

Estimate of the Galactic electron and positron fluxes at the Earth

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In collaboration with

Julien Lavalle

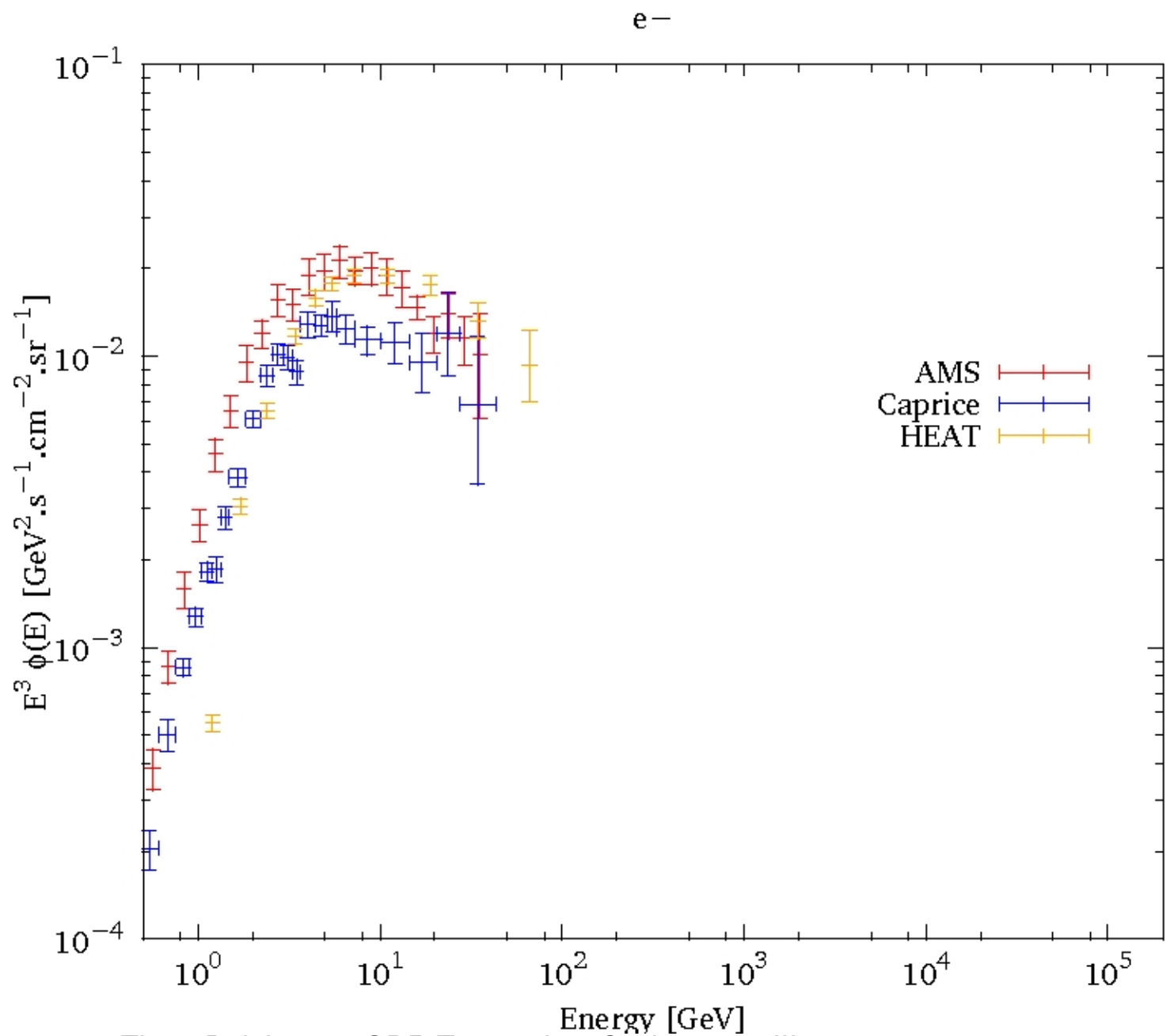
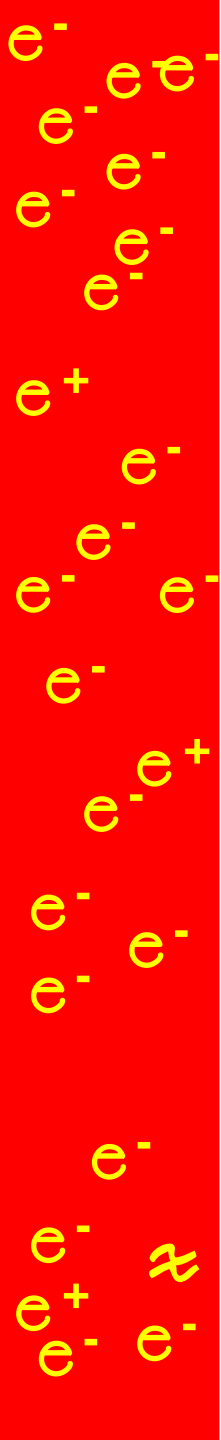
Roberto Lineros

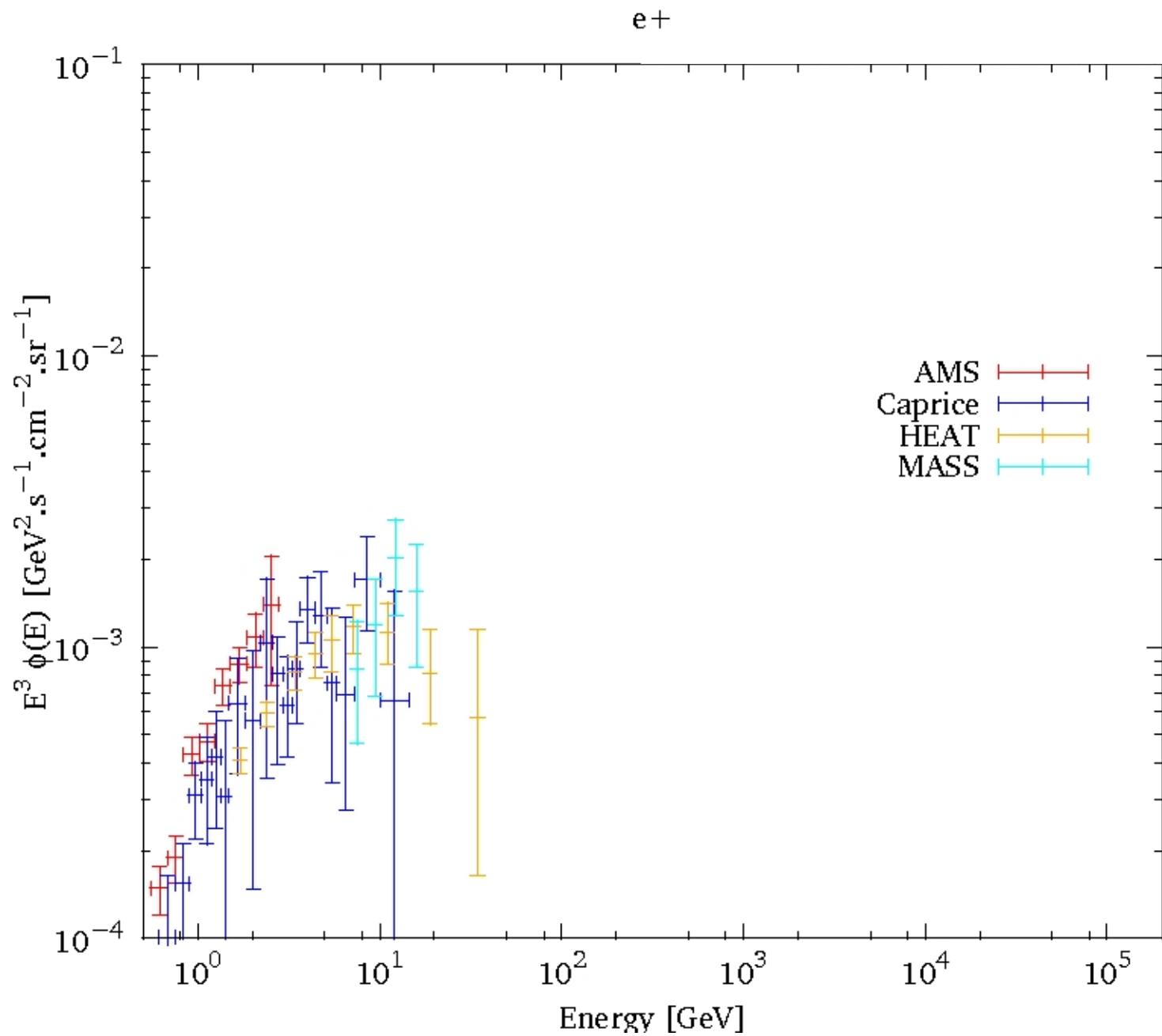
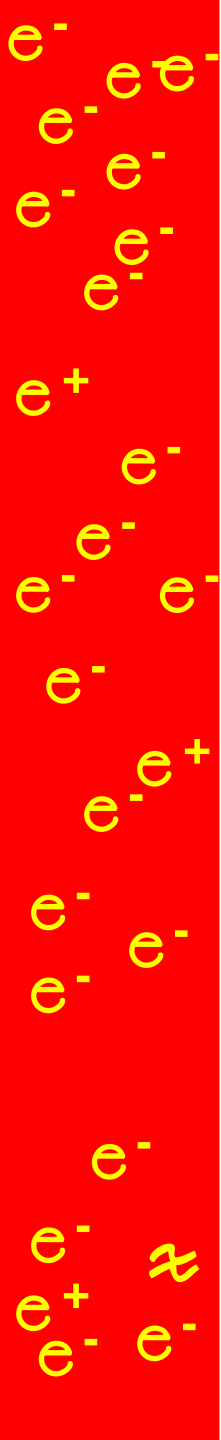
Fiorenza Donato

Nicolao Fornengo

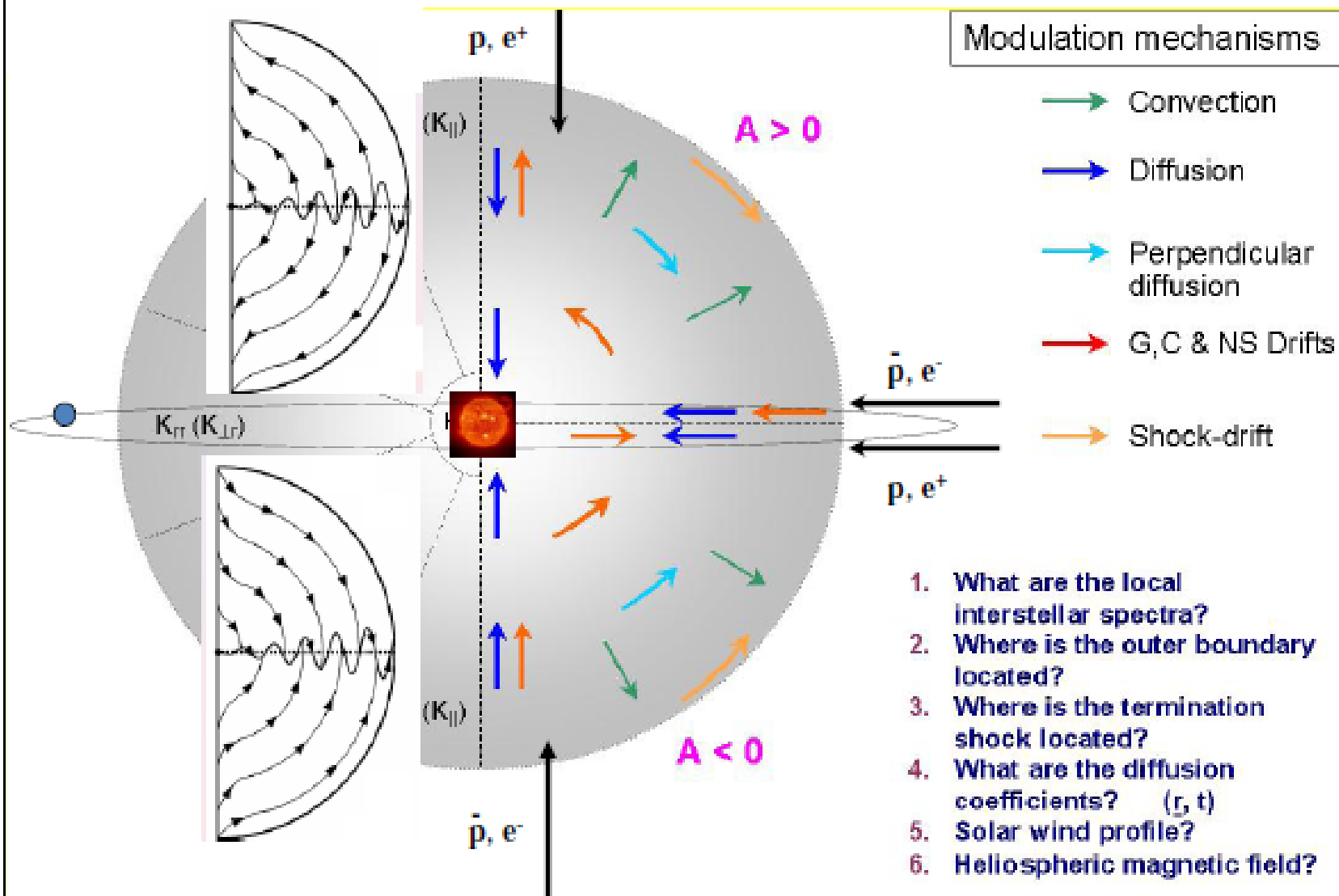
Pierre Salati

arXiv:1002.1910



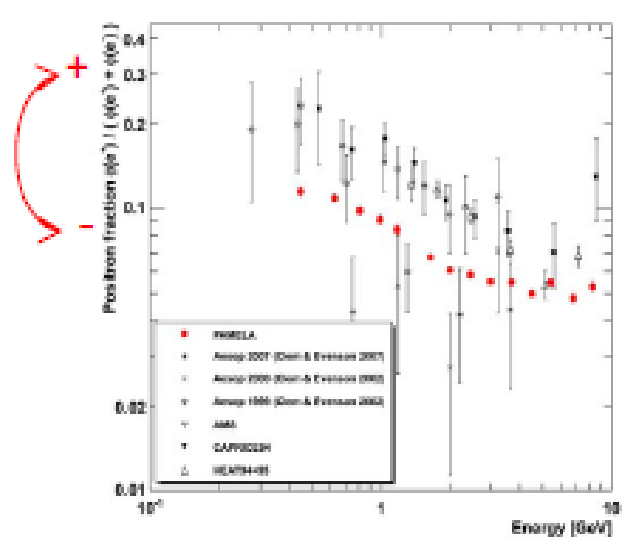
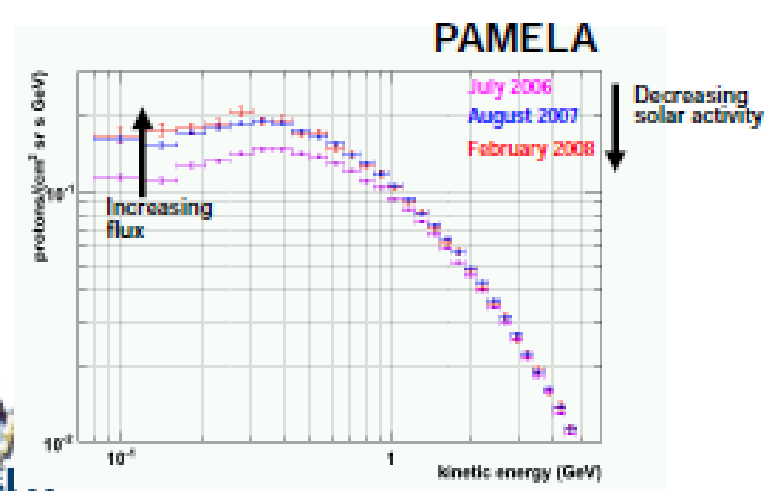
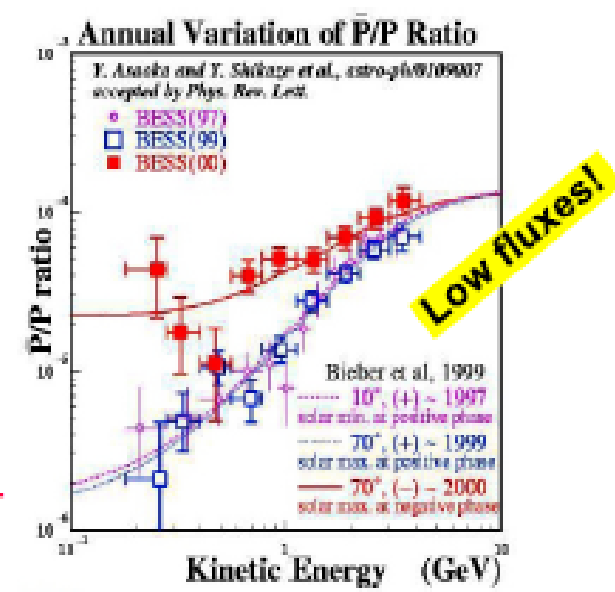
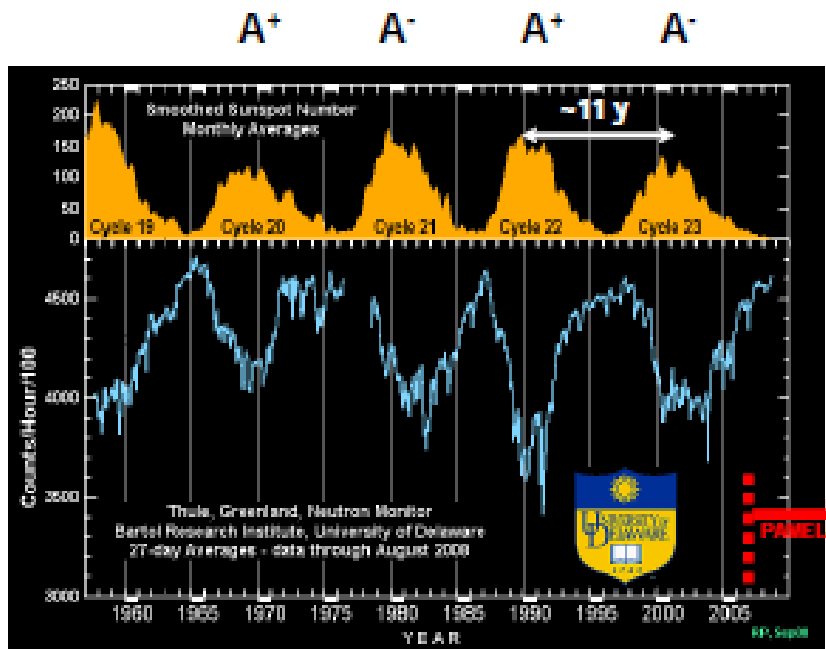


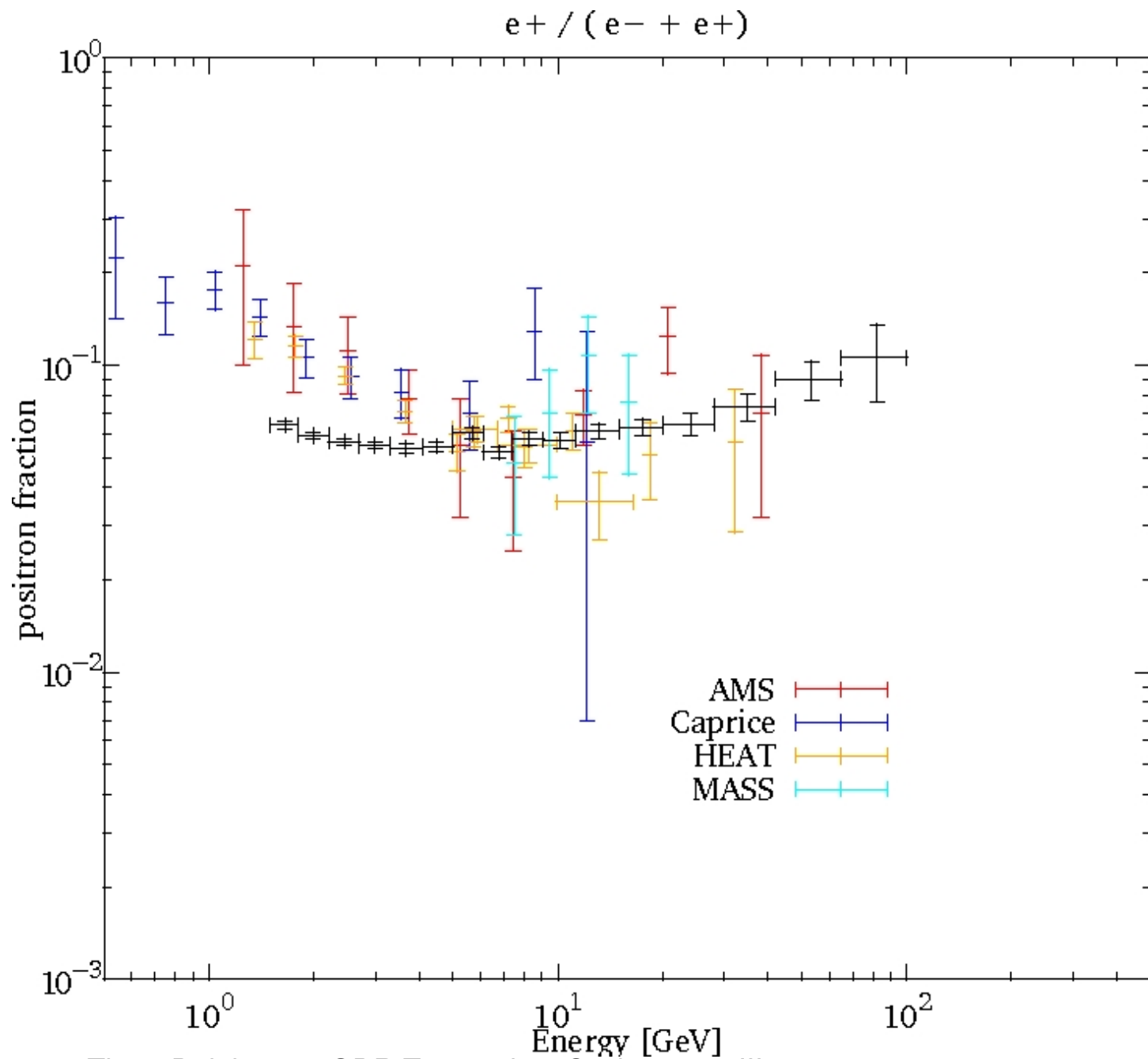
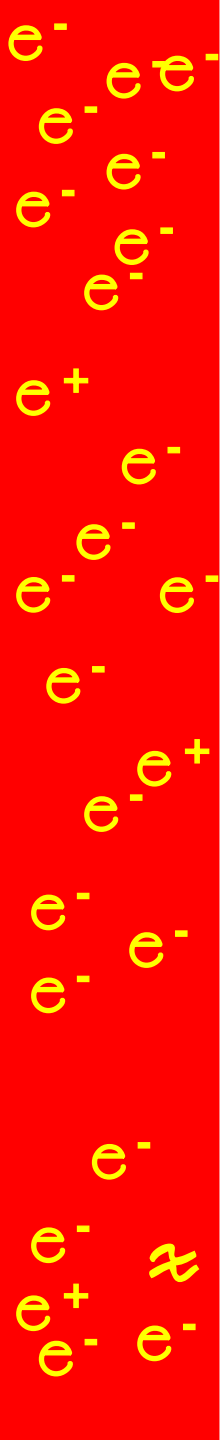
Charge dependent solar modulation



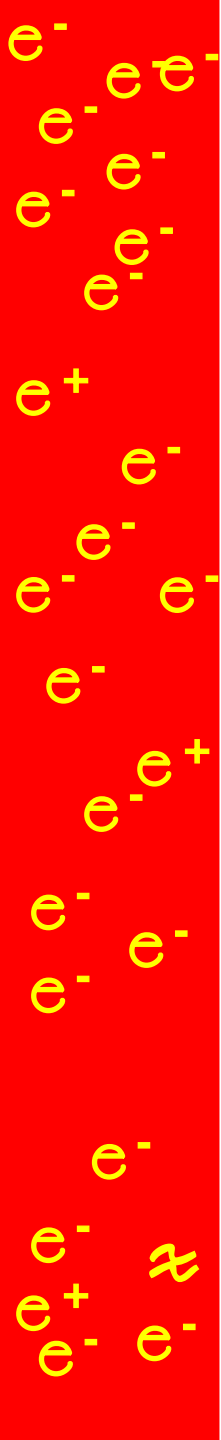
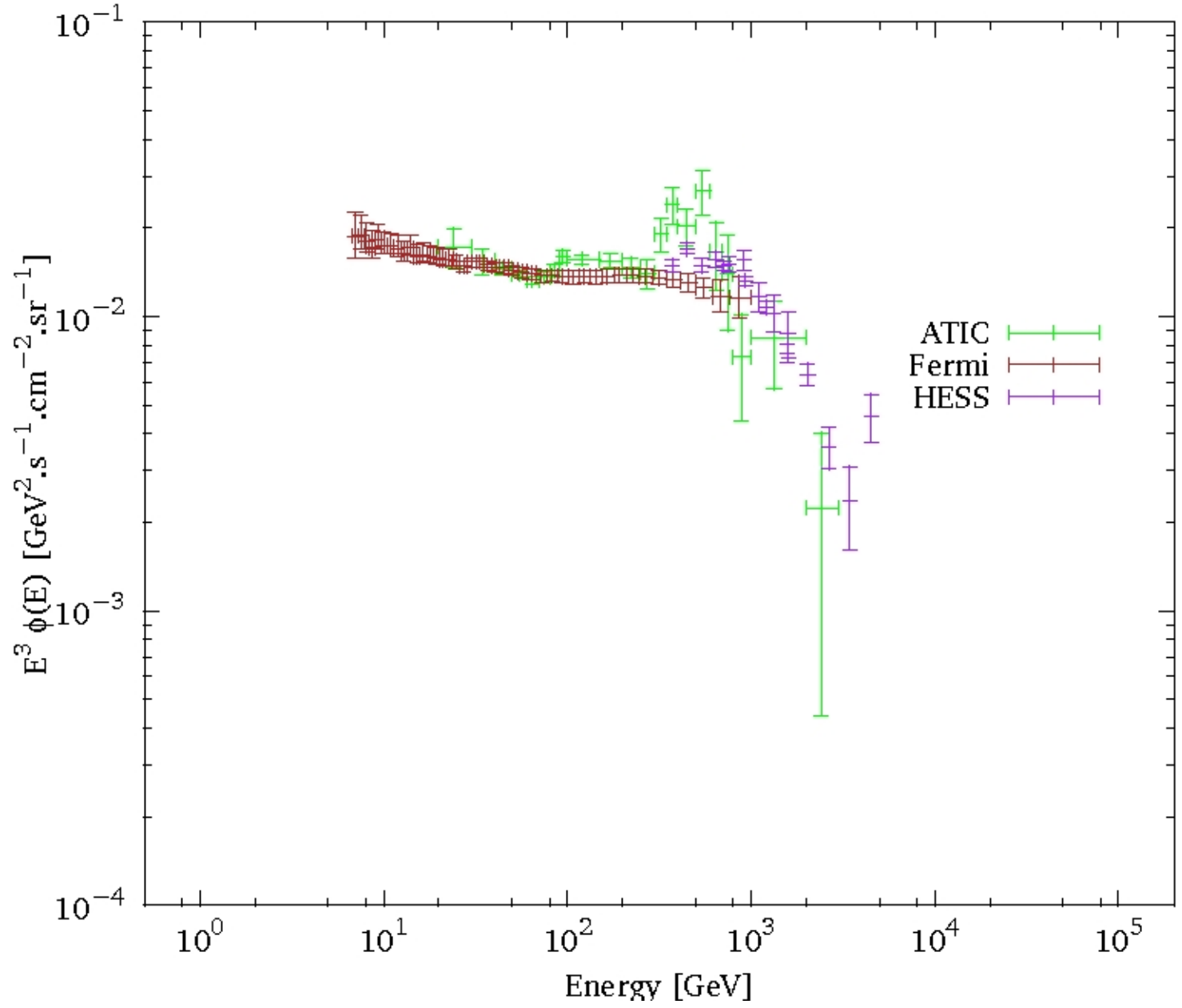
1. What are the local interstellar spectra?
2. Where is the outer boundary located?
3. Where is the termination shock located?
4. What are the diffusion coefficients? (r, t)
5. Solar wind profile?
6. Heliospheric magnetic field?

Solar modulation





e+ and e-



Model

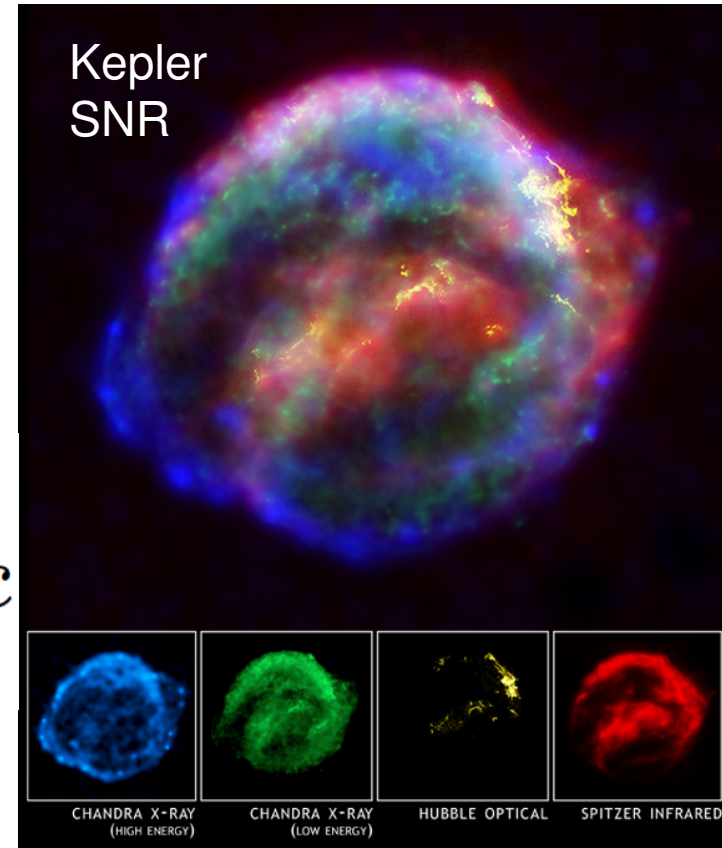
- Diffusion equation

$$-K_0 E^\delta \Delta \Psi(r, z, E) + \partial_E [b_{loss}(E) \Psi(r, z, E)] = Q(r, z, E)$$

Sources

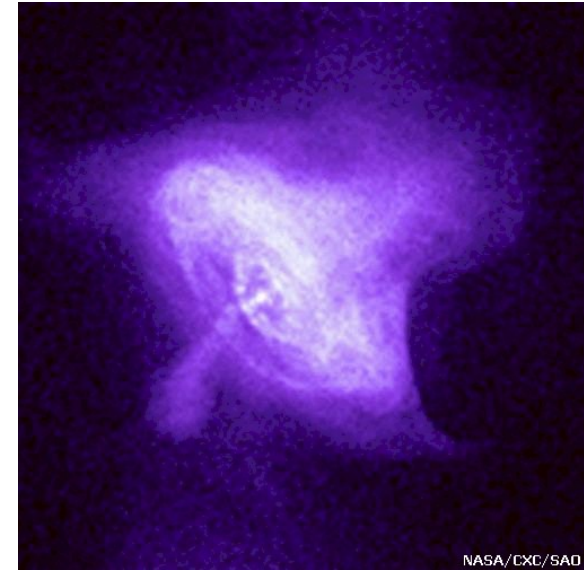
- Supernova remnants

$$Q_0 E^{-\gamma} e^{-E/E_c}$$



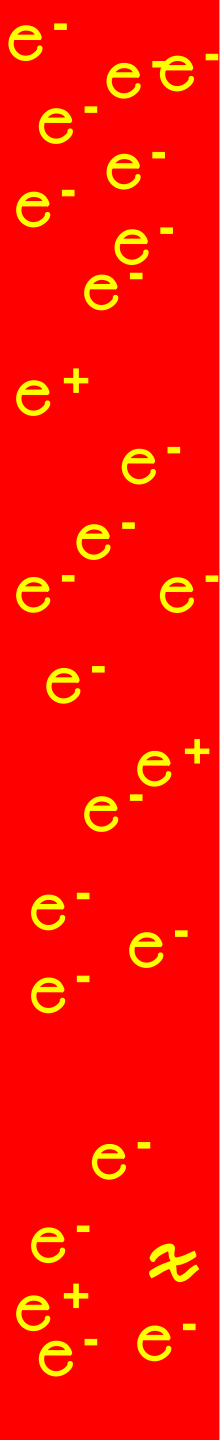
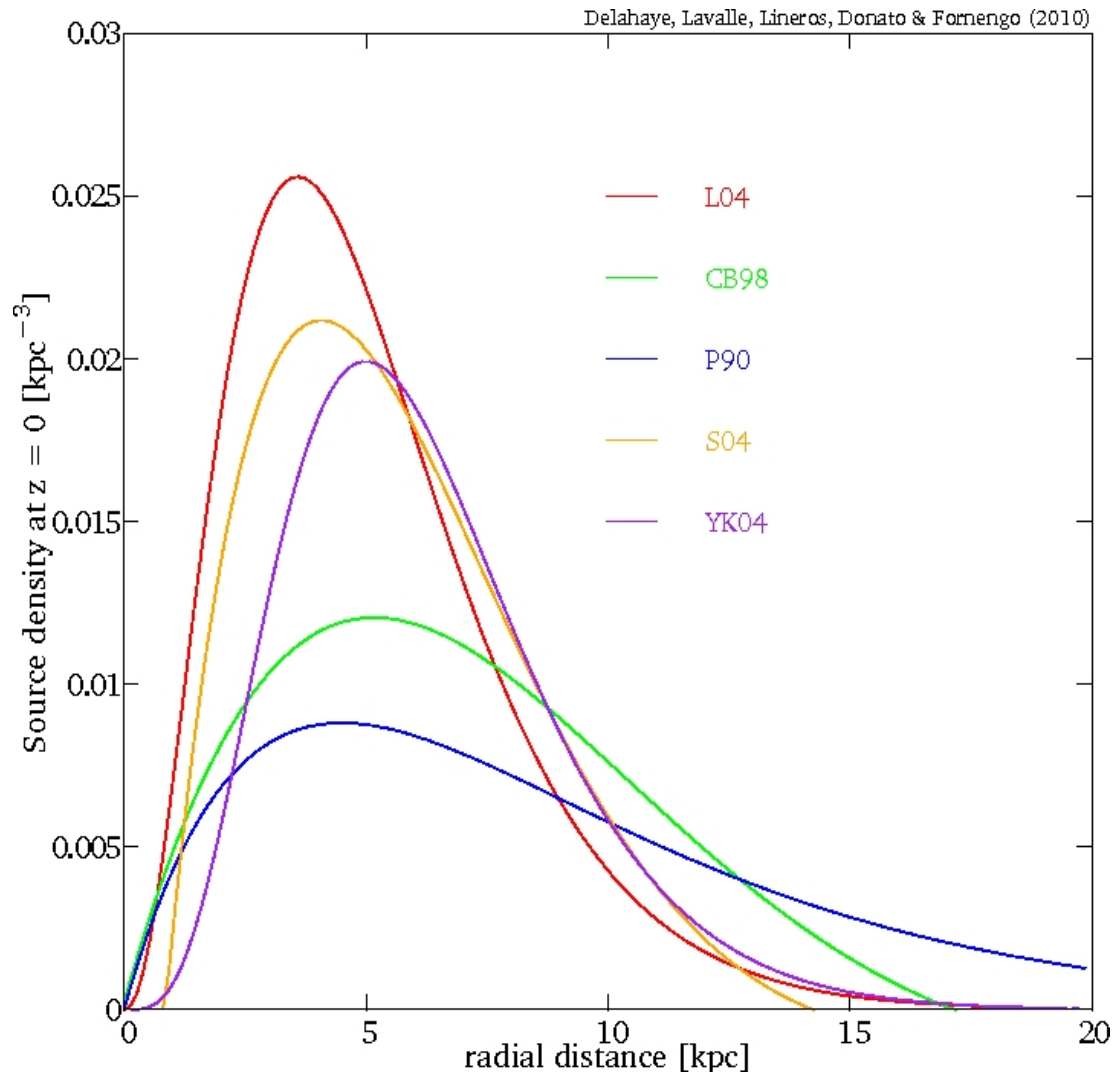
Sources

- Supernova remnants
- Pulsars

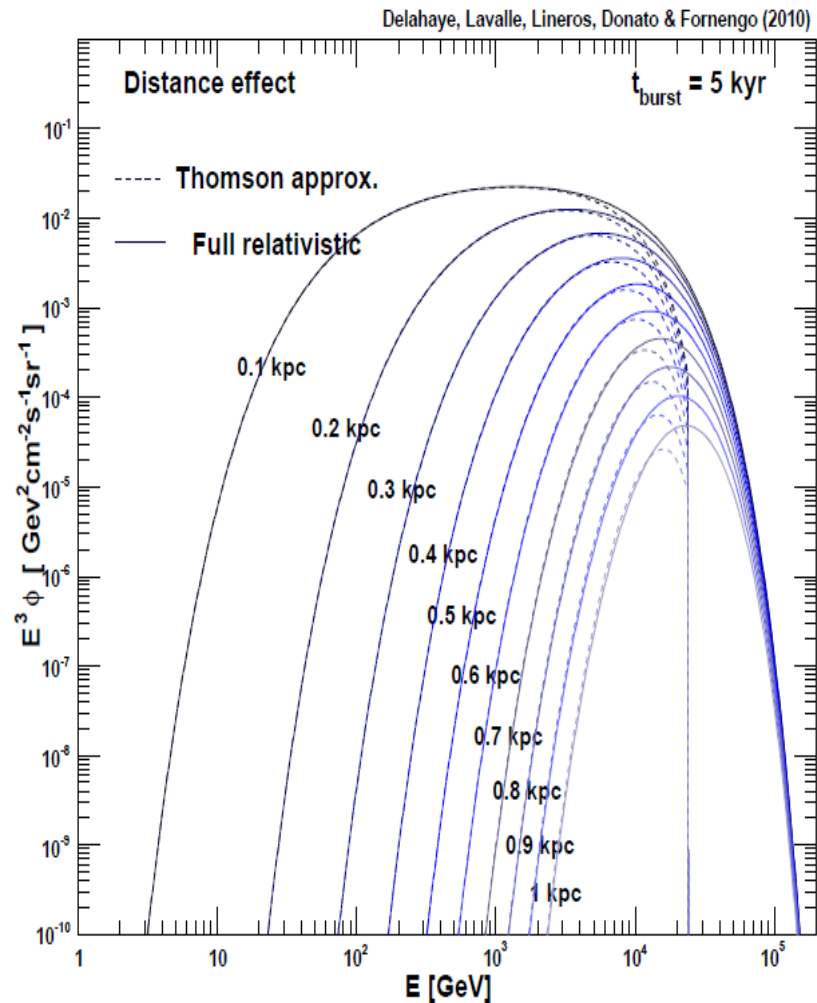
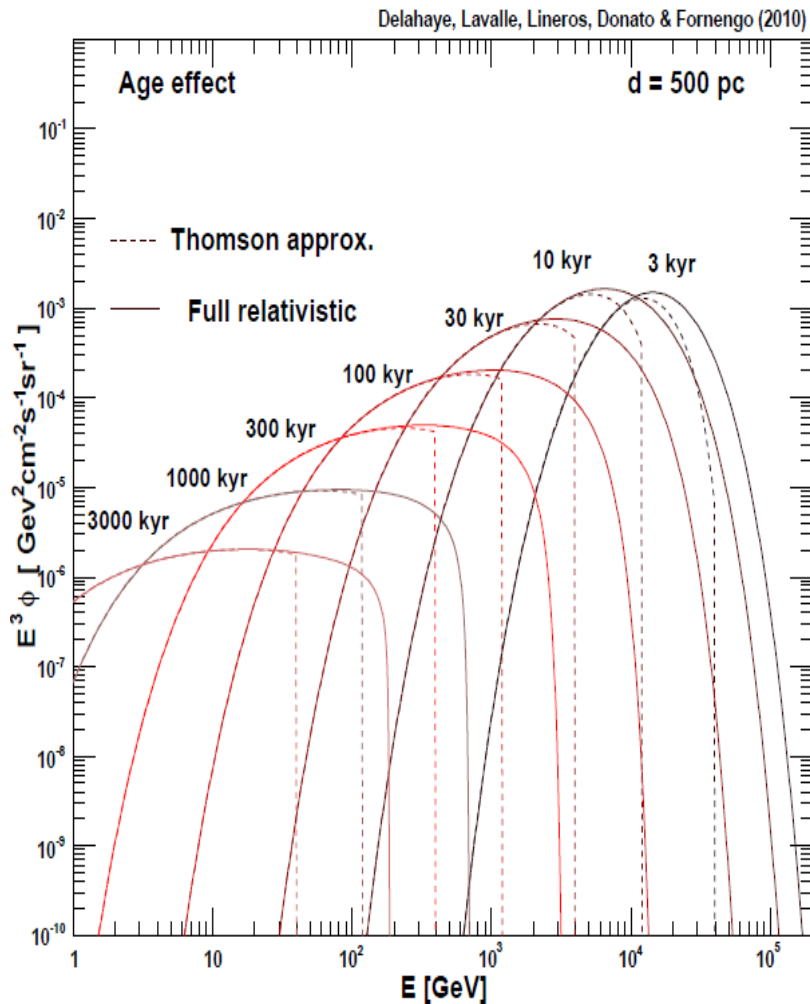


$$Q_0 E^{-\gamma} e^{-E/E_c}$$

Source distribution



Discreteness



Source catalogues

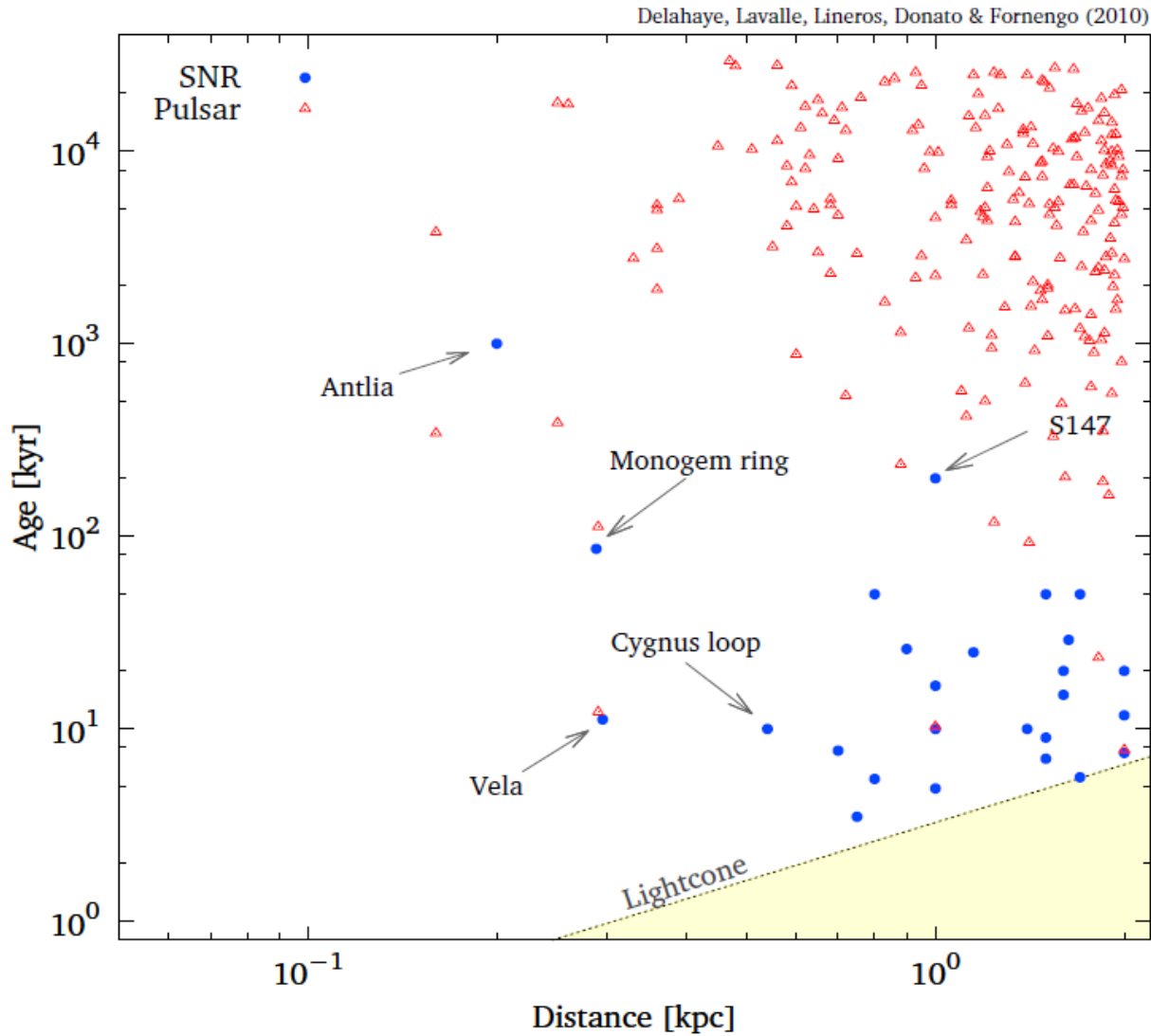
Green SNR catalogue

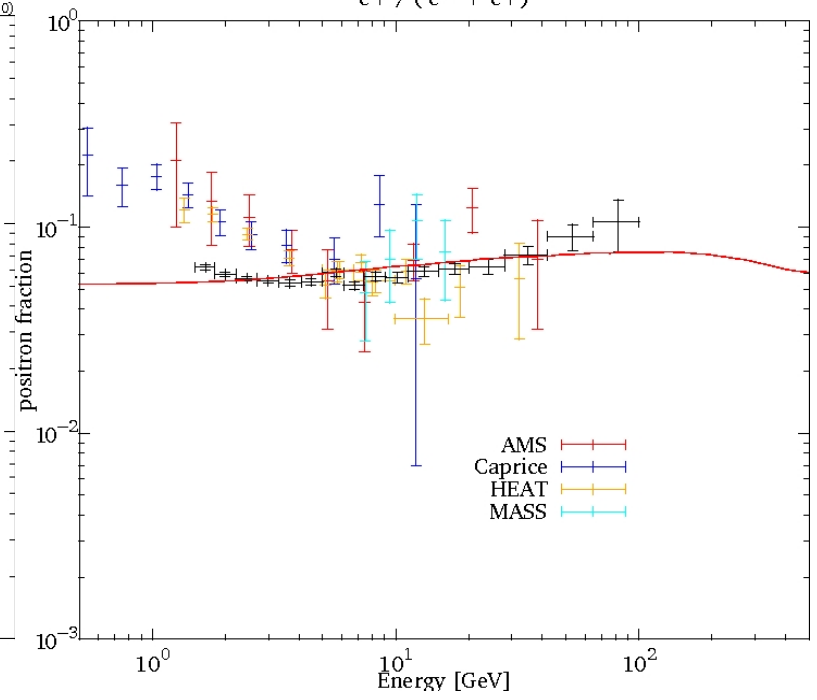
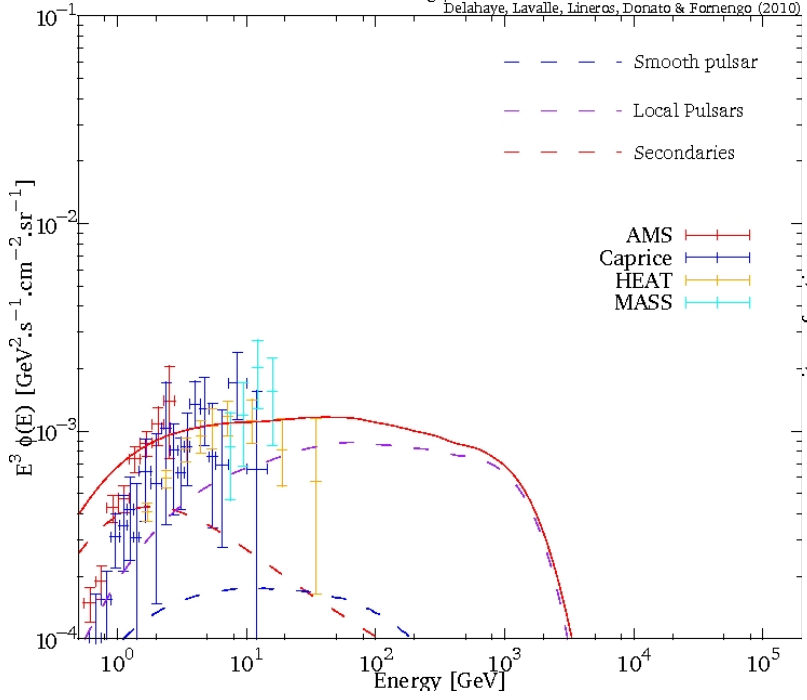
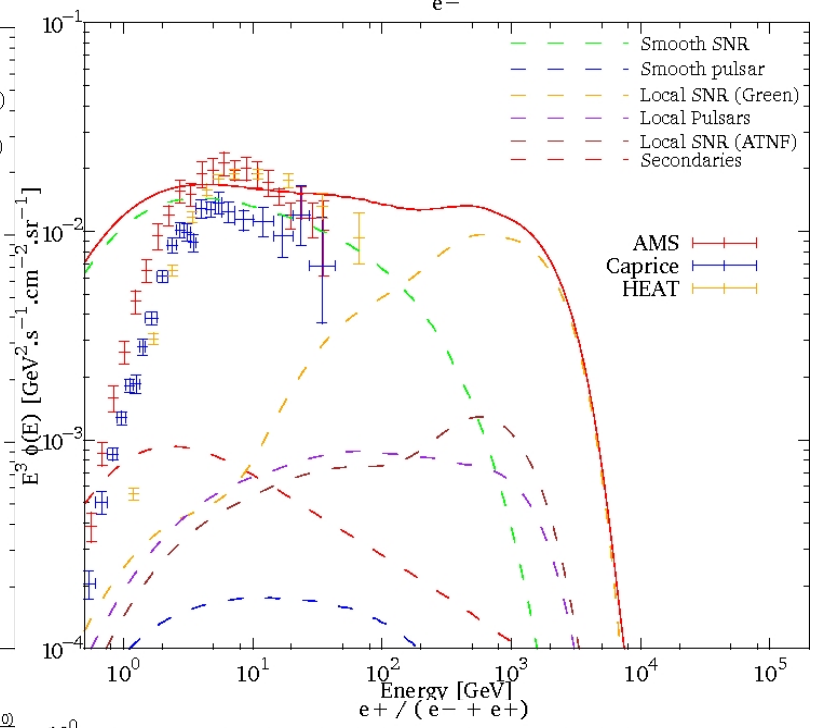
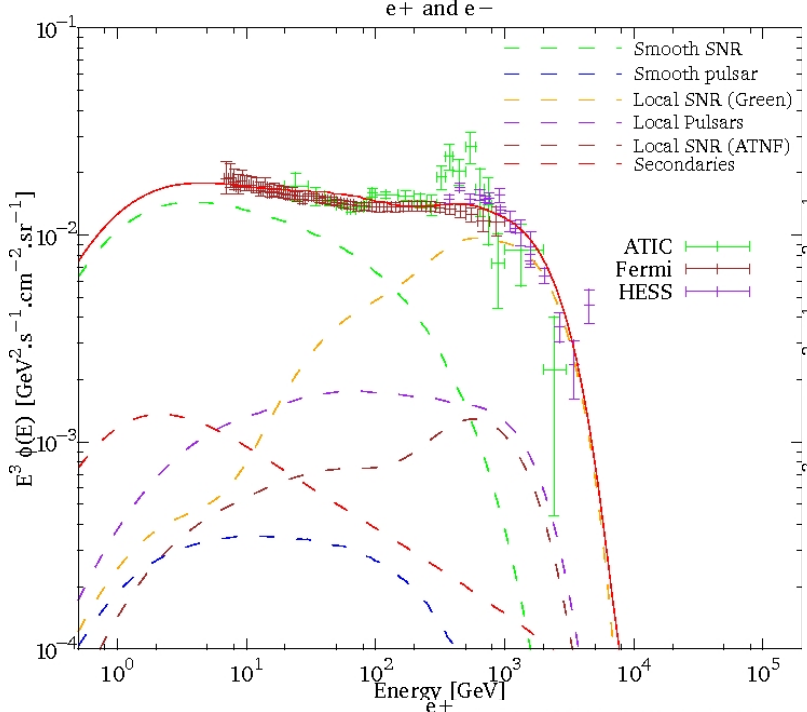
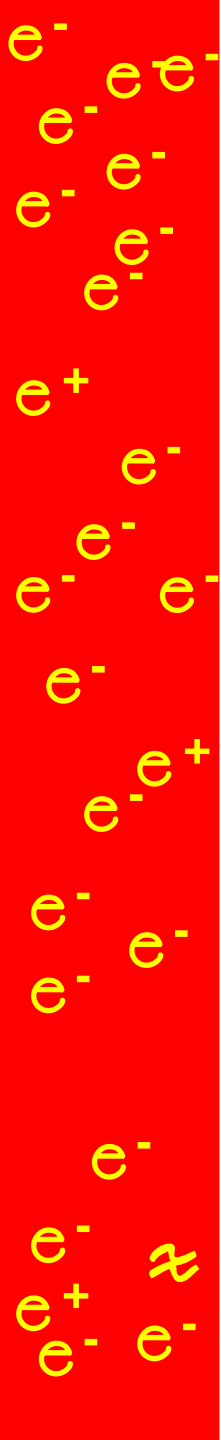
<http://www.mrao.cam.ac.uk/surveys/snrs/>

ATNF pulsar catalogue

<http://www.atnf.csiro.au/research/pulsar/psrcat/>

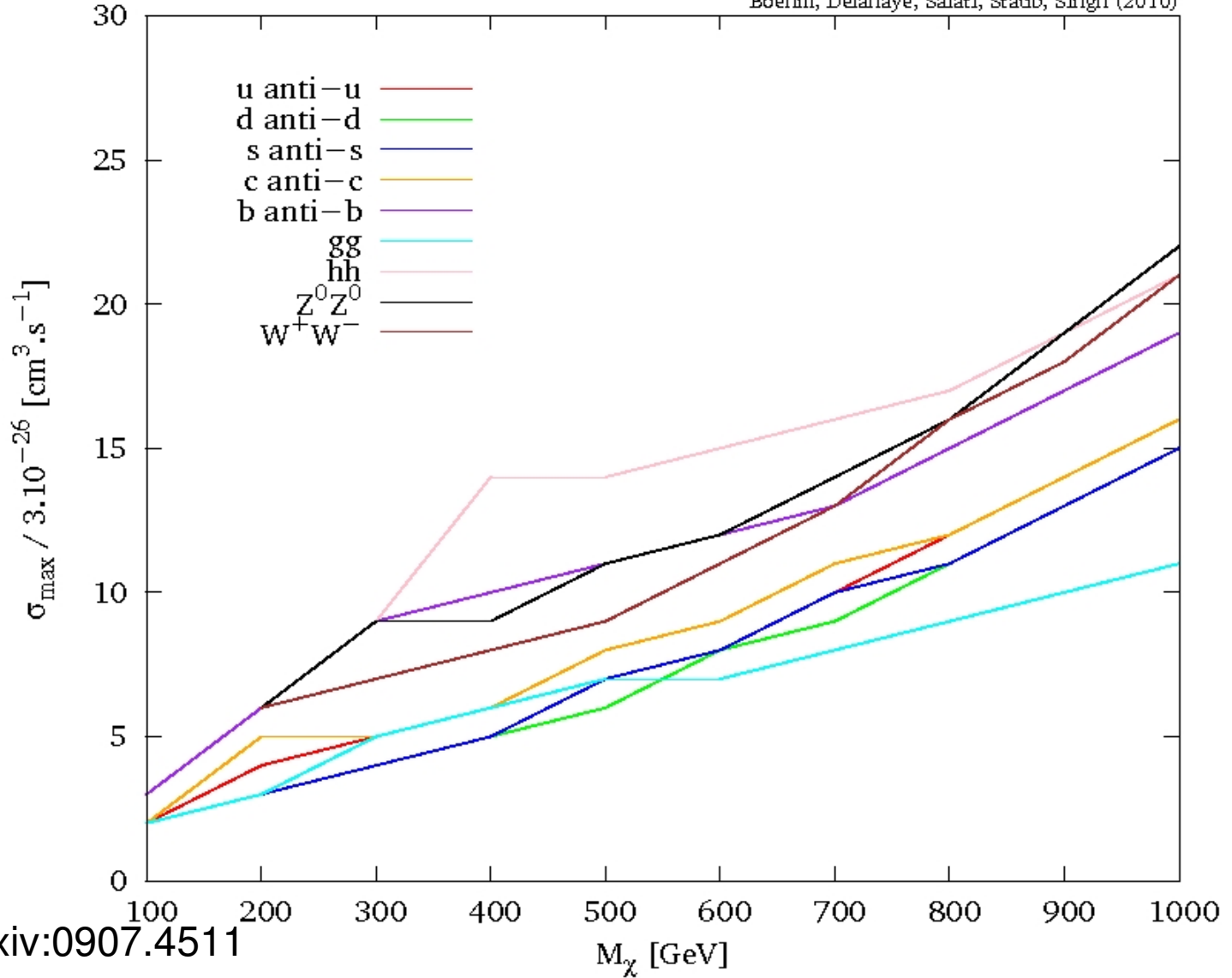
Local sources



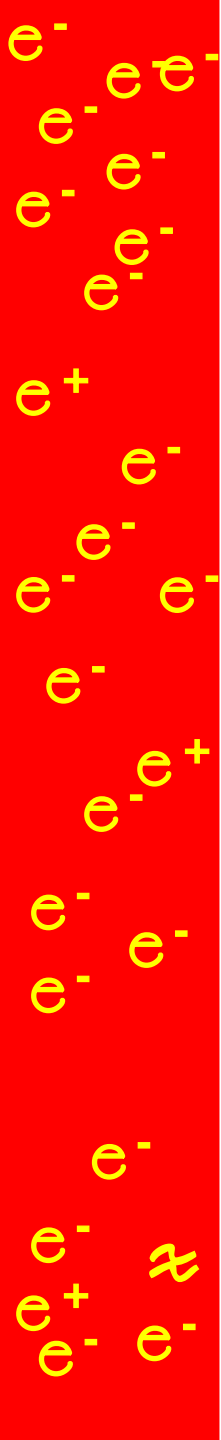


Anti-protons

Boehm, Delahaye, Salati, Staub, Singh (2010)

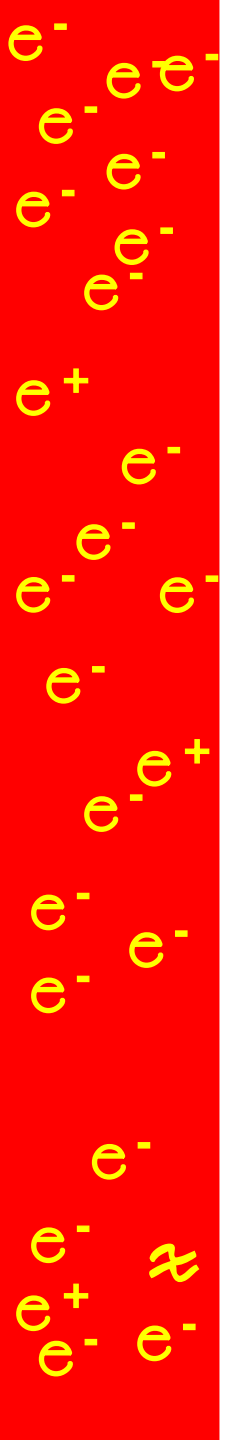


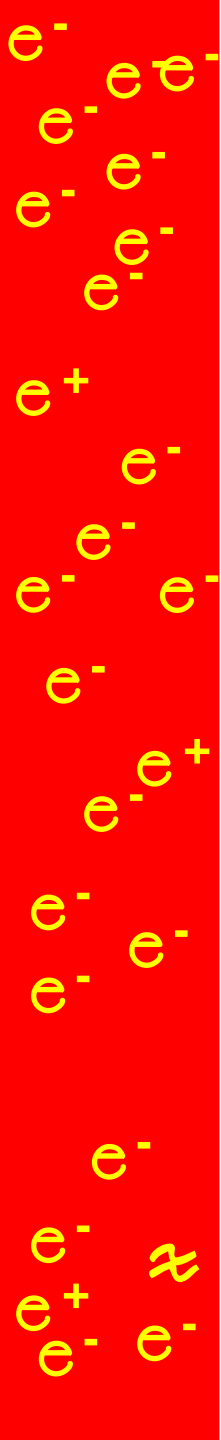
arxiv:0907.4511



Conclusions

- No need for Dark Matter to explain current data
=> Does not mean that it is not there!
- Dark matter to quark coupling can be large





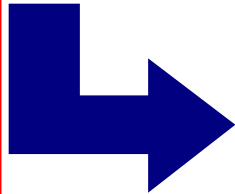
You want more ?

Open questions

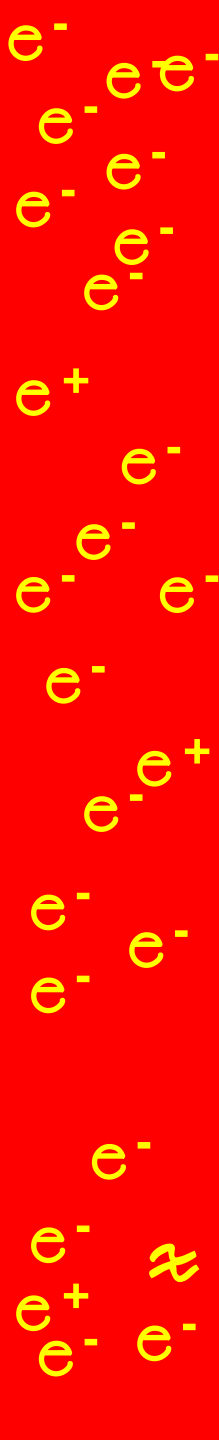
- Secondary production in SNRs

Blasi & Serpico (PRL103, 2009)

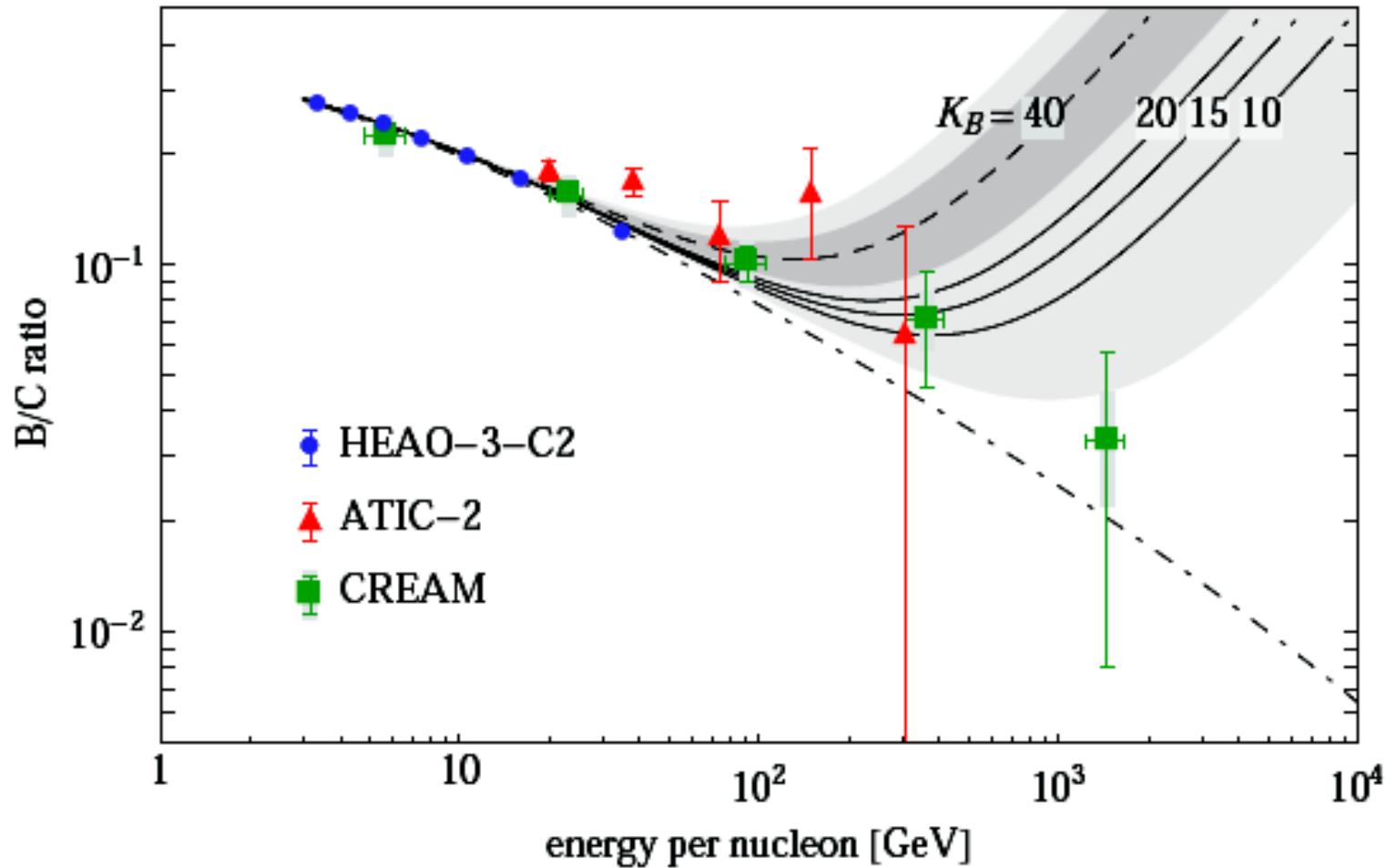
Mertsch, Ahlers & Sarkar (PRD80 & PRL103, 2009)



anti-protons & B/C

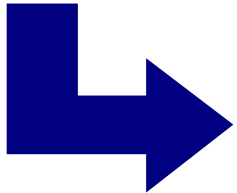


Open questions



Open questions

- Fermi features
 - Expected (local astrophysical sources)
 - Dark Matter



positron absolute spectra

