

GALACTIC SCIENCE WITH CTA

Andrea Giuliani

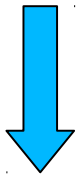
INAF / IASF Milano

OUTLINE



- * ***GALACTIC PLANE SURVEY***
- * ***GALCTIC CENTER SURVEY***
- * ***PEVATRONS***

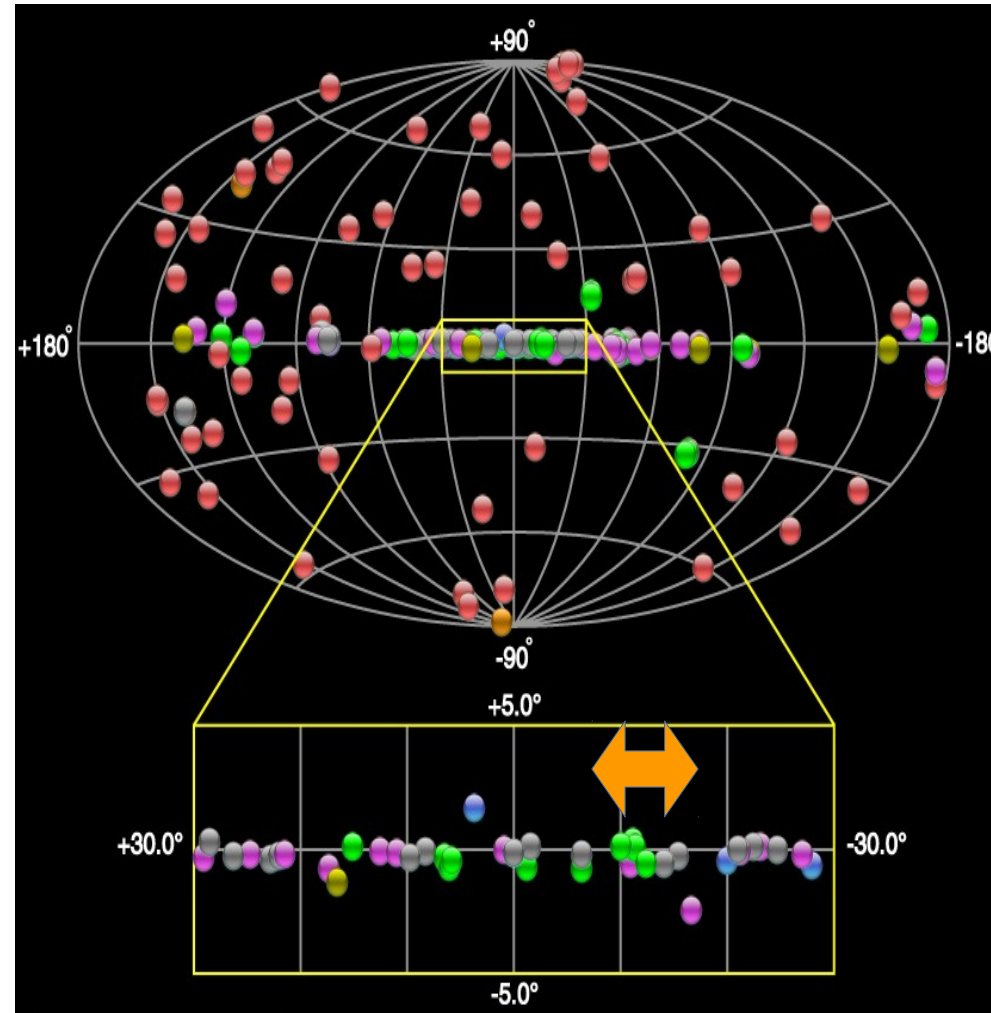
Large Field of View

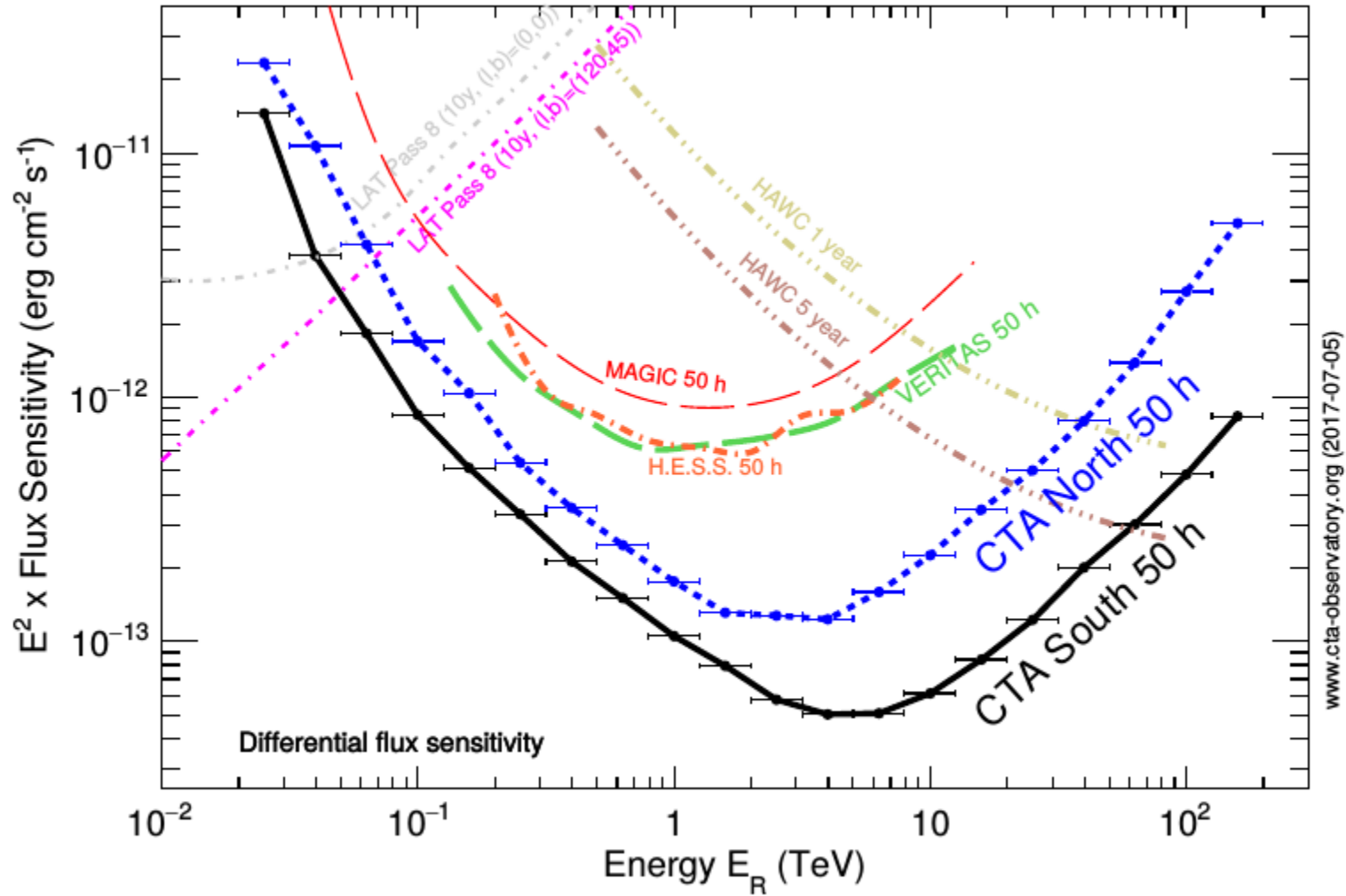


*Large exposure of the
Galactic plane*

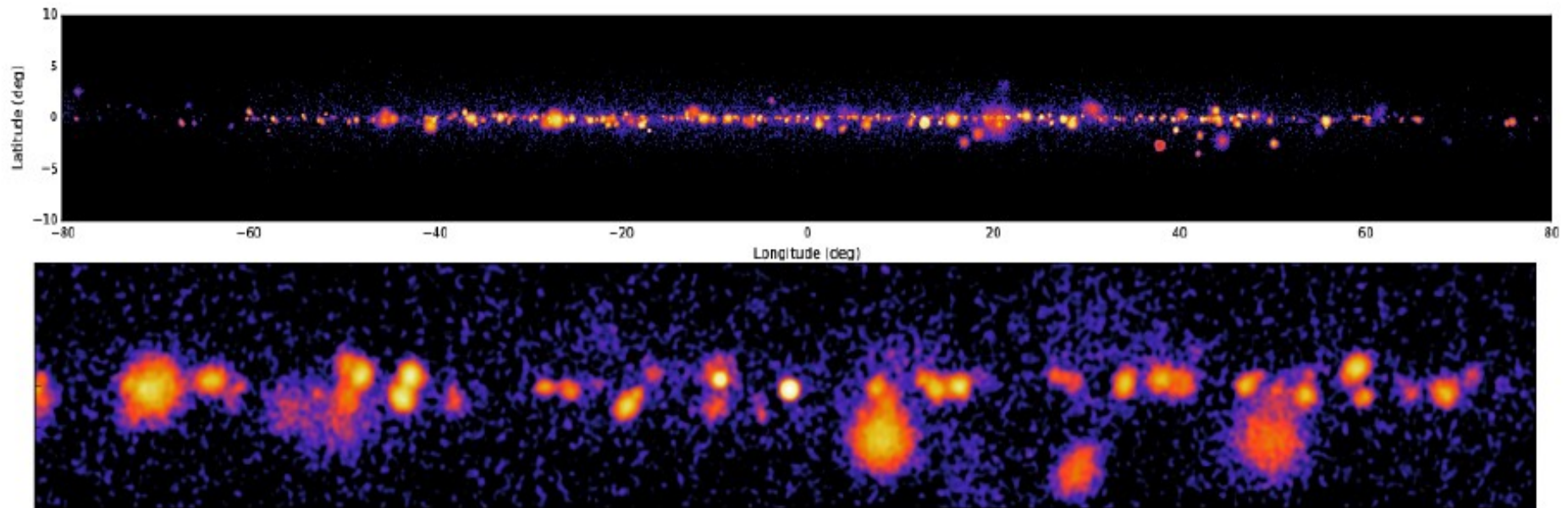
Multiple source observations

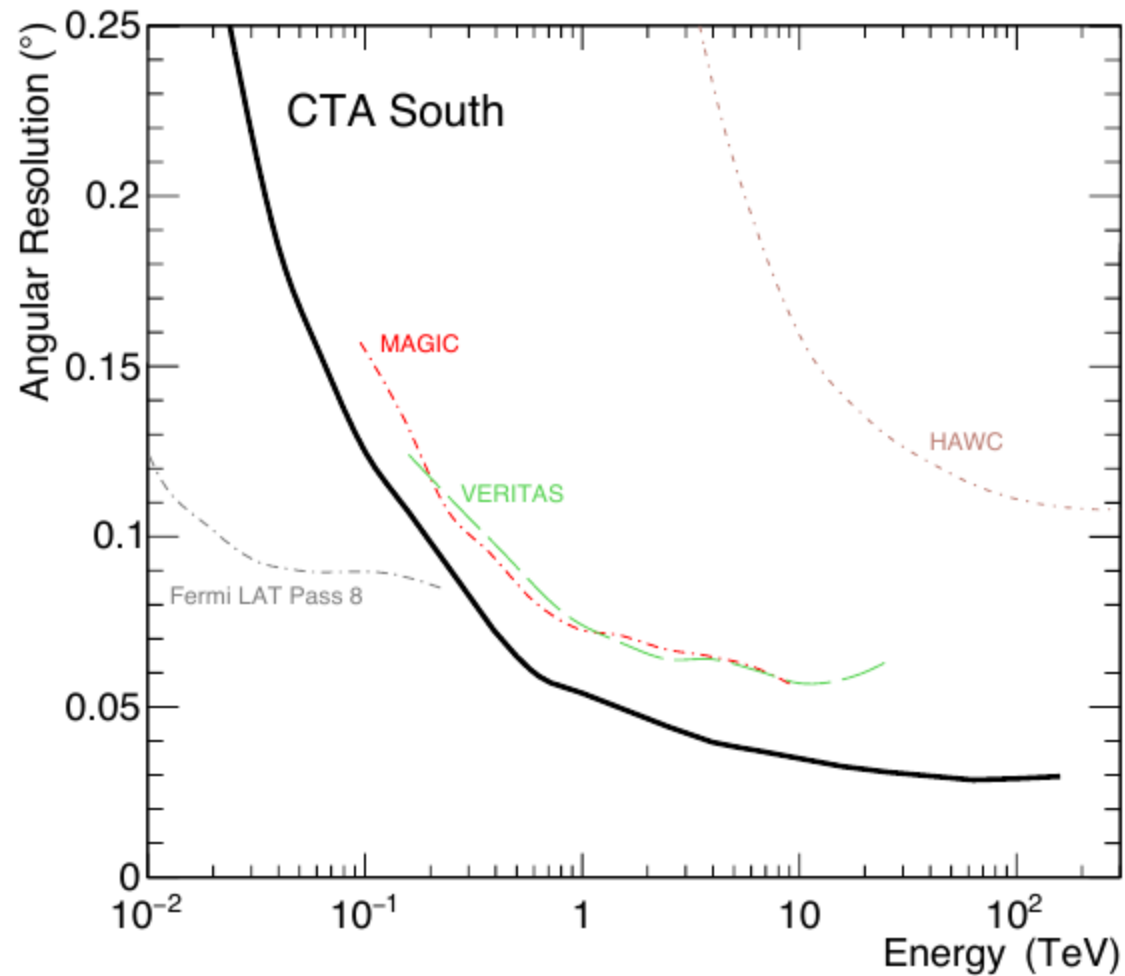
*Transient and serendipitous
sources*

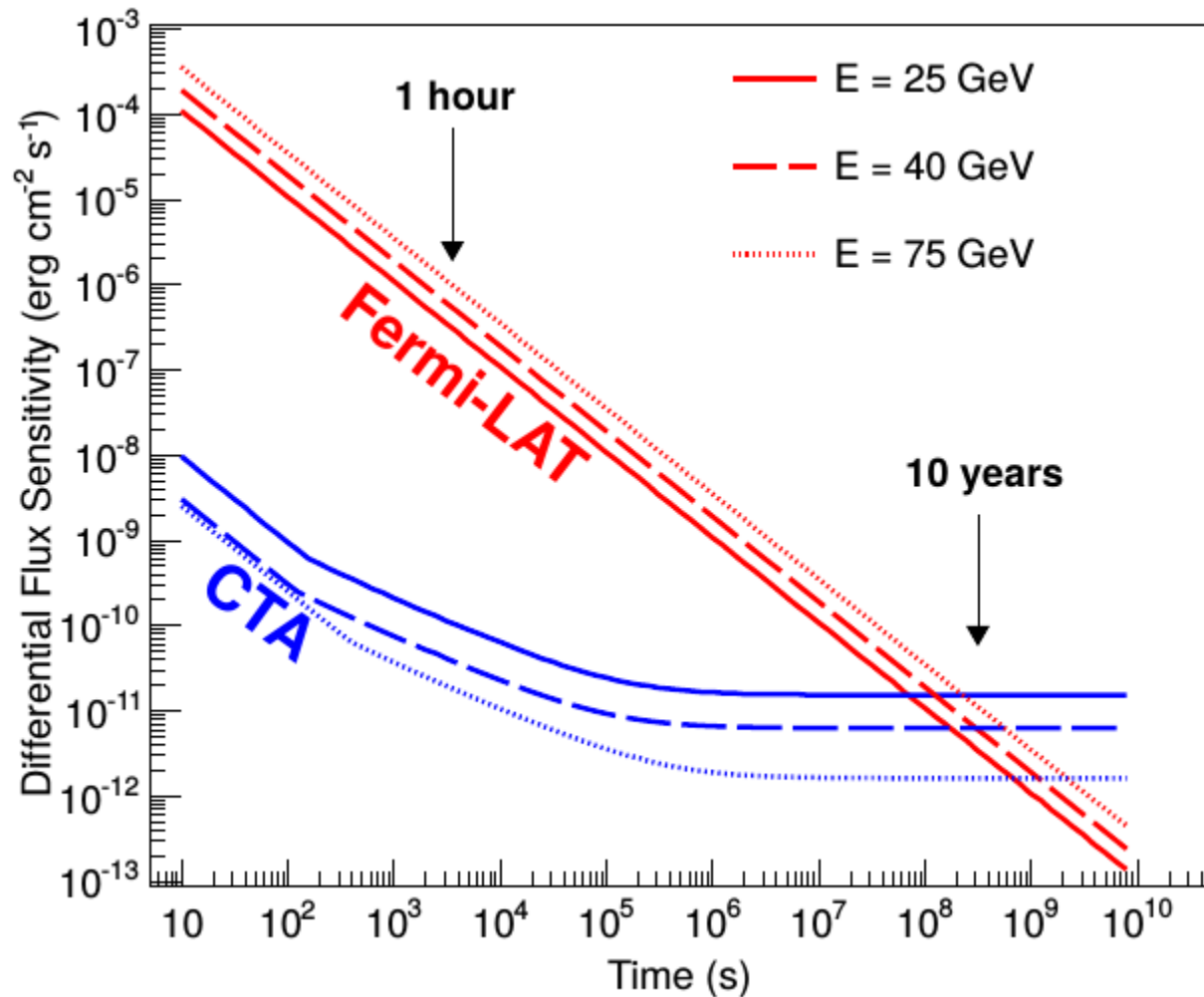




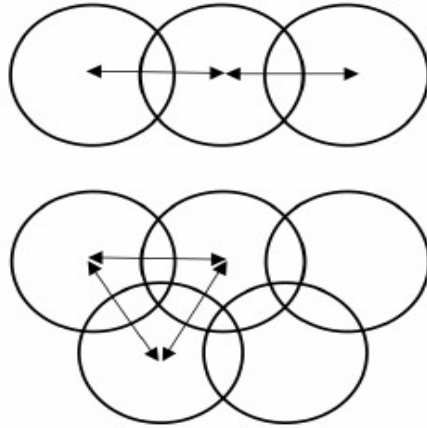
GALACTIC SCIENCE



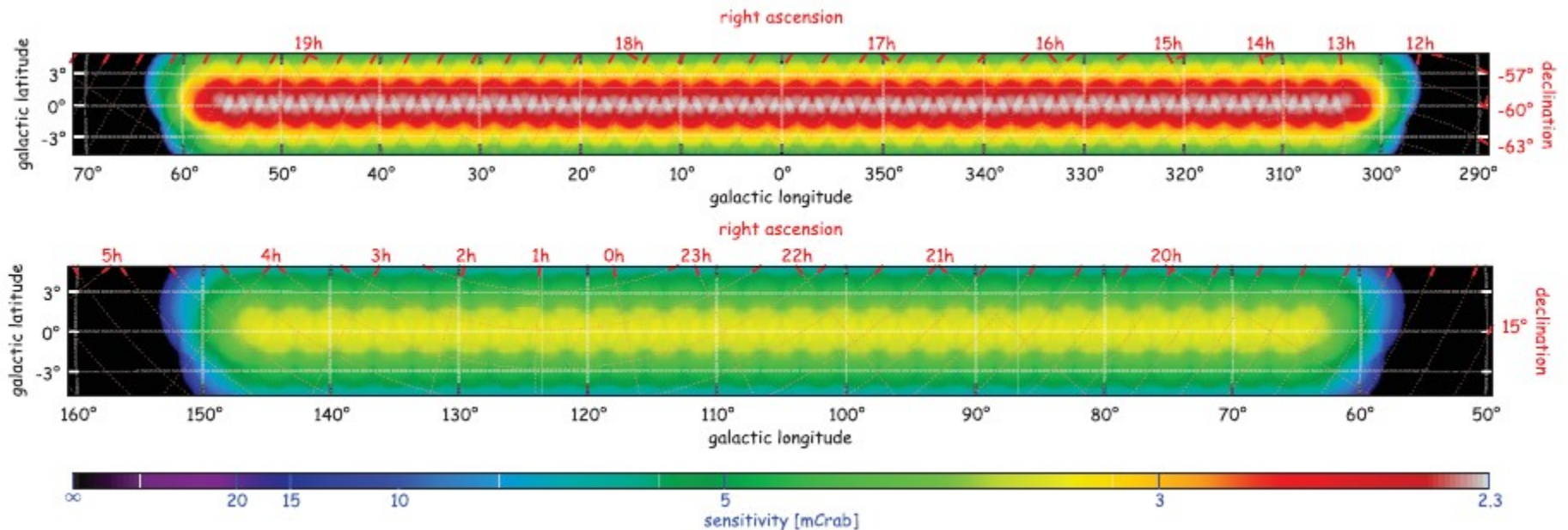
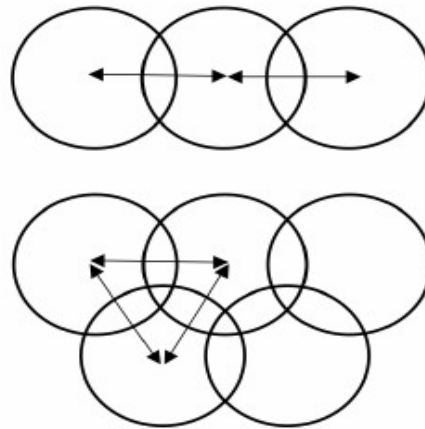




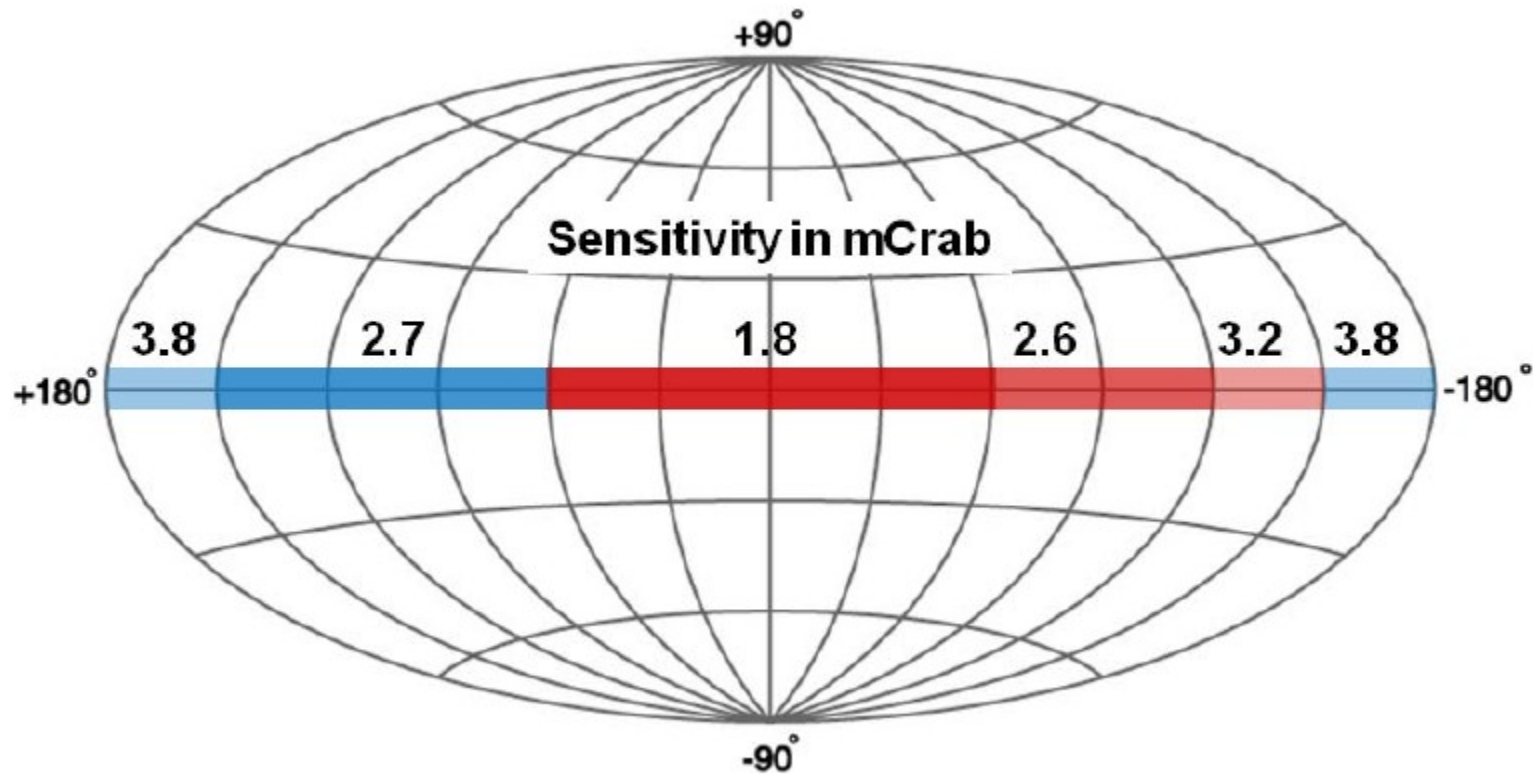
GALACTIC PLANE SURVEY

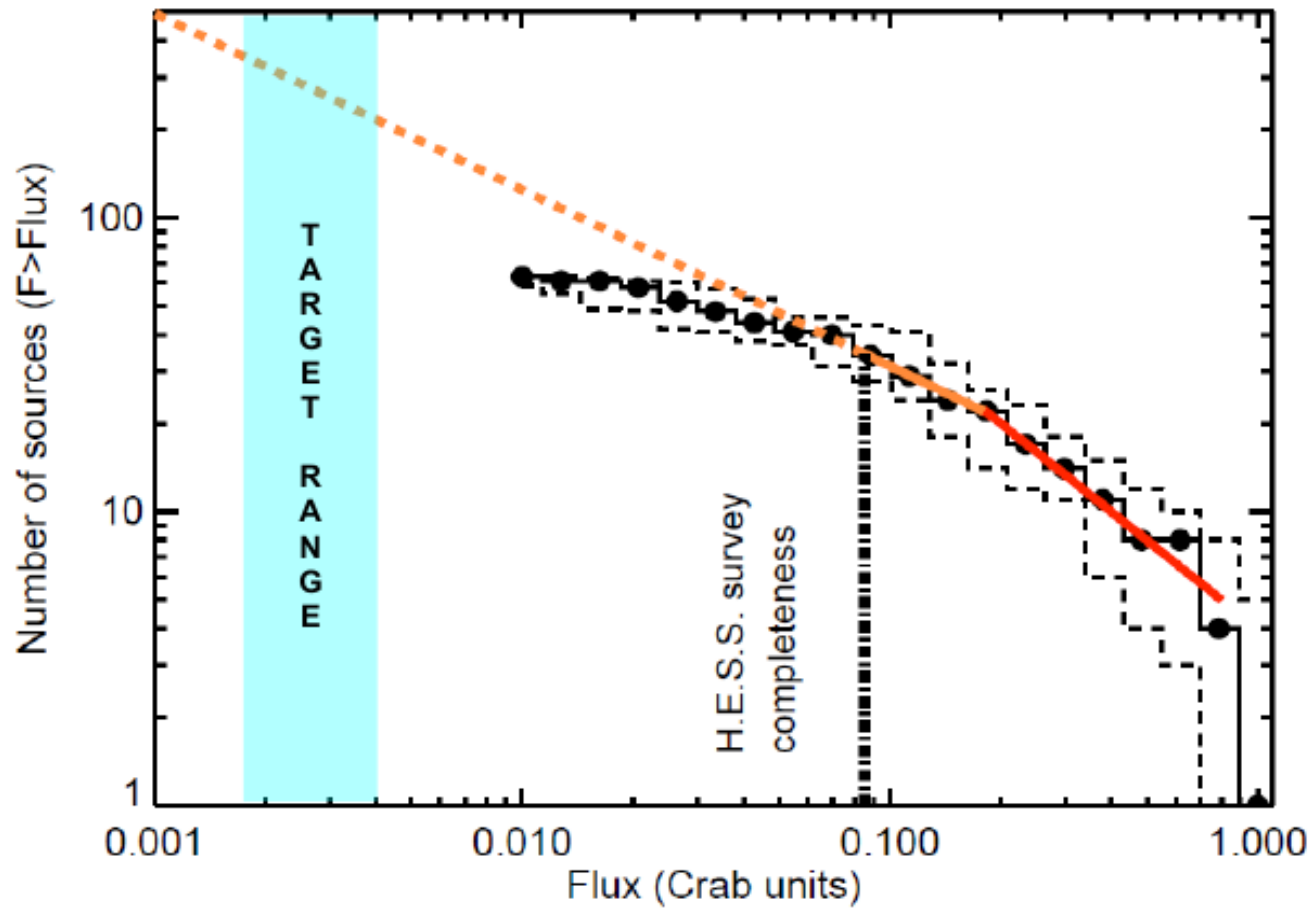


GALACTIC PLANE SURVEY



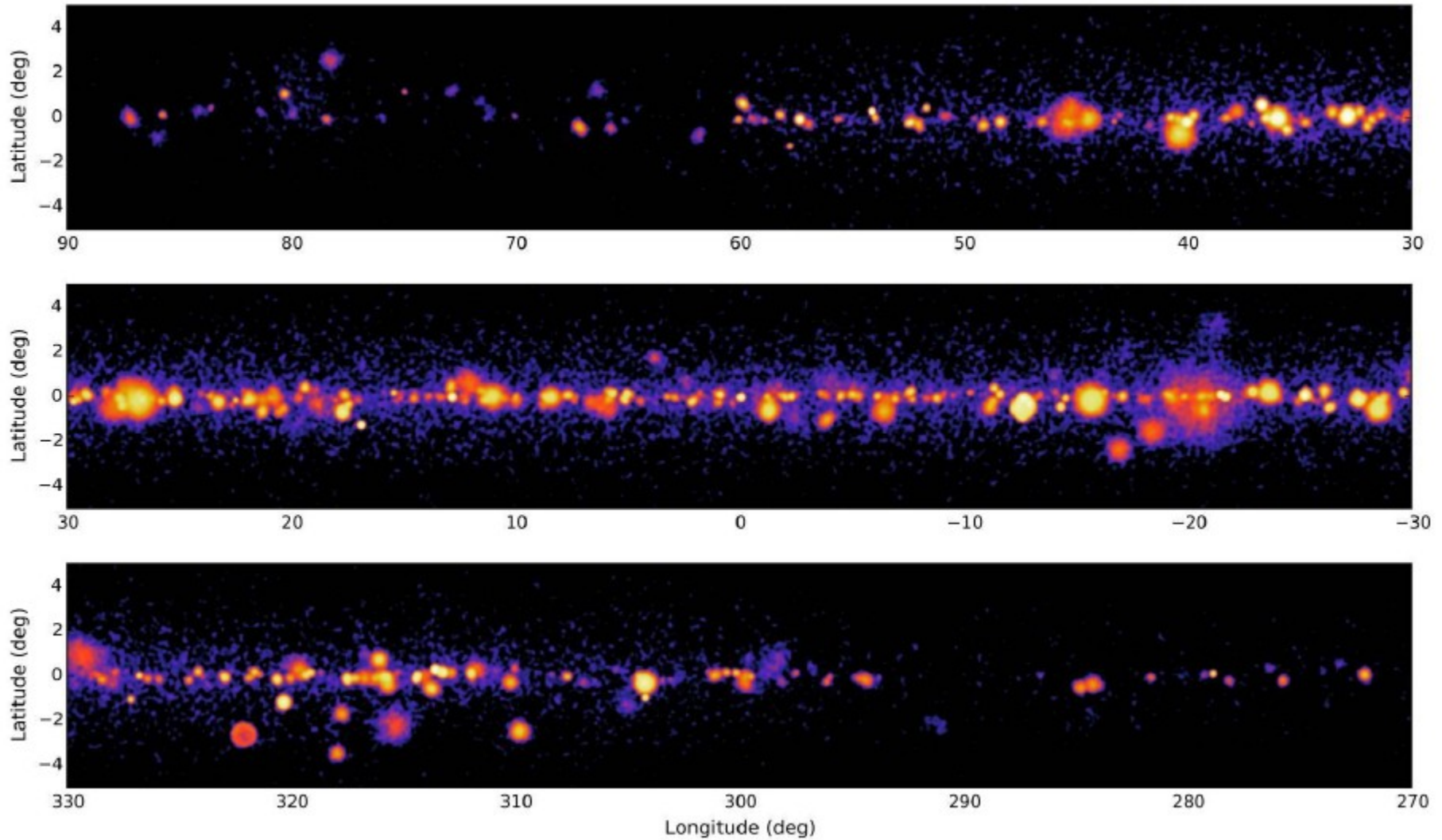
GALACTIC PLANE SURVEY



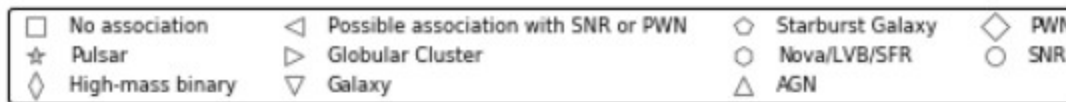


Adapted from Renaud 2009

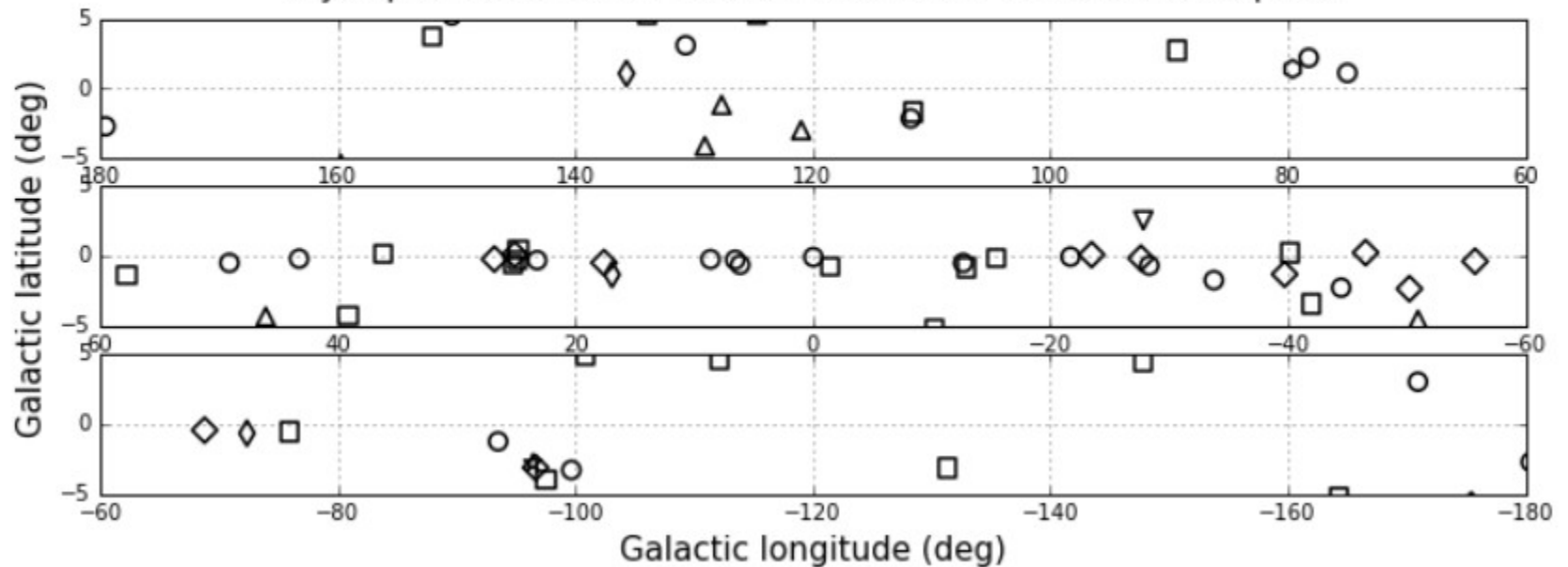
GALACTIC PLANE SURVEY



GALACTIC 2FHL SOURCES



SkyMap of Fermi-LAT 2FHL sources within 5° of the Galactic plane

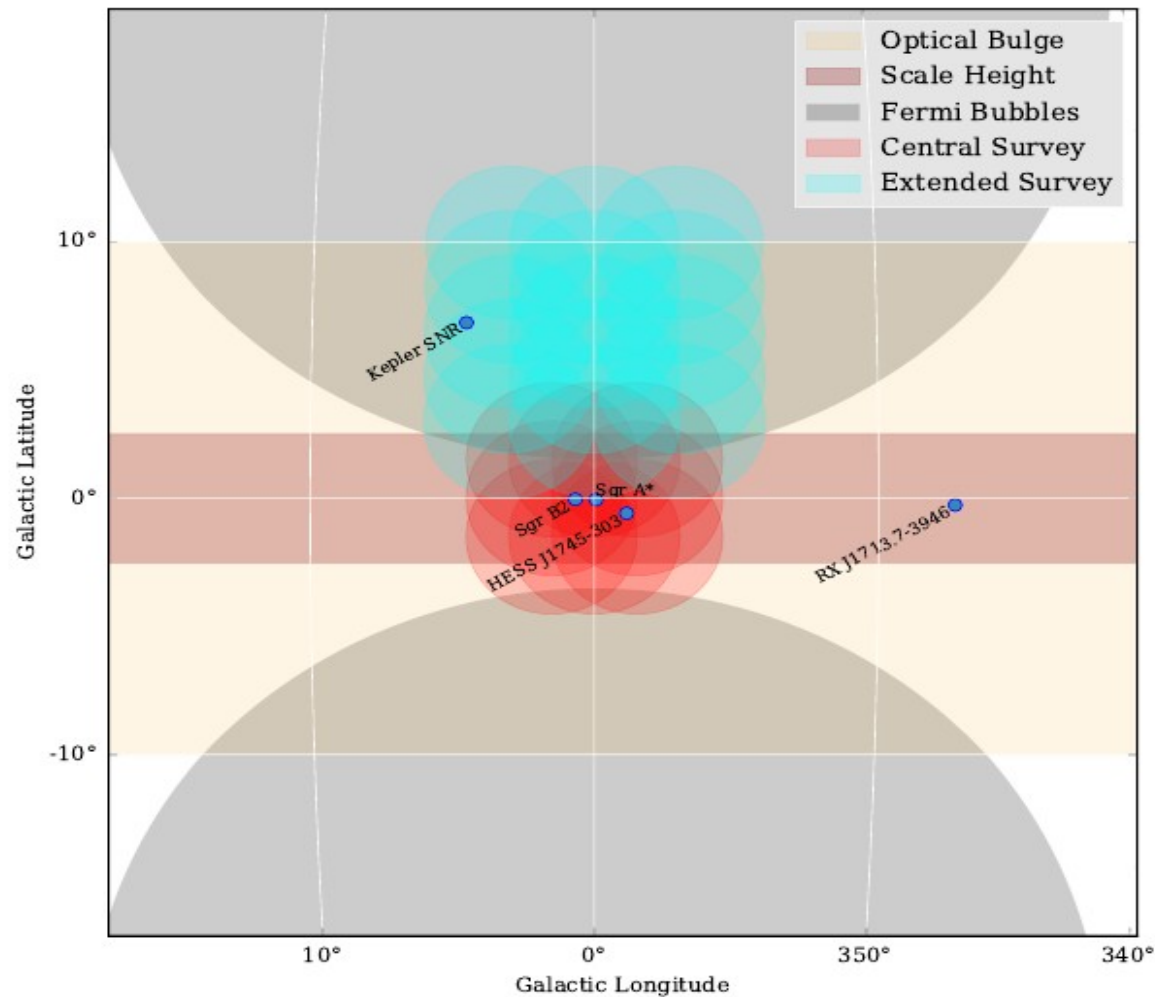


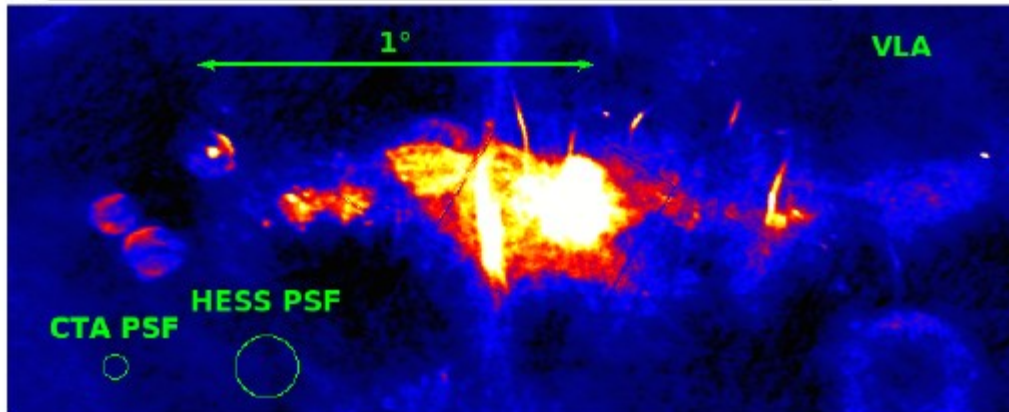
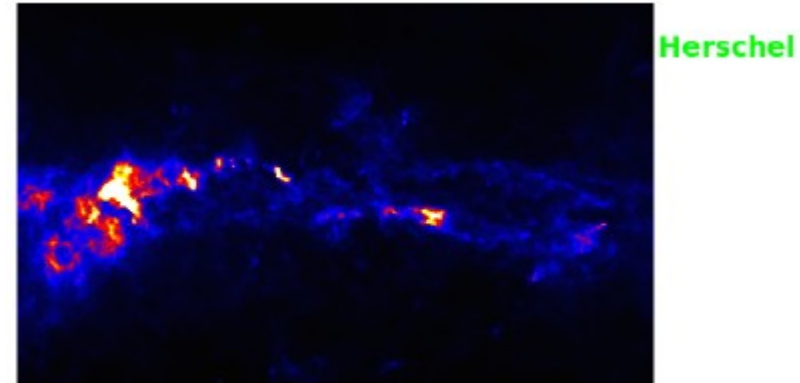
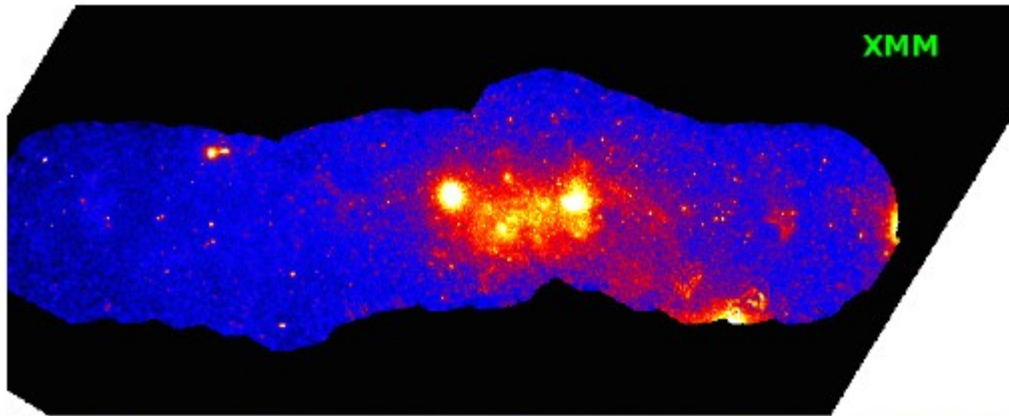
GALACTIC PLANE SURVEY



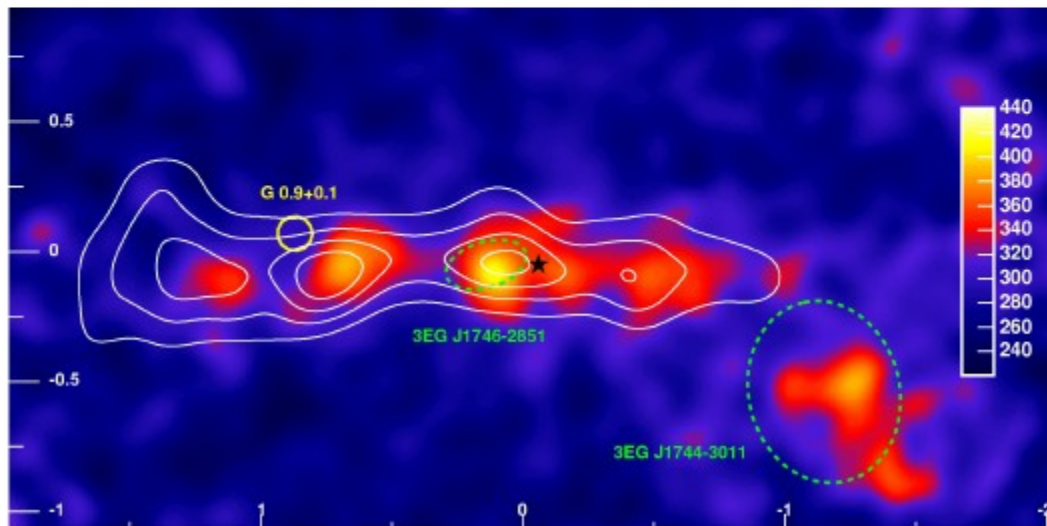
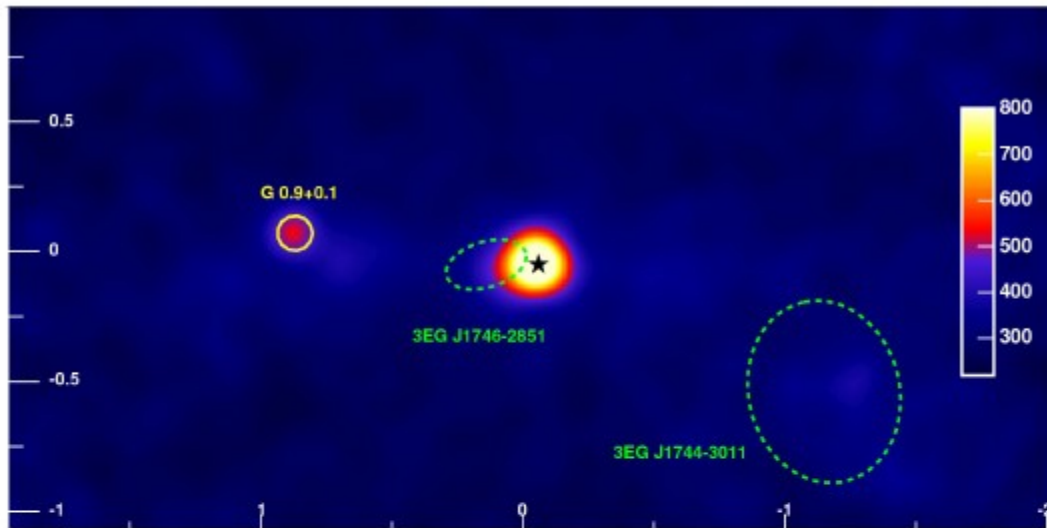
- Discovery of new and unexpected phenomena in the Galaxy.
- Discovery of PeVatron candidates that are of key importance in our search for the origin of cosmic rays.
- Detection of many new VHE Galactic sources, particularly PWNe and SNRs, to increase the Galactic source count by a factor of five or more.
- Measurement of the large-scale diffuse VHE gamma-ray emission
- Discovery of new VHE gamma-ray binary systems
- Production of a multi-purpose legacy data set comprising sky images and source catalogues of the complete Galactic plane at VHE.

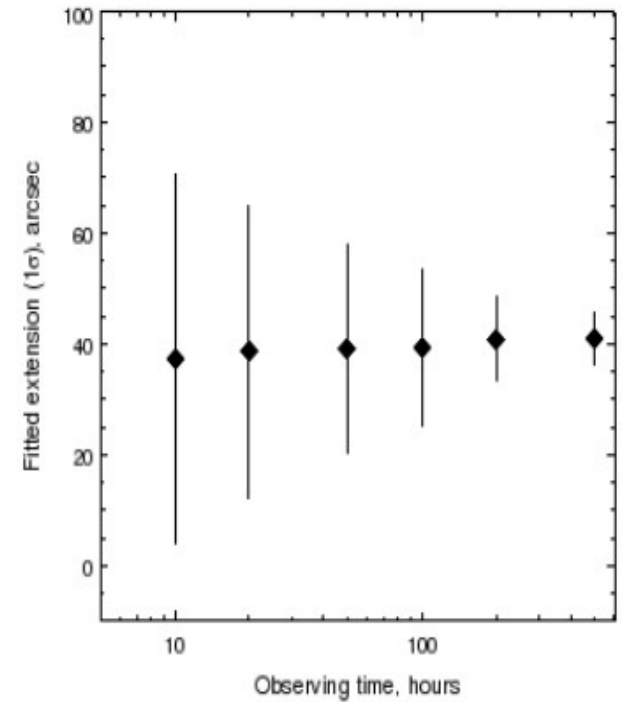
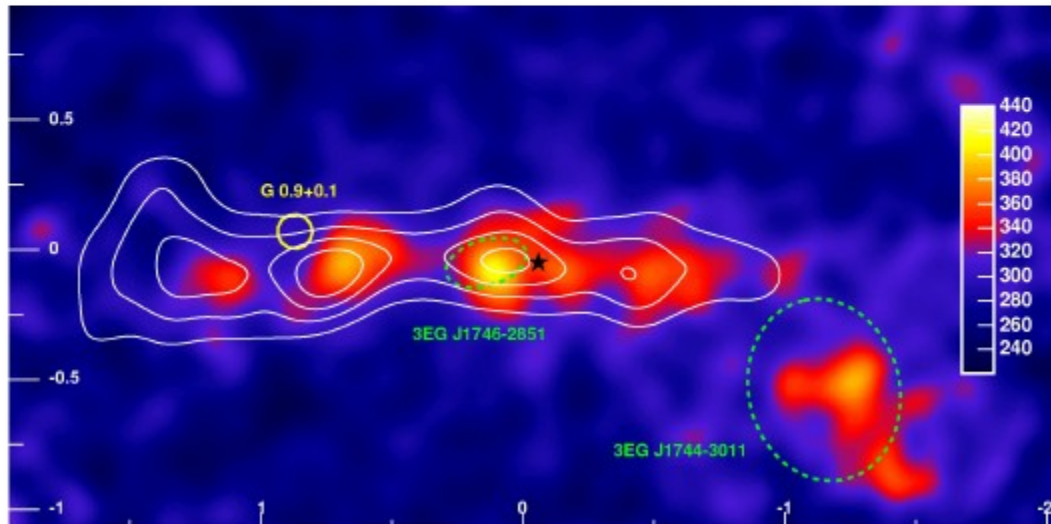
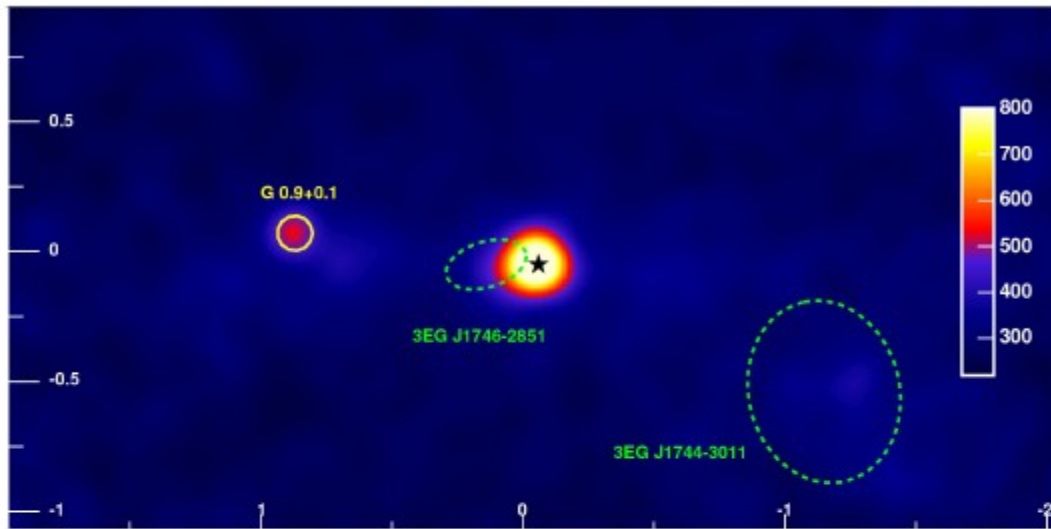
GALACTIC CENTER SURVEY

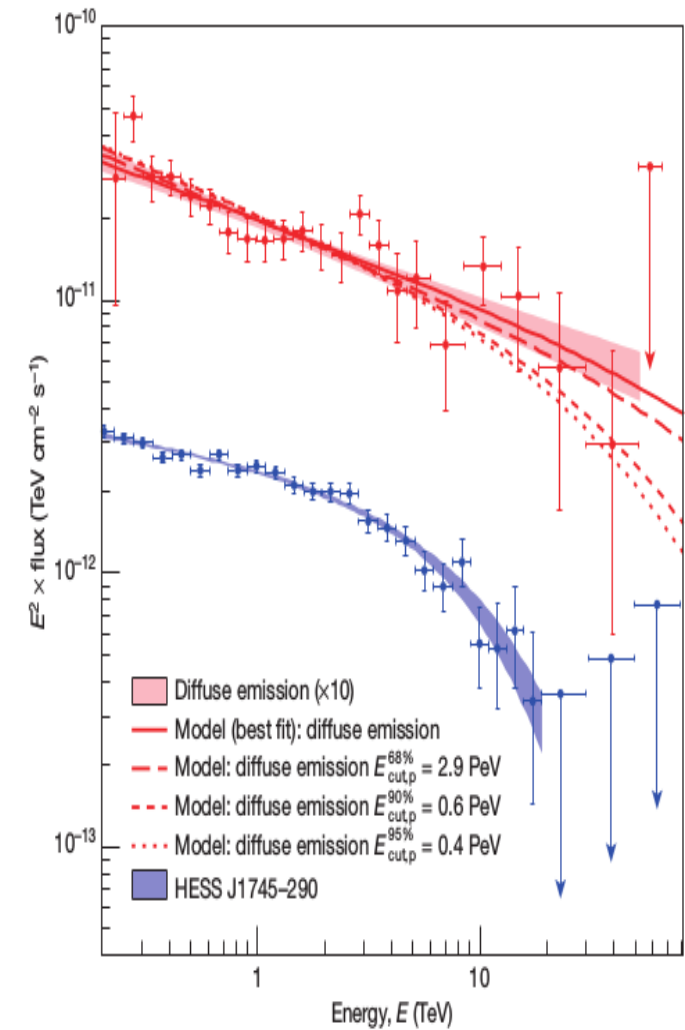
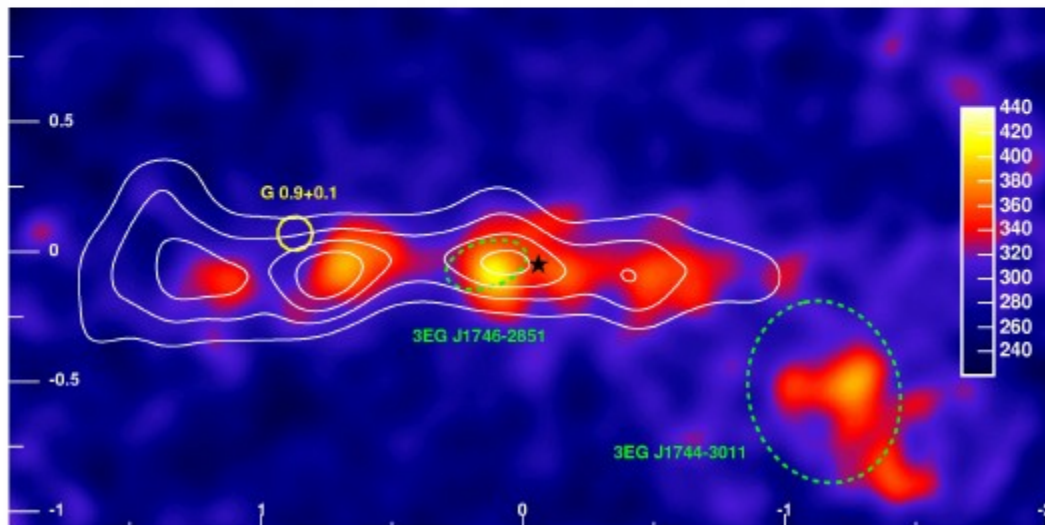
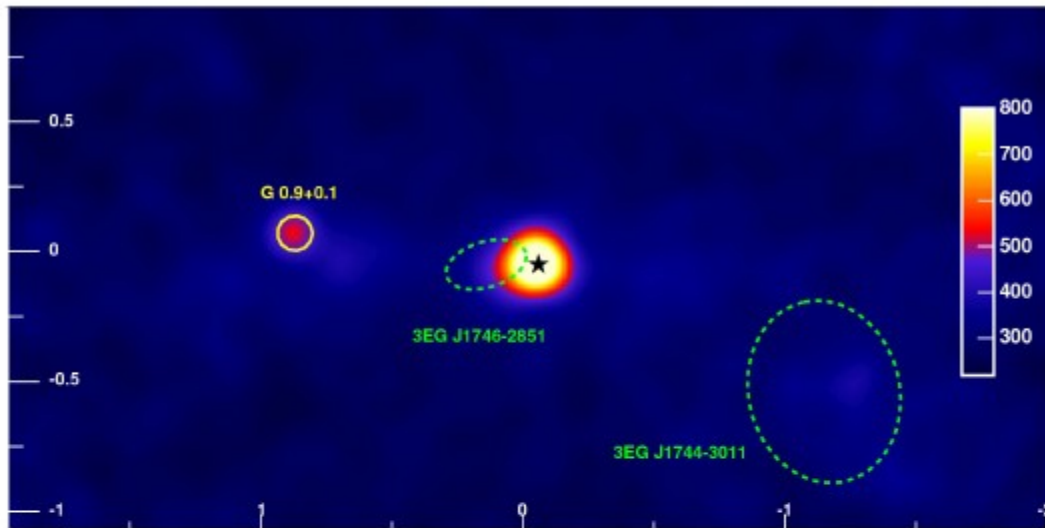




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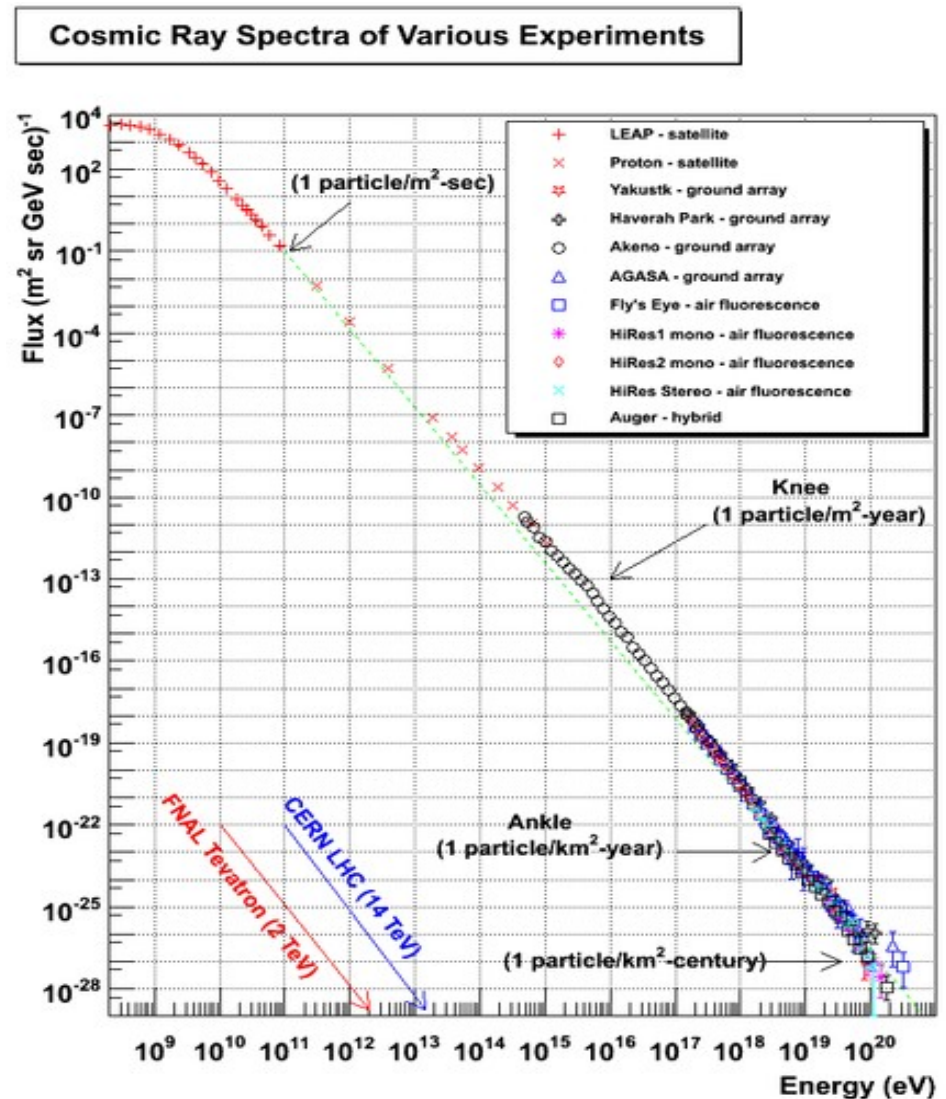




Pevatrons : Why ?

The simple shape of the spectrum suggests a common origin for CRs up to (at least) 10^{15} eV

→ Pevatrons



Pevatrons : What ?

*Accelerators of protons (or nuclei) up to 1 PeV
(spectrum without cut-offs up to 1 PeV)*

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(spectrum without cut-offs up to 1 PeV)*

Interaction with ISM gives gammas with energy up to $\sim 10 \% E_p$

*→ Hadronic gamma-ray emission,
with without cut-offs up to ~ 100 TeV*

Pevatrons : Where ?

SN Remnants ? can accelerate of CRs !

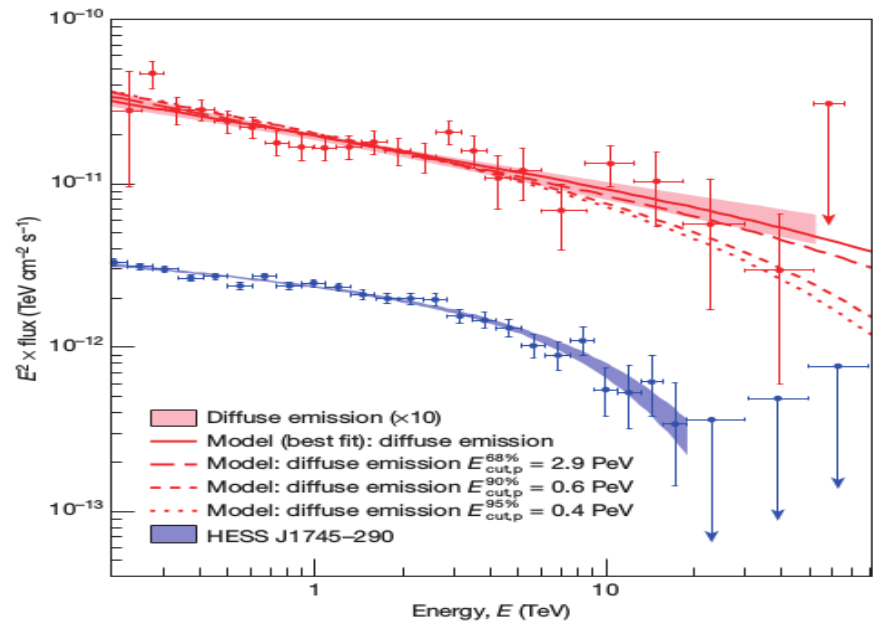
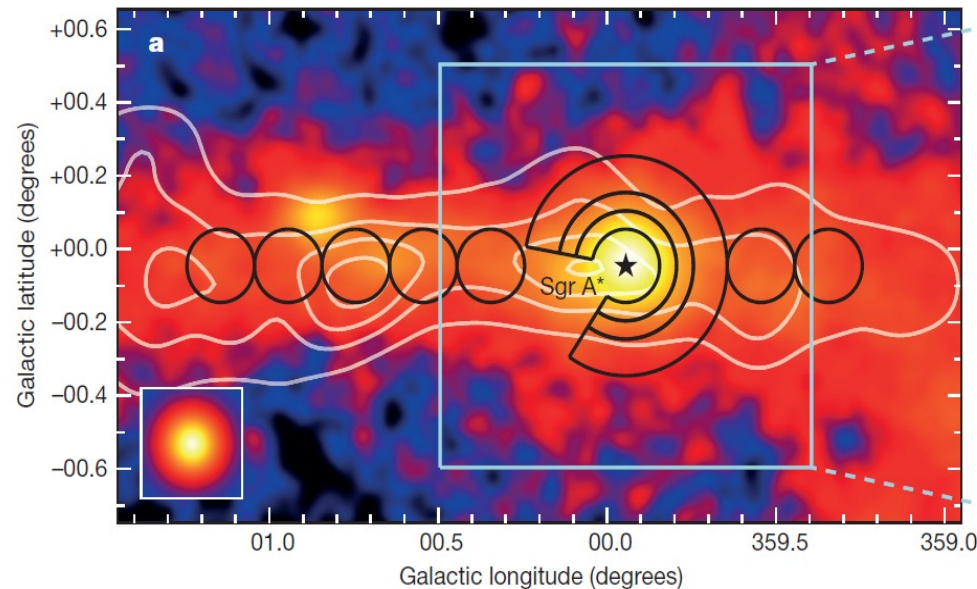
but still no evidence SNR = Pevatron

Pevatrons : Where ?

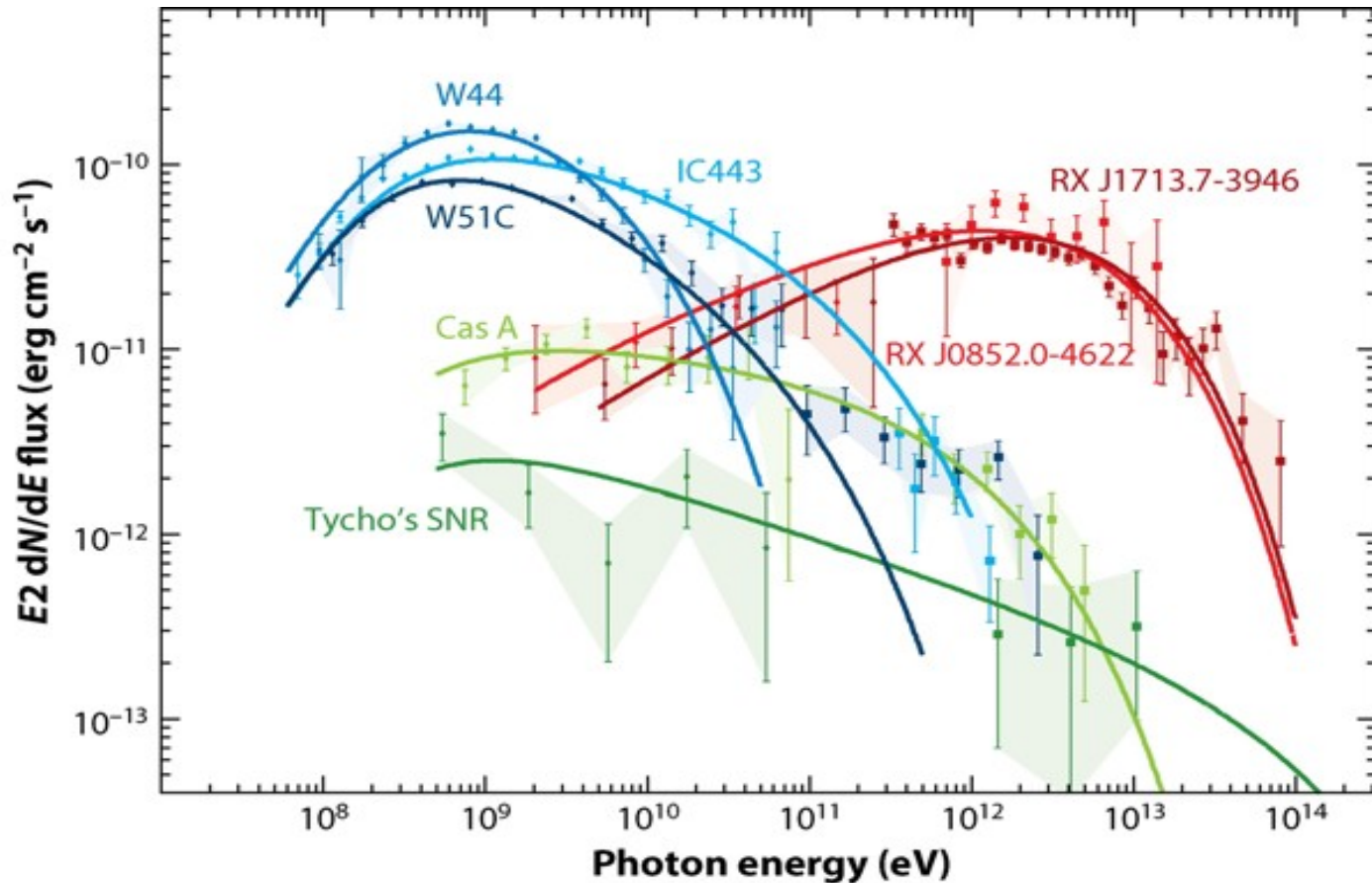
SN Remnants ? can accelerate of CRs !

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Galactic Center ? First Pevatron ? (HESS Coll., Nature 2016)

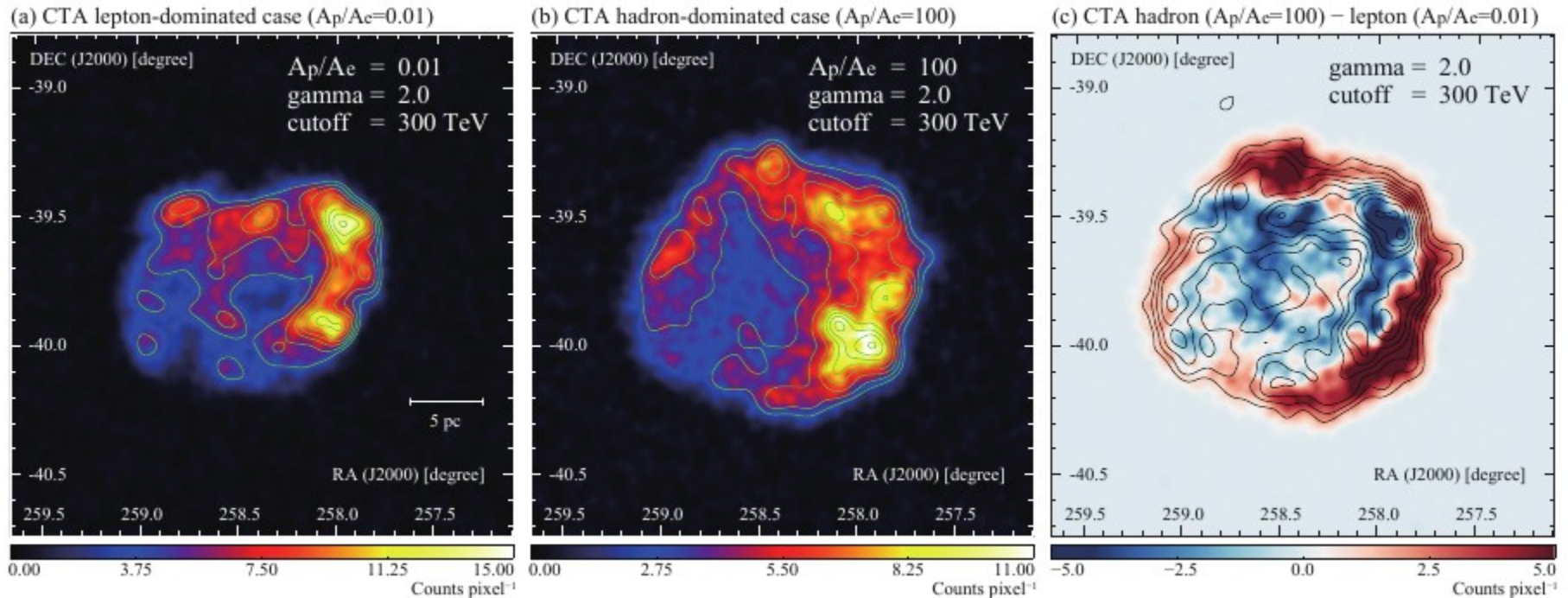


Pevatrons (SNRs) : who ?



Funk S. 2015.

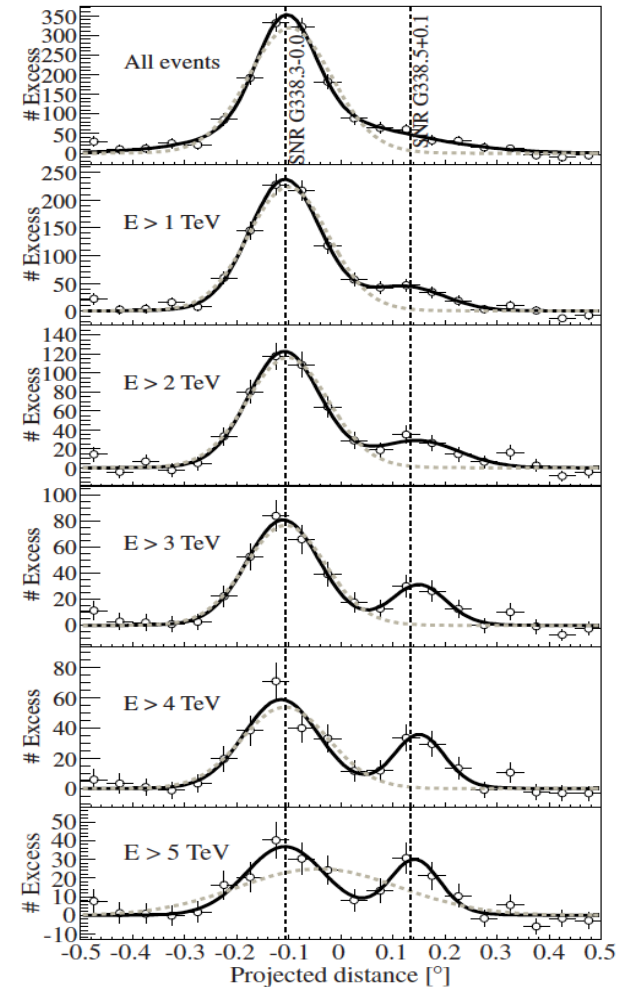
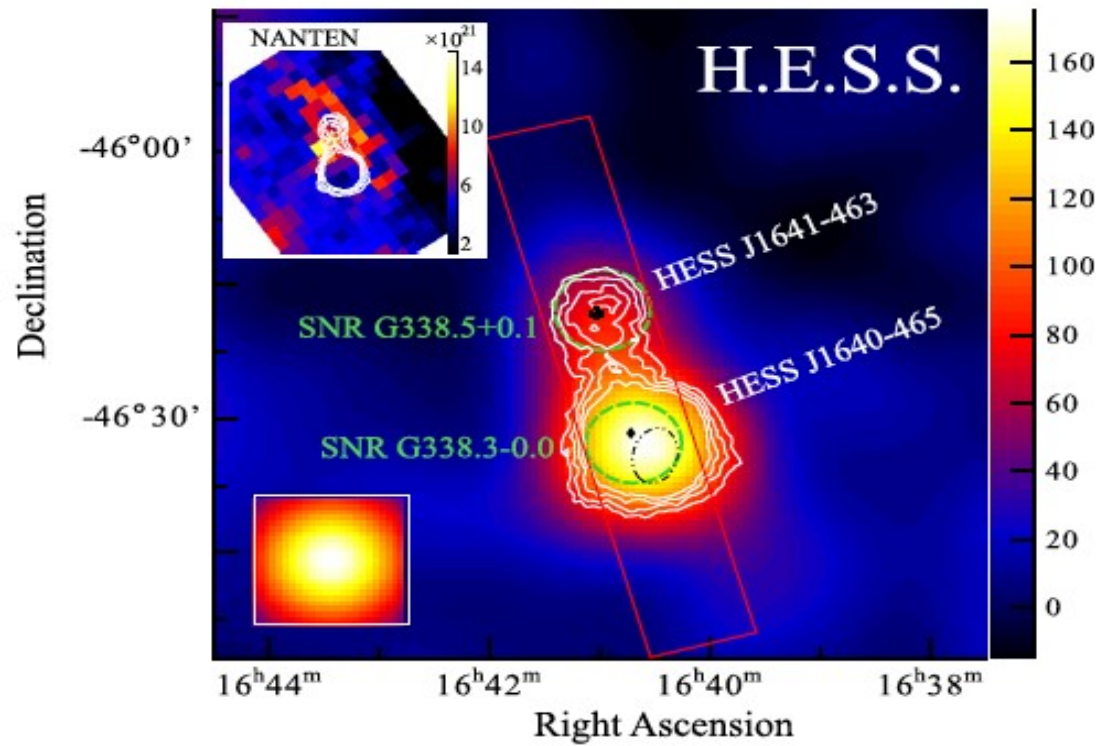
Annu. Rev. Nucl. Part. Sci. 65:245–77



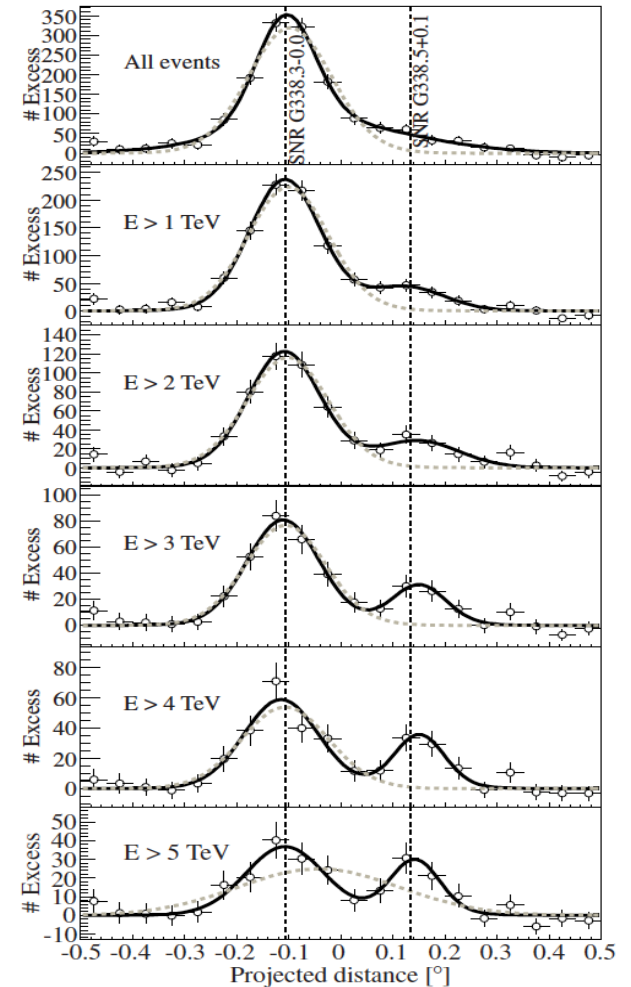
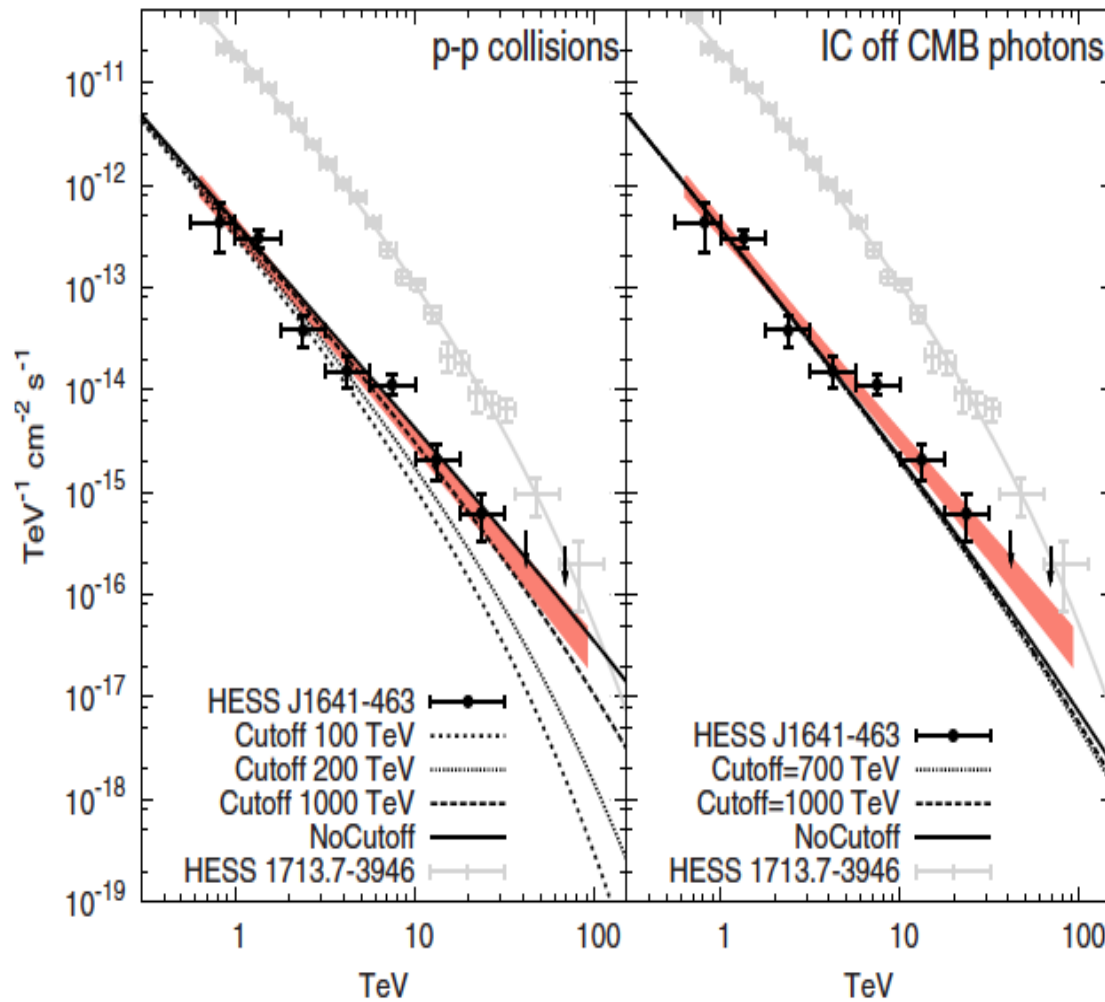
From : Prospects for cherenkov telescope array observations of the young supernova remnant RXJ1713.73946. The Astrophysical Journal, 840, 2, 74

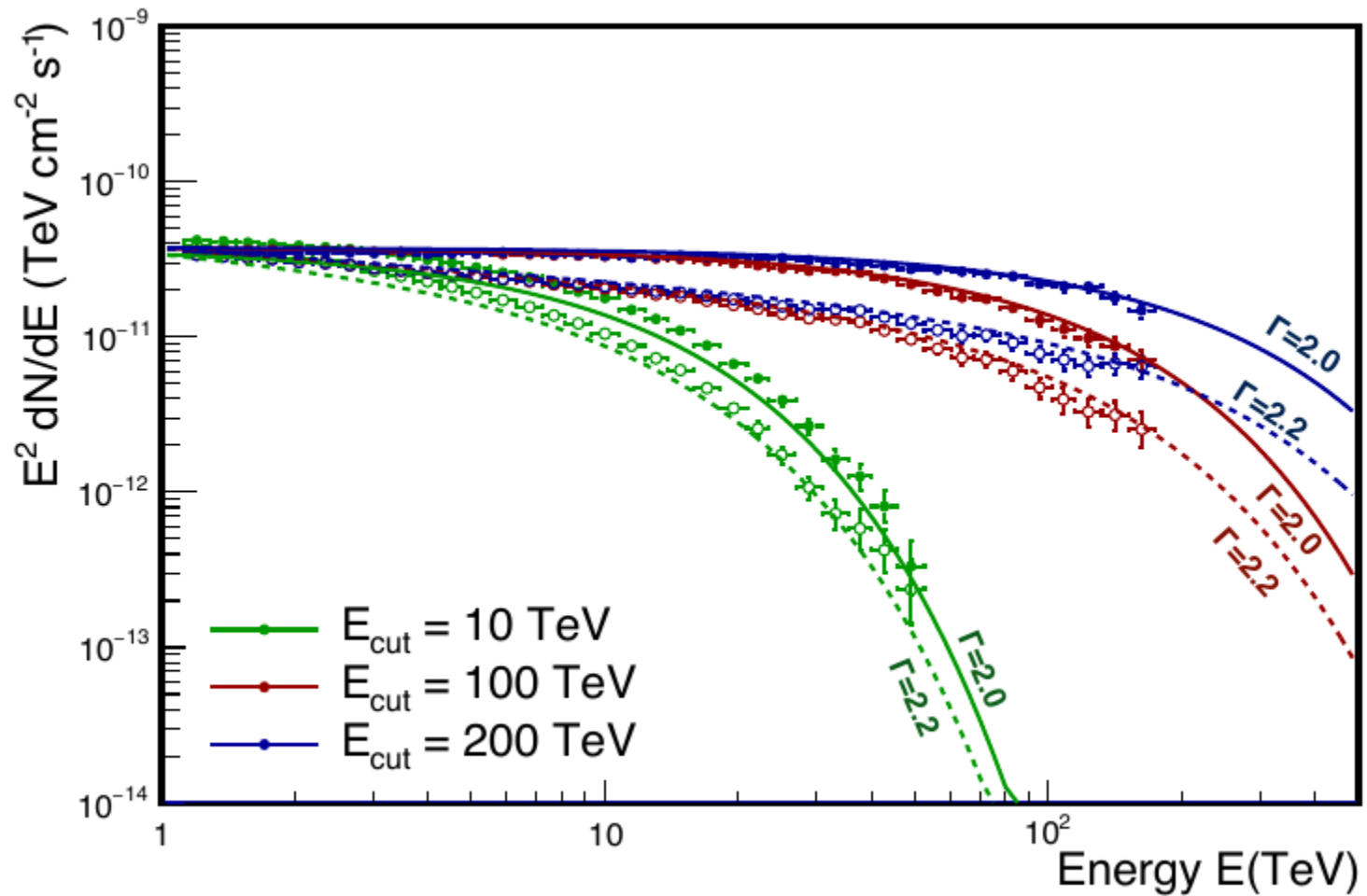
PEVATRONS – HESS J1441-463?

Abramowski et al, 2014

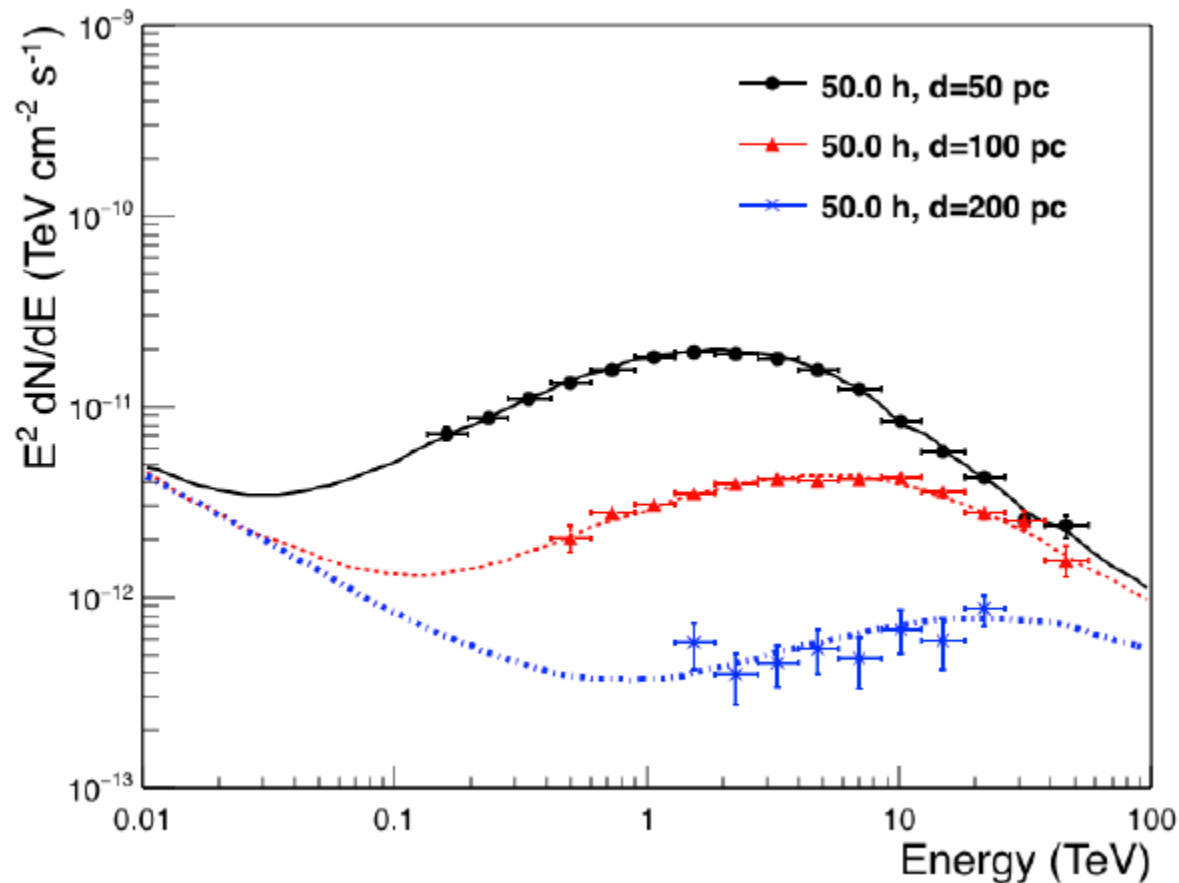


PEVATRONS





PEVATRONS – DARK ACCELERATORS



THANKS !