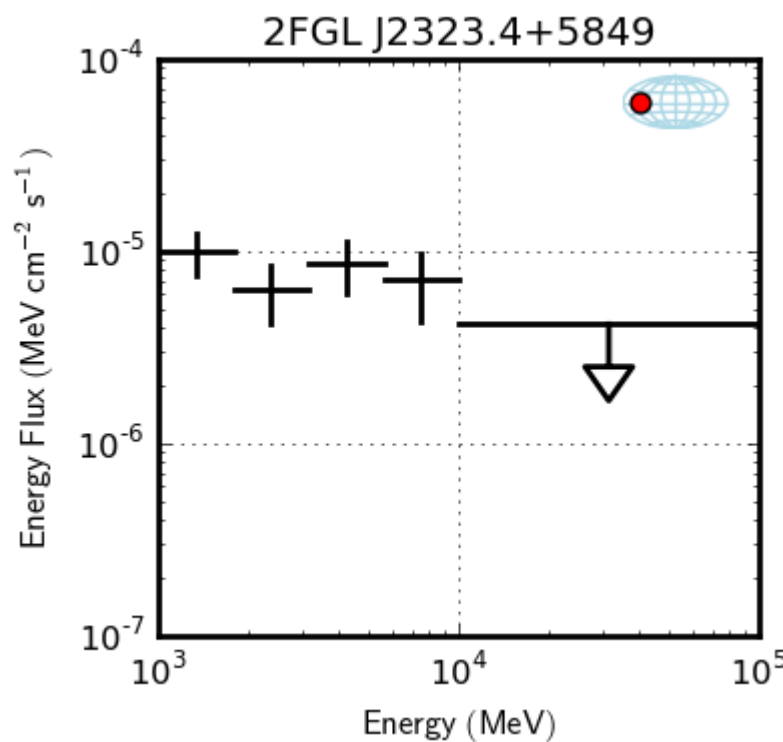
The galactic diffuse model used: ring\_2year\_P76\_v0.fits

The isotropic spectra models used: isotrop\_2year\_P76\_source\_v0.txt (For front and back events), isotrop\_2year\_P76\_source\_v0\_front.txt (For front only events), isotrop\_2year\_P76\_source\_v0\_back.txt (For back only events)

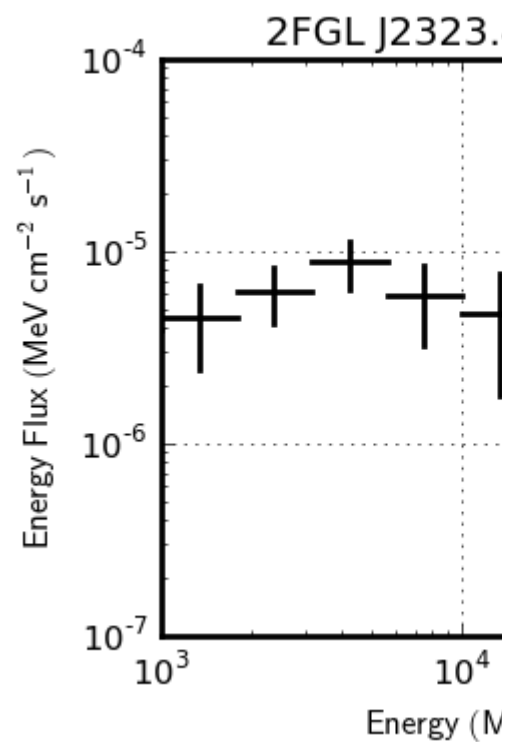
Catalog used: gll\_psc\_v04.fit

Instrument response function: P7SOURCE\_V6

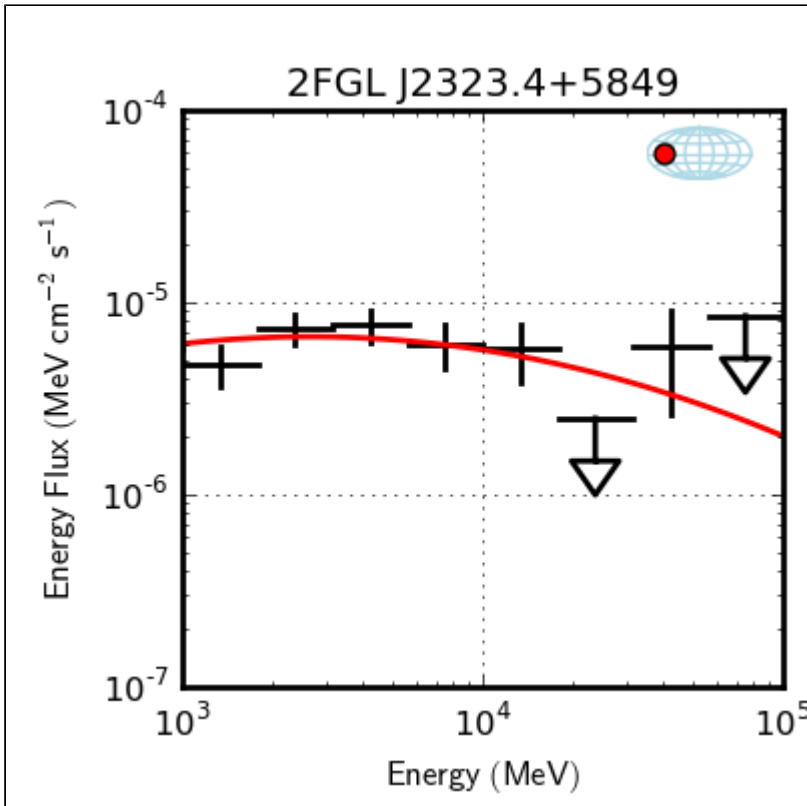
|                   |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                            |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S<br>E<br>D<br>s  | 1st half of time window<br>MET<br>Start = 239557417 seconds (2008-08-04T15:43:37)<br>Stop = 284206459 seconds (2010-01-03T10:14:19)                                                                                                                                                                 | 2nd half of time window<br>MET<br>Start = 284206459 seconds (2010-01-03T10:14:19)<br>Stop = 328855431 seconds (2011-06-04T04:43:49)                                                                                                                                                        |
| Front only events | <div><p>2FGL J2323.4+5849</p></div> <div><p>Norm : 1.37e-13<br/>Index : 2.15<br/>beta : 0.0935<br/>E_break : 6.78e+03<br/>Ph. Flux : 3.68e-08 (DERIVED)<br/>En. Flux : 5.77e-11 (DERIVED)<br/>TS: 237.1</p></div> | <div><p>2FGL J2323.</p></div> <div><p>Norm : 4.51e-10<br/>Index : 1.75<br/>beta : 0.0394<br/>E_break : 98.9<br/>Ph. Flux : 5.28e-08 (DERIVED)<br/>En. Flux : 7.58e-11 (DERIVED)<br/>TS: 264.5</p></div> |



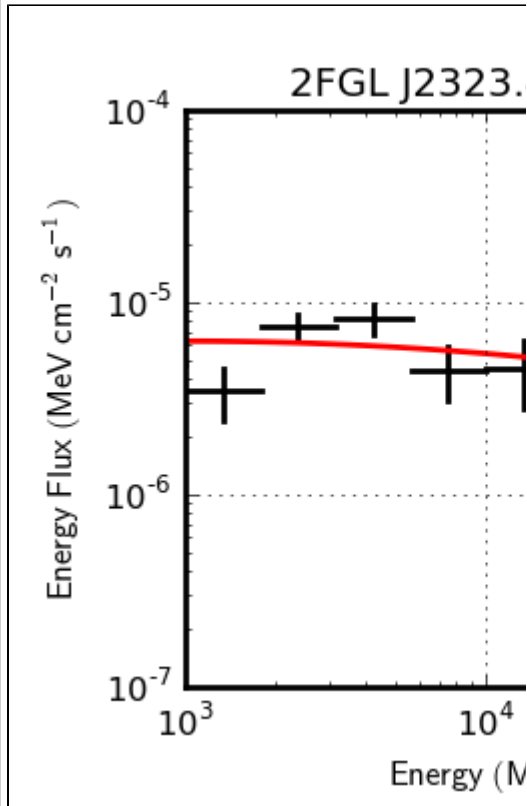
Norm :  $1.15\text{e-}07$   
Index : 2.19  
beta :  $1.21\text{e-}08$   
E\_break : 12.6  
Ph. Flux :  $1.05\text{e-}07$  (DERIVED)  
En. Flux :  $1.08\text{e-}10$  (DERIVED)  
TS: 116.2



Norm :  $9.31\text{e-}26$   
Index : 2.19  
beta :  $1.16\text{e-}09$   
E\_break :  $2.14\text{e+}09$   
Ph. Flux :  $9.15\text{e-}08$  (DERIVED)  
En. Flux :  $9.11\text{e-}11$  (DERIVED)  
TS: 94.629082599



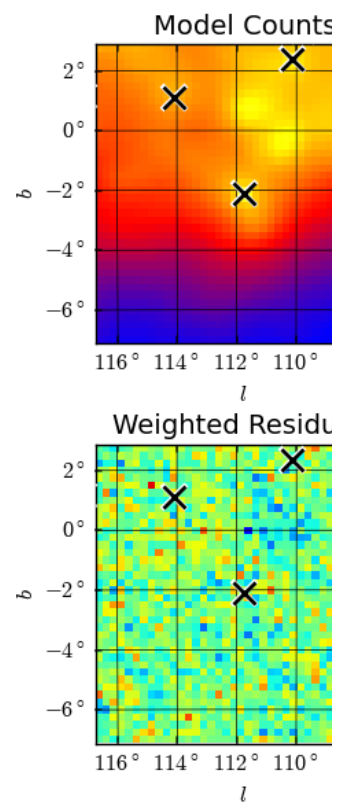
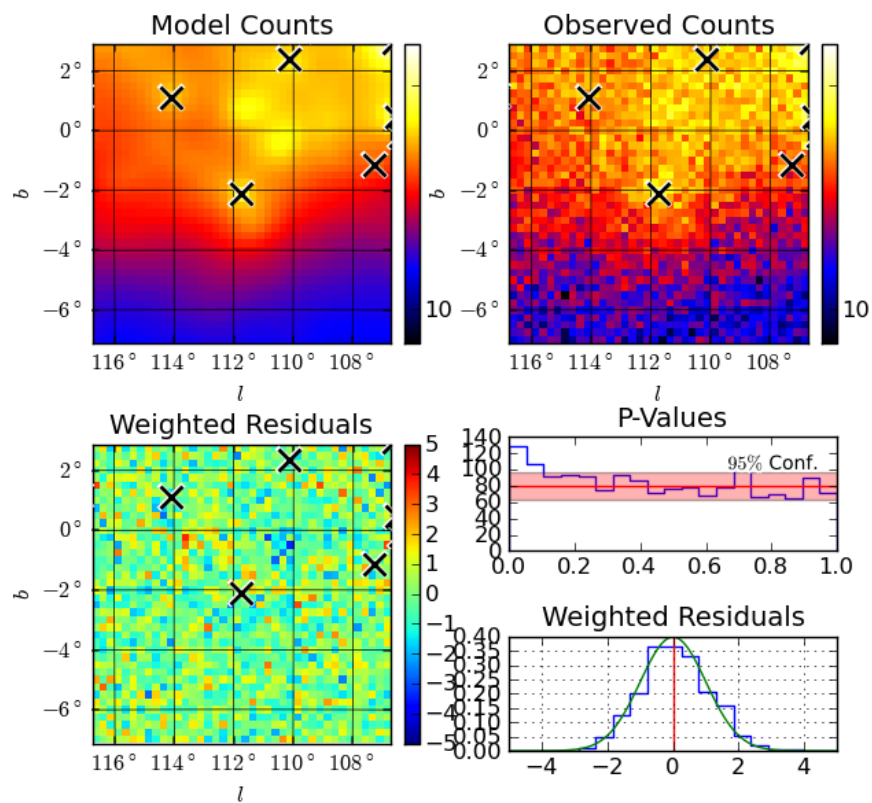
Norm : 3.29e-11  
Index : 1.65  
beta : 0.0904  
E\_break : 378  
Ph. Flux : 3.96e-08 (DERIVED)  
En. Flux : 5.75e-11 (DERIVED)  
TS: 330.2

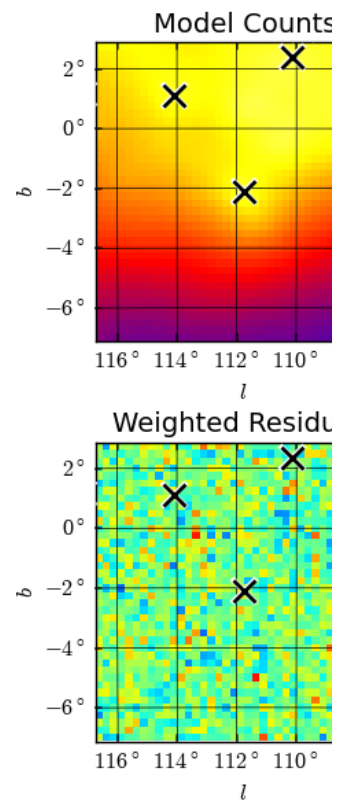
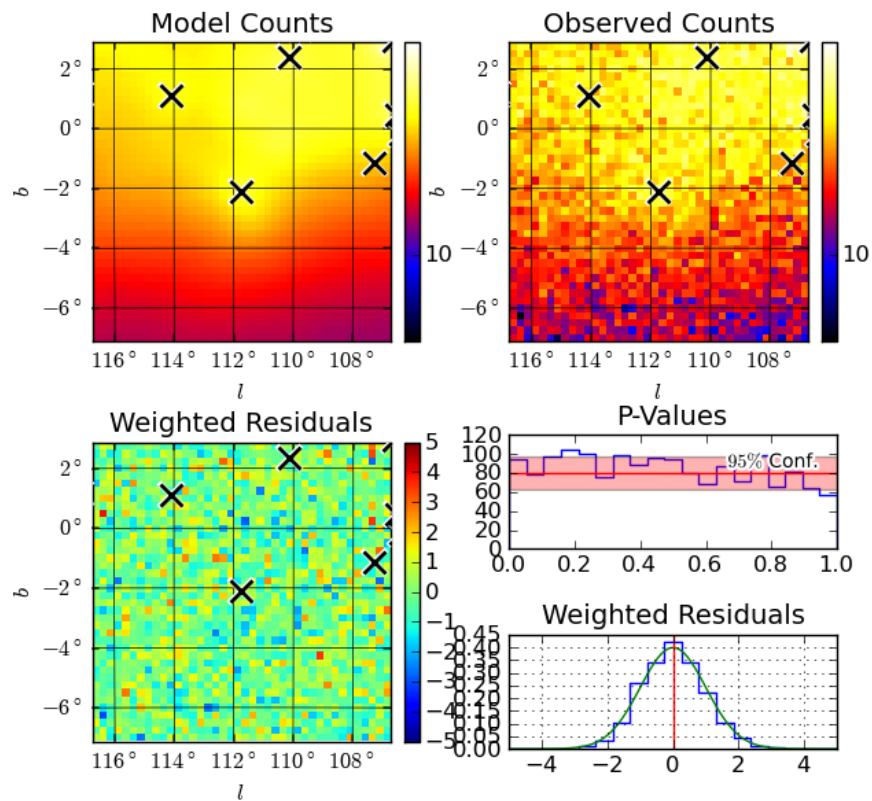


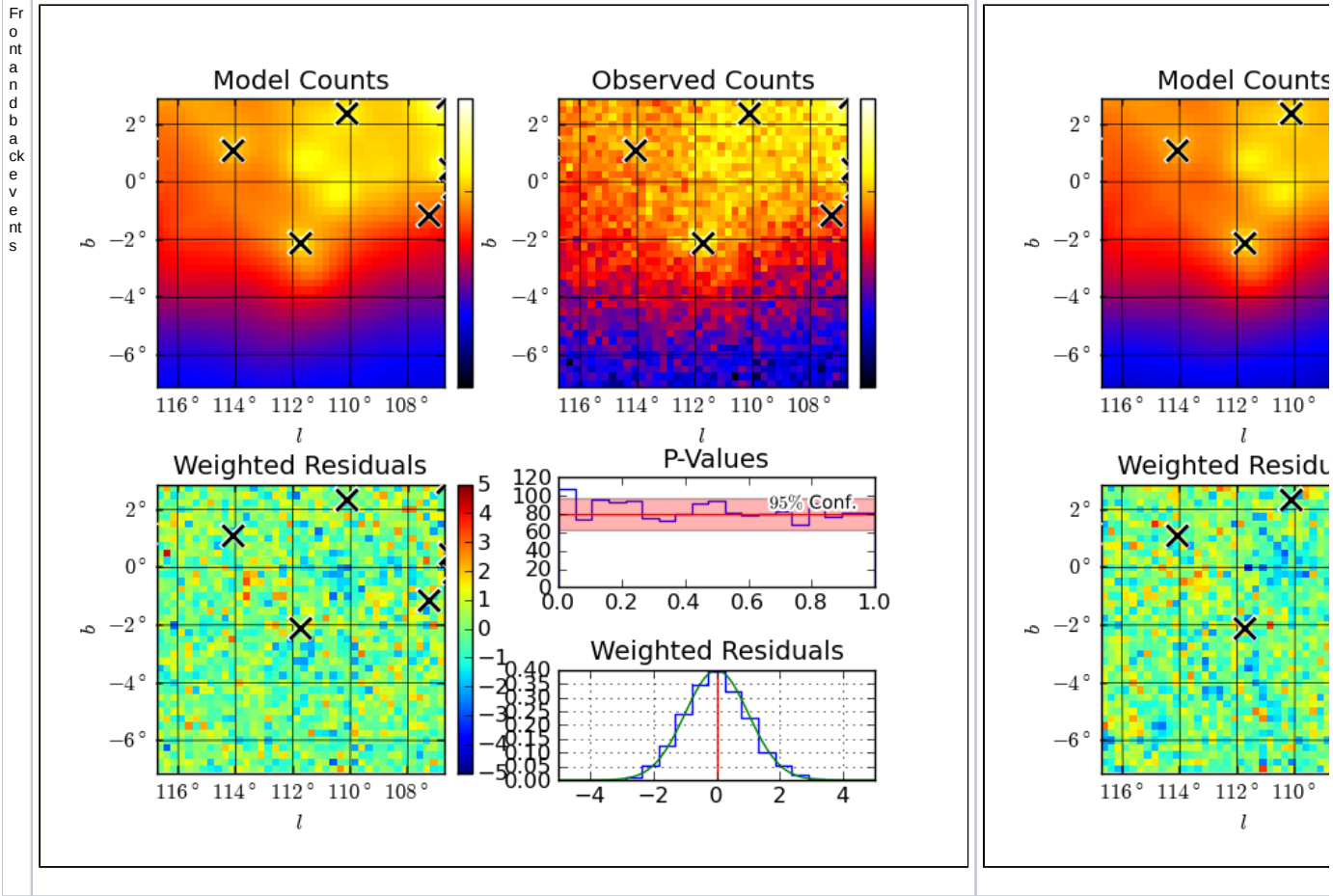
Norm : 4.02e-14  
Index : 2.14  
beta : 0.0285  
E\_break : 1.15e+04  
Ph. Flux : 5.83e-08 (DERIVED)  
En. Flux : 7.51e-11 (DERIVED)  
TS: 358.6

The following counts maps were also done in pointlike.

|                                                |                                                                                                                                     |                                                                                                                                     |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| C<br>o<br>u<br>n<br>t<br>s<br>m<br>a<br>p<br>s | 1st half of time window<br>MET<br>Start = 239557417 seconds (2008-08-04T15:43:37)<br>Stop = 284206459 seconds (2010-01-03T10:14:19) | 2nd half of time window<br>MET<br>Start = 284206459 seconds (2010-01-03T10:14:19)<br>Stop = 328855431 seconds (2011-06-04T04:43:49) |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|







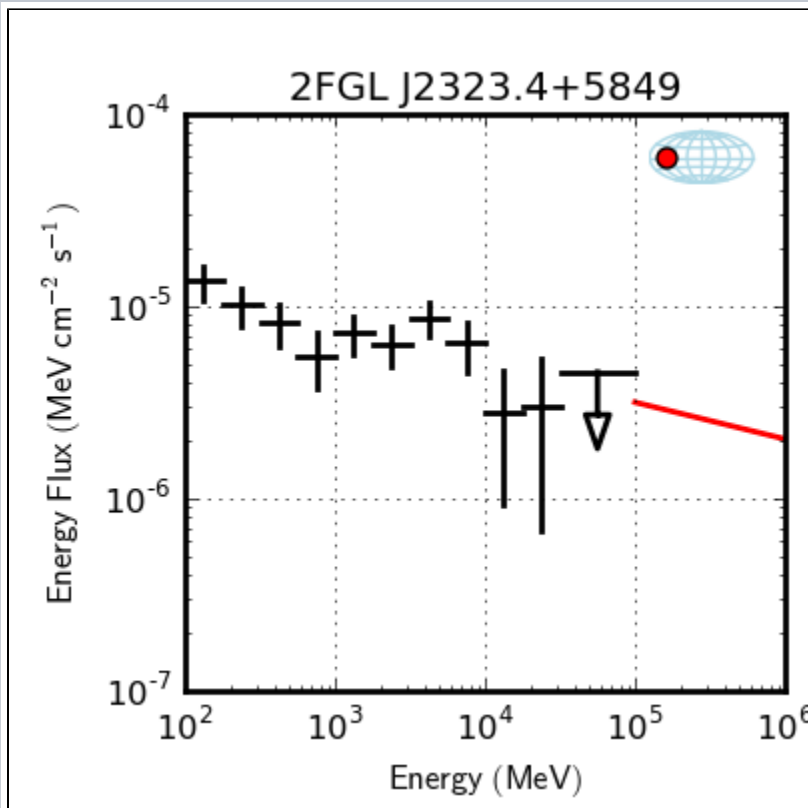
Observations

- 1) The analysis was done with separate isotropic spectra files for the front and back of Fermi to check to see if both observation sets overlapped on a particular source.
- 2) The analysis was also done with two different time windows to try and get a statistical check on any of the features observed in the SEDs for the full timeframe.

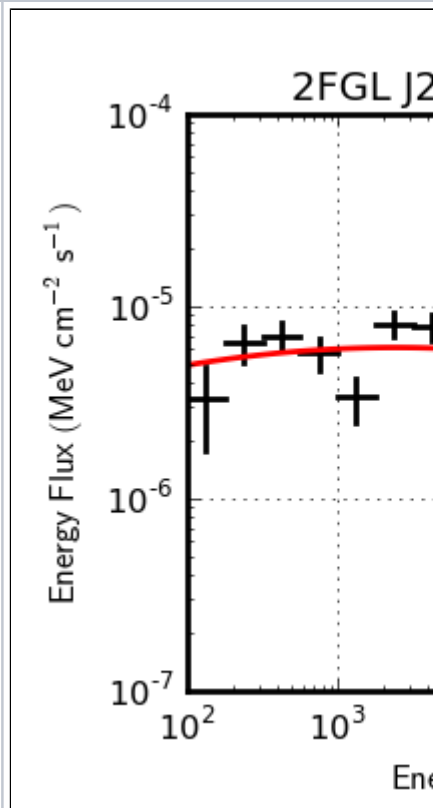
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Between 100MeV and 1GeV there appears to be significant variation in the flux observed by the Fermi satellite depending on which type of events (Front, back, or both) are used in producing the SEDs. The SEDs, using close to three years of observation data, are as follows:

| Full time window<br>MET<br>Start =<br>239557417<br>seconds<br>(2008-08-04T15:43:37)<br>Stop =<br>328855431<br>seconds<br>(2011-06-04T04:43:49) | Back only events | Front only events |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|
|                                                                                                                                                |                  |                   |



Norm : 6.25e-12  
 Index : 0.976  
 beta : 0.24  
 E\_break : 635  
 Ph. Flux : 1.3e-08  
 En. Flux : 4.33e-11  
 TS: 412.8



Norm : 6.25e-12  
 Index : 0.976  
 beta : 0.24  
 E\_break : 635  
 Ph. Flux : 1.3e-08  
 En. Flux : 4.33e-11  
 TS: 412.8