Diffuse galactic background as seen by Fermi

Jean-Marc Casandjian, on behalf of the Fermi LAT collaboration

















Can we model the large scale structures of the Galactic interstellar emission ?



Strong et al., Annual Reviews of Nuclear and Particle Science, 2007



$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\partial t} = q(\vec{r}, p) \text{ sources (SNR, nuclear reactions...)}$$

$$\frac{\partial \psi(\vec{r}, p, t)}{\nabla x^{\vec{v}} \psi - \vec{v}} = \frac{\partial \psi}{\partial p} \left[\frac{\partial p}{\partial p} \frac{\partial \psi}{\partial p^2} \right] \text{ convection (Galactic wind)}$$

$$\frac{\mathbf{E}}{\mathbf{F} - \mathbf{Ioss}} = \frac{\partial}{\partial p} \left[\frac{dp}{dt} \psi - \frac{1}{3} p \vec{\nabla} \cdot \vec{x} \psi \right]$$

$$\frac{\mathbf{F}}{\mathbf{F} - \mathbf{Ioss}} = \frac{\partial}{\partial p} \left[\frac{dp}{dt} \psi - \frac{1}{3} p \vec{\nabla} \cdot \vec{x} \psi \right]$$

$$\frac{\mathbf{F}}{\mathbf{F} - \mathbf{Ioss}} = \frac{\partial}{\partial p} \left[\frac{dp}{dt} \psi - \frac{1}{3} p \vec{\nabla} \cdot \vec{x} \psi \right]$$

$$\frac{\mathbf{F}}{\mathbf{F} - \mathbf{F} - \frac{\psi}{\tau_{d}}} \text{ radioactive decay}$$

$$+ \text{ boundary conditions}$$

(



Longitude and Latitude projection, Inner Galaxy



What did we learn so far ?

That we can model the interstellar emission with :

- Templates: low-level but accurate
- Galprop: high-level modelisation

Detailed ExtraGalactic studies :





contact author: Markus Ackermann



Physical Review Letters 104 (2010) 101101

What are the origins of the EGB :

Blazars, Star Forming Galaxies, Radio-quiet AGN, Millisecond Pulsars, Intergalactic shocks, Dark Matter annihilation, large electron Galactic halo, UHECR interacting with EBL





Journal of Cosmology and Astroparticle Physics, vol. 2010 (2010-04-00) p.014 Contact: Gabrijela Zaharijas

Star Forming Galaxies



Starburst Galaxies

Fermi has detected emission from 2 starburst galaxies: M82 and NGC 253 Nearest luminous starburst galaxies d~3 Mpc Star formation rate ~10 × Milky Way rate

