Populations in the first year of the Fermi all-sky survey

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on behalf of the Fermi-LAT collaboration

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The Extragalactic Diffuse Background

- **The origin of the Extragalactic Diffuse Background (EDB) is uncertain:**

  - **Blazars contribute ~20-100%** [Chiang&Mukherjee98,Stecker&Salomon96,Mücke&Pohl00, Narumoto&Totani04,Dermer07, Inoue&Totani09] **from EGRET studies**

  - **What about Star forming galaxies, Starbursts, LSS formation, Dark Matter ?** [Pavlidou&Fields02,Loeb&Waxman00, Thompson+07, Ullio+02]


Dermer07

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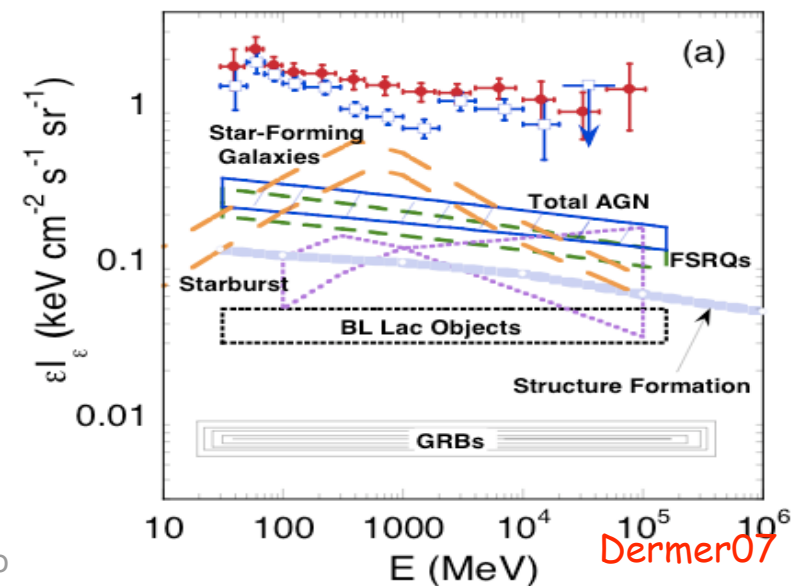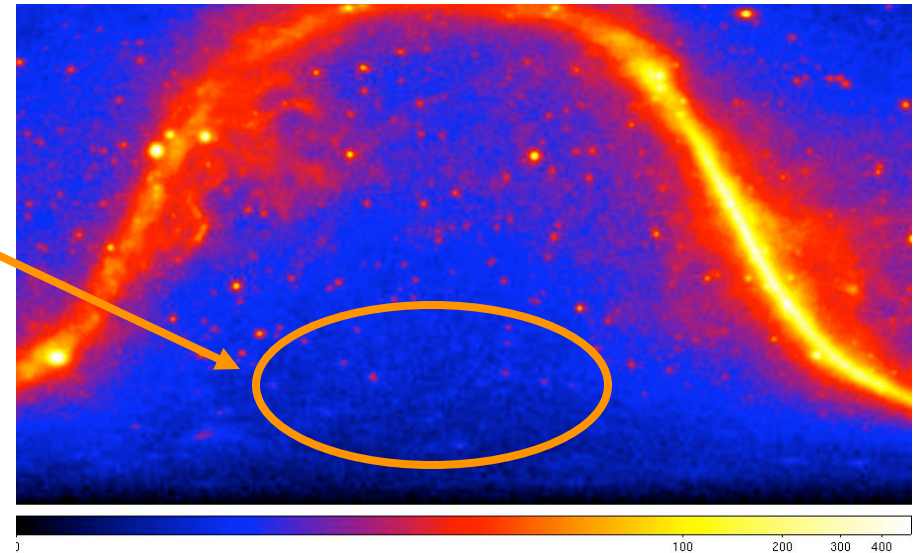
What to do ?

- **First, provide a new measurement of the EDB (see M.Ackermann's talk)**
- **Second, address contribution of *detected* sources to the EDB**
  - **Derive logN-logS and/or luminosity function and integrate**
- **Finally, speculate on the origin of the *'unresolved'* (=EDB-resolved) component**

Padovani+07
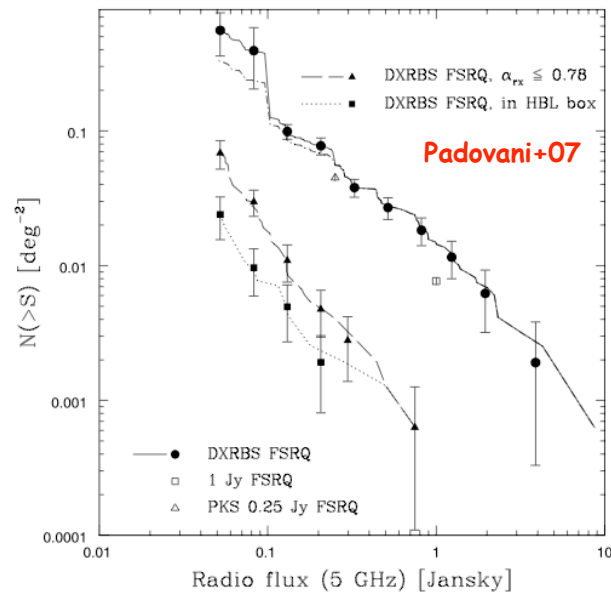
3months sensitivity for a 10σ $E^{-2.2}$ source

(Abdo+09, ApJS 183, 46)

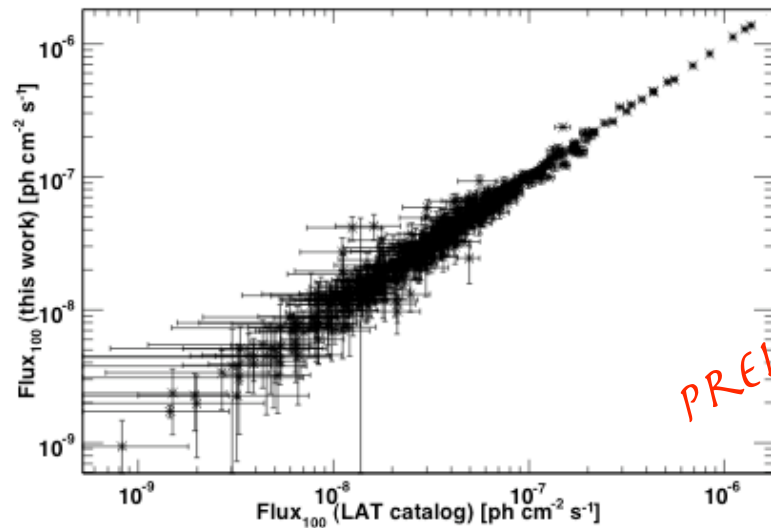M. Ajello
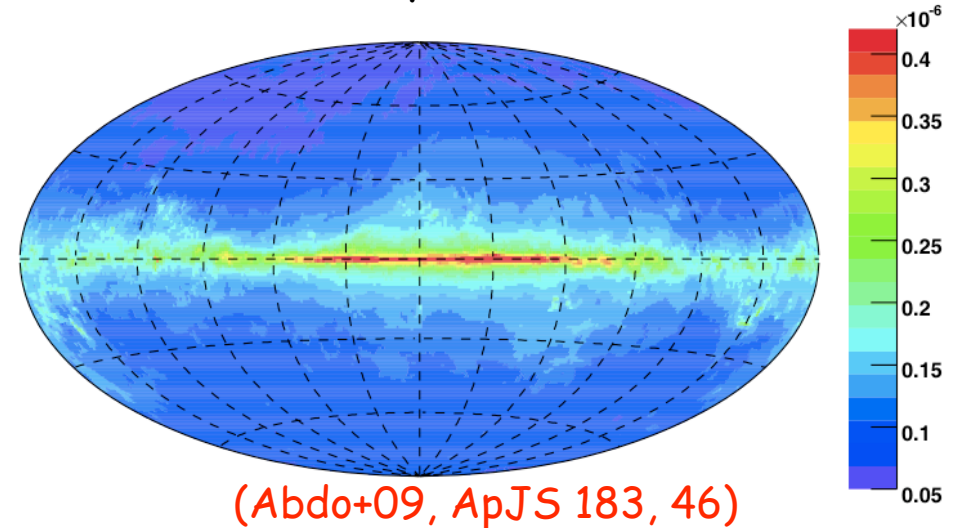
Simulations

- **18 MC simulations performed on the 1yr dataset to determine the LAT sensitivity**
- **Receipt:**
  - **Use up to date diffuse models**
  - **Add an isotropic population with fluxes and photon indices randomly drawn from 'best-guess' distributions (logN-logS)**
  - **Sources are simulated well below the sensitivity threshold**
- **Detection:**
  - **Perform detection step as close as possible to real data** (Abdo+09, ApJS 183, 46)
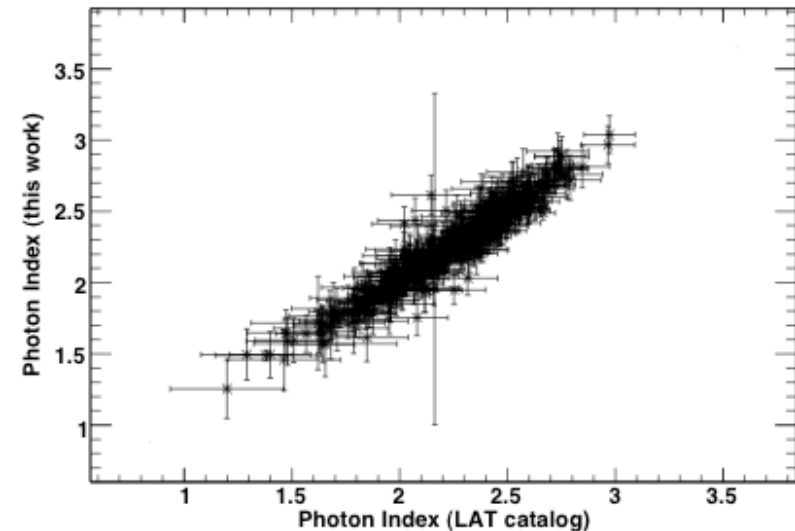 - **Use Maximum Likelihood to determine spectral parameters and TS**

- **Cross check between our (slimmer) detection pipeline and the official one**

  - **Fluxes and spectral indices reconstructed with good accuracy**

  - **Smaller number of sources detected**

  - **Small problems (~1%) with sources close to the Galactic Plane --> Analysis limited to |b|>15°-20°**

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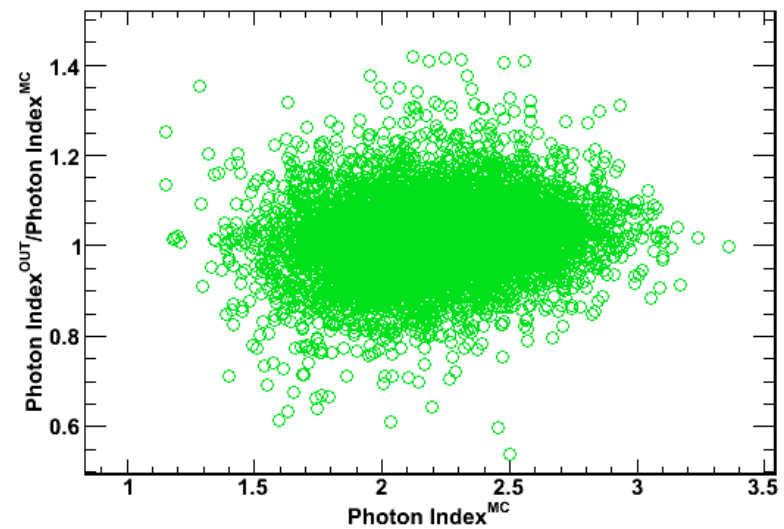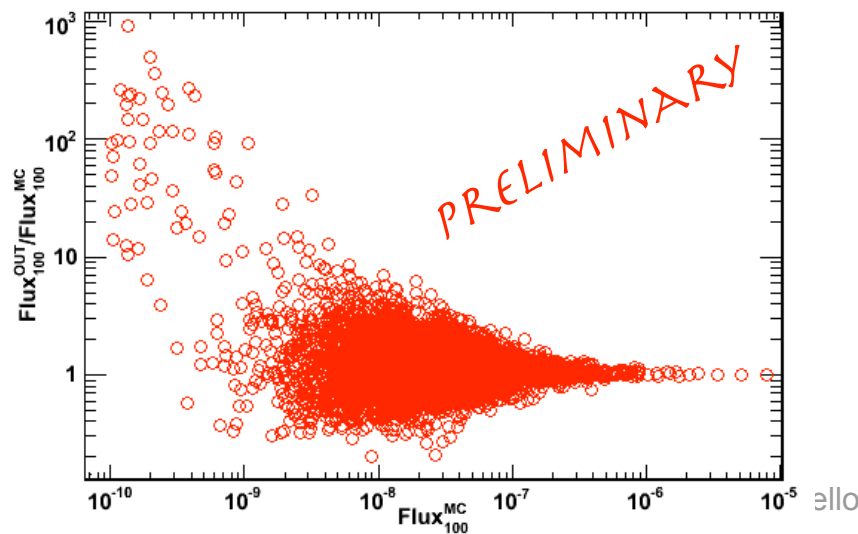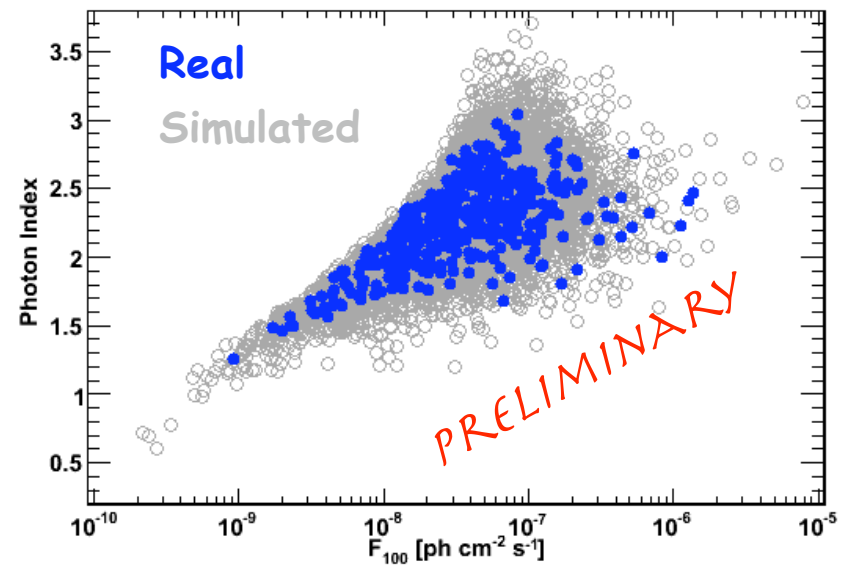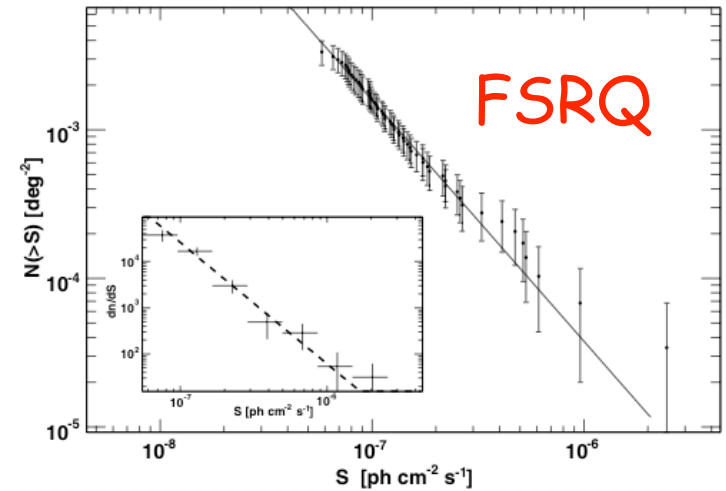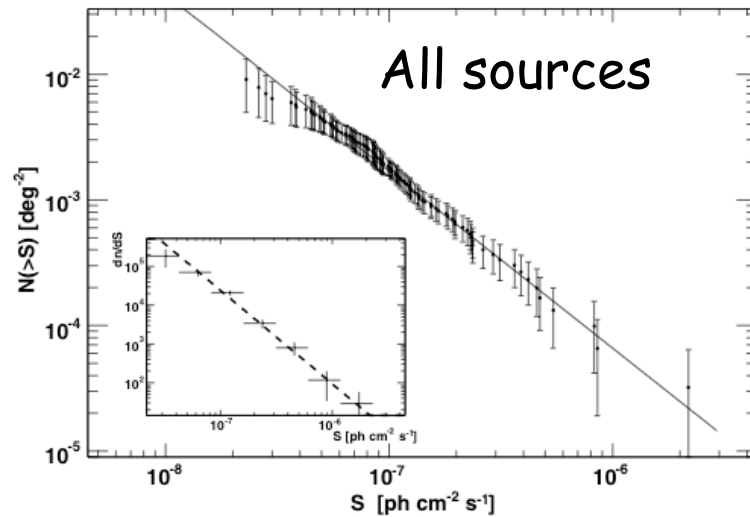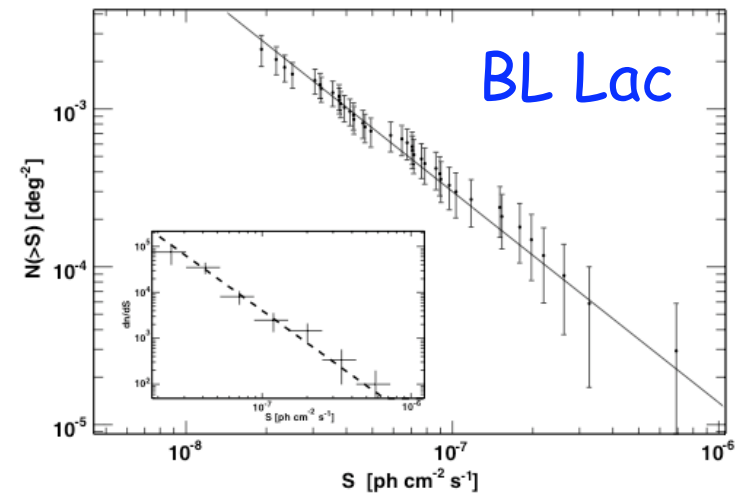# Simulated data

- **Simulations reproduce well the photon-index-dependent flux limit**

- **Moderate signs of Eddington bias and source confusion**

  - **Confusion evaluated as $F_{100}^{OUT}/(3\sigma+F_{100}^{MC})>1.5$**

Fermi
Gamma-ray
Space Telescope

All sources

FSRQ

LAT resolves ~7% of the LAT EDB

No significant deviation from Euclidean

BL Lac

Blazar class	slope
All	2.50±0.12
FSRQs	2.55 ±0.12
BLLacs	2.32 ±0.15

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Conclusions

- **Fermi/LAT is providing a tremendous amount of high-quality γ-rays**
- **The logN-logS of point-sources (blazars) spans 3 decades in flux and shows a flattening at $F_{100}\sim$6-7e-8 ph/cm^2/s (remember it's '*preliminary*')**
- **The average spectral slope of point-like sources in the 100MeV-100GeV band is ~2.4**
- **The contribution of resolved sources to the LAT extragalactic diffuse component is ~20-30%**
  - **The unresolved component should have an average spectrum $\propto E^{-2.4}$**
    - **May be blazars below threshold (Luminosity Function will tell)**
    - **May be other source classes (Star forming galaxies ?)**

Most used words in emails with P. Giommi

www.wordle.net