

# Science with the Southern Gamma Ray Survey Observatory

Fabian Schüssler on behalf of the SGSO Alliance

**SOUTHERN  
GAMMA-RAY  
SURVEY  
OBSERVATORY**

sgso-alliance.org

## The Southern Gamma Survey Observatory (SGSO)

### Next generation $\gamma$ -ray observatory

- Wide-FoV particle detector array with  $\sim 100\%$  duty-cycle
- High-altitude site on Southern Hemisphere
- Energy range: 100GeV to 100TeV
- Complementary to HAWC/LHAASO and CTA



Feel free to join the SGSO Alliance at [sgso-alliance.org](http://sgso-alliance.org)

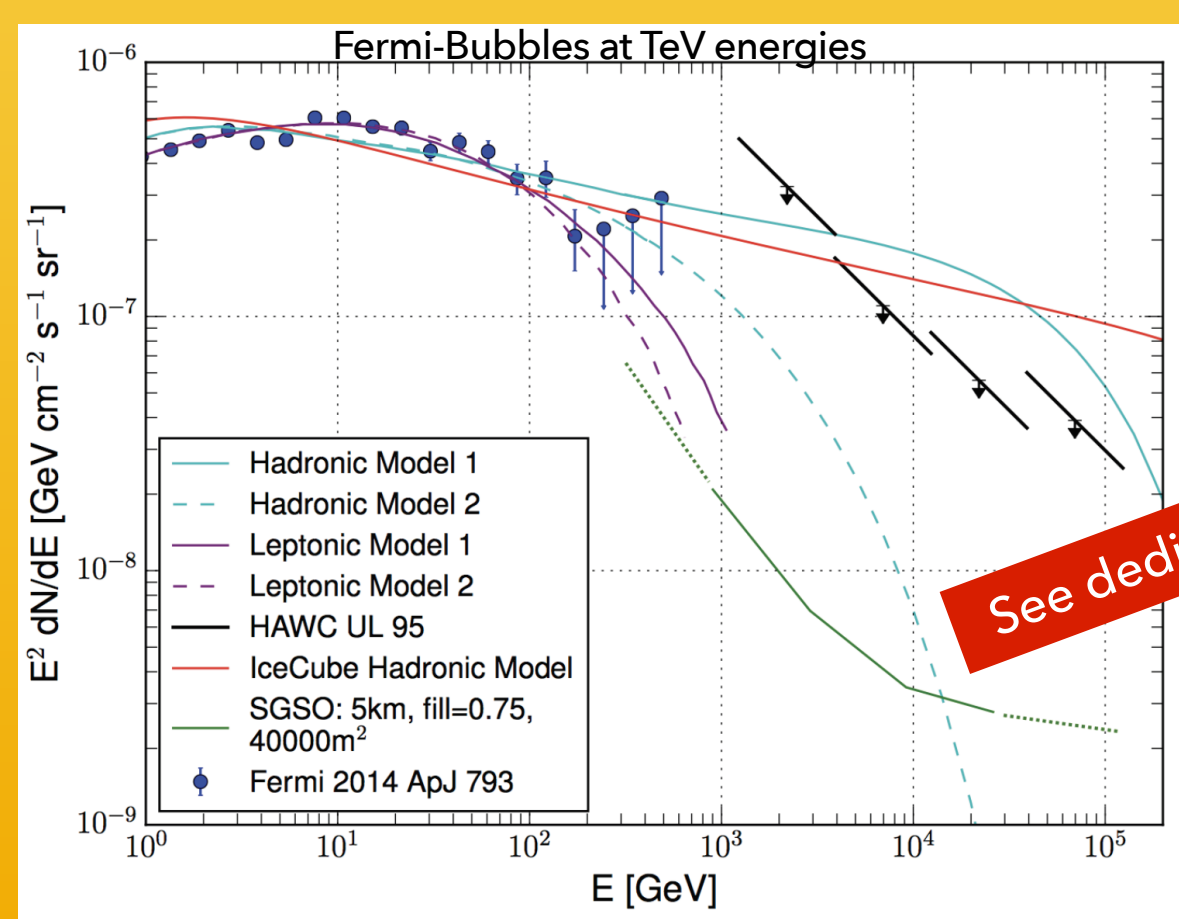
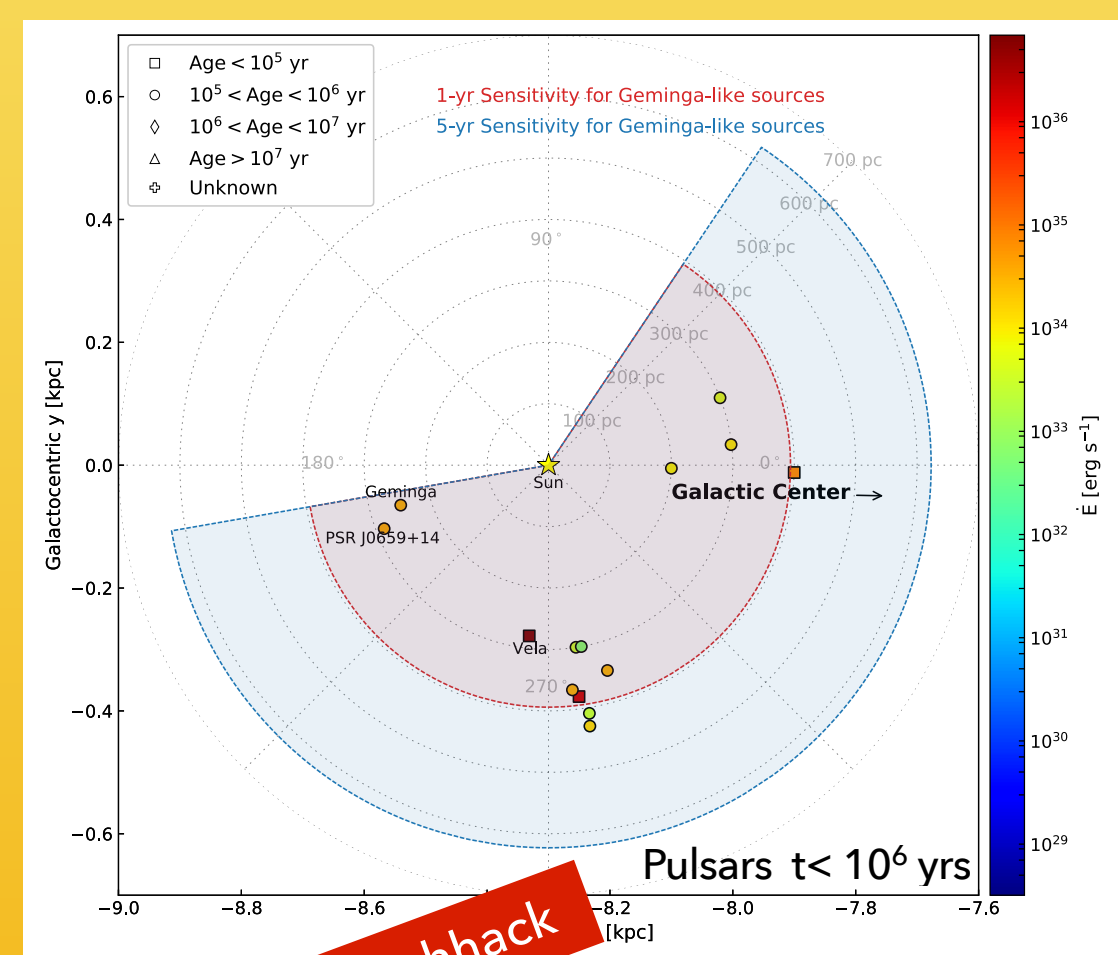
### The SGSO Alliance

- [sgso-alliance.org](http://sgso-alliance.org)
- Group of ( $\sim 85$ ) scientists interested in the development of a next generation gamma-ray observatory in the Southern hemisphere
- Various sites and detector designs being studied in parallel
- Prototyping of detector stations in progress
- White paper on the science case in preparation (summary here)

## The Science of SGSO

### Galactic particle accelerators

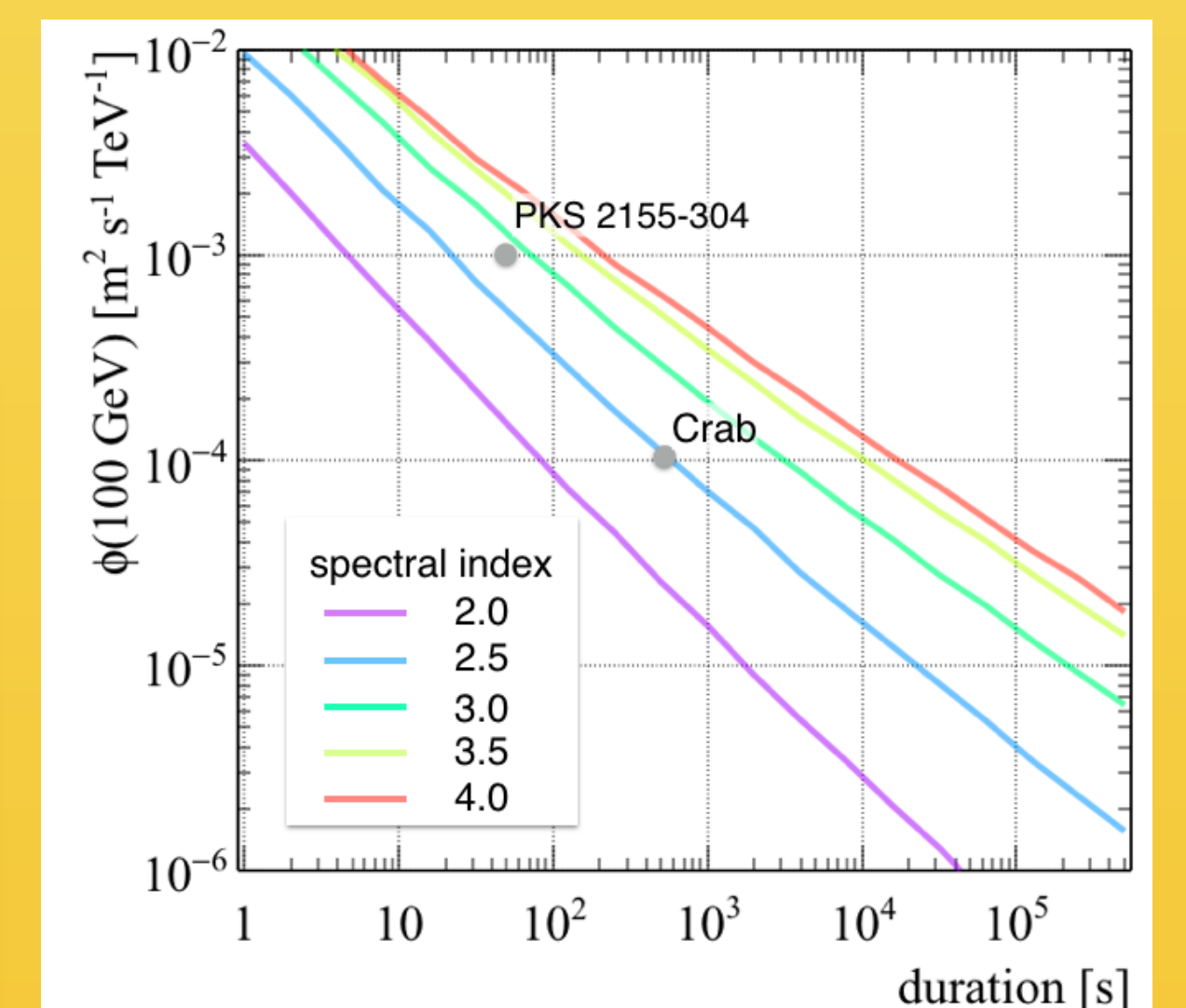
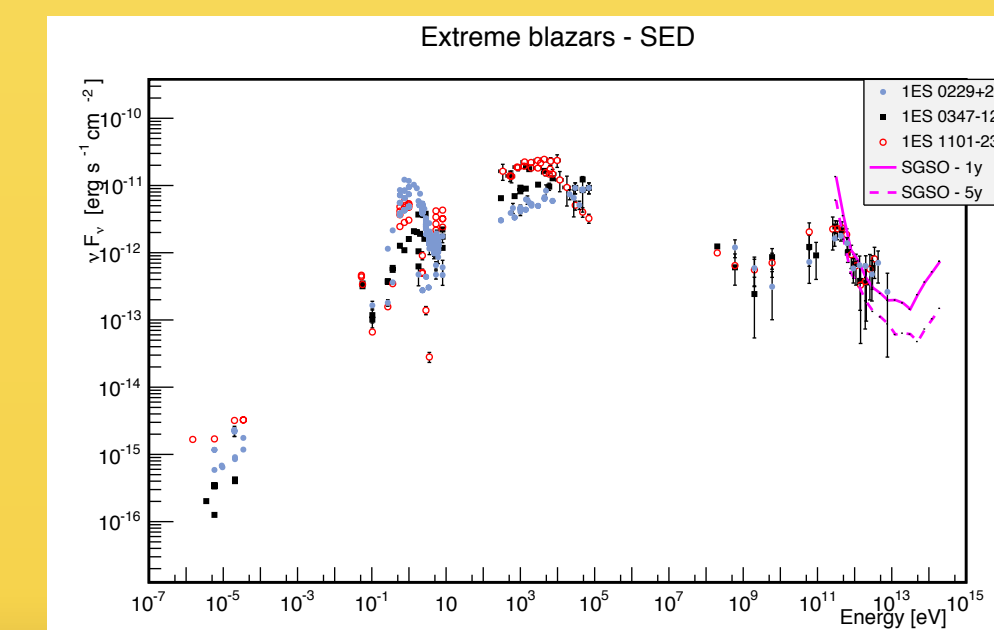
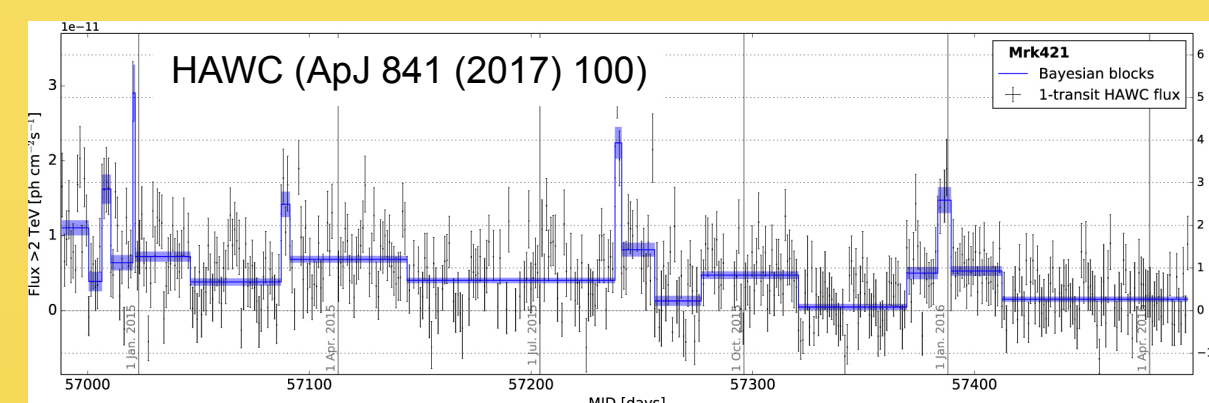
- Pulsars constraining local  $e^+$  flux
- Extended sources: Fermi-Bubbles
- Deep survey for Pevatrons
- Monitoring of variable sources



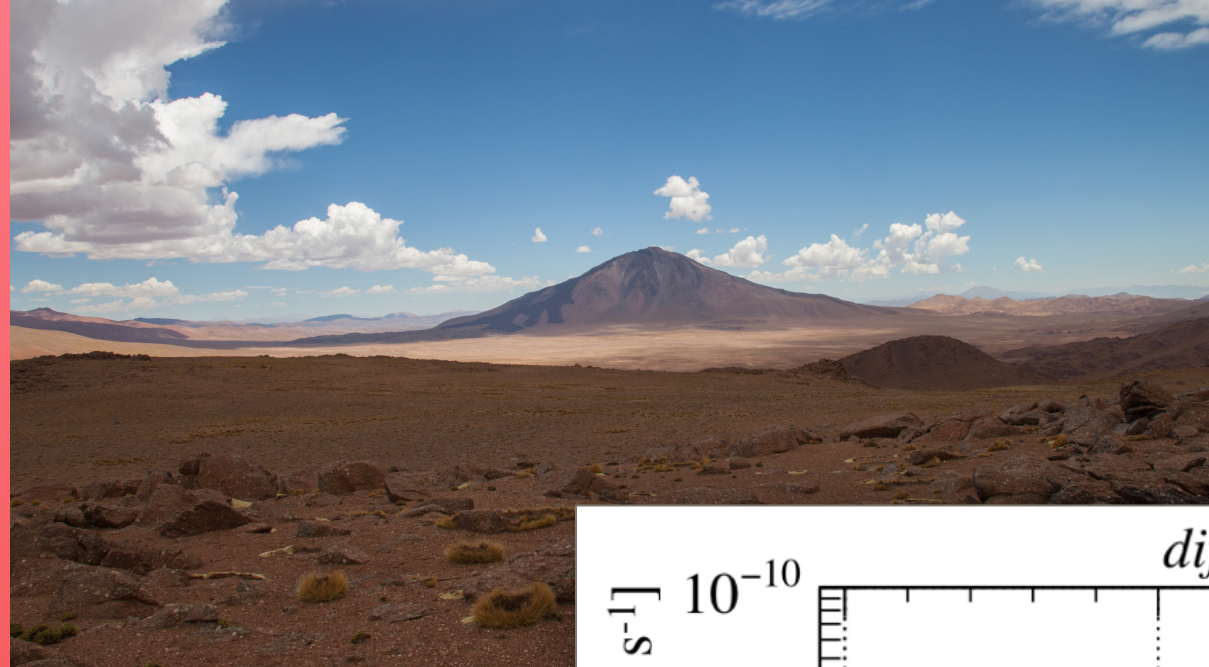
See dedicated poster by H. Fleischhack

### Monitoring the Transient Sky

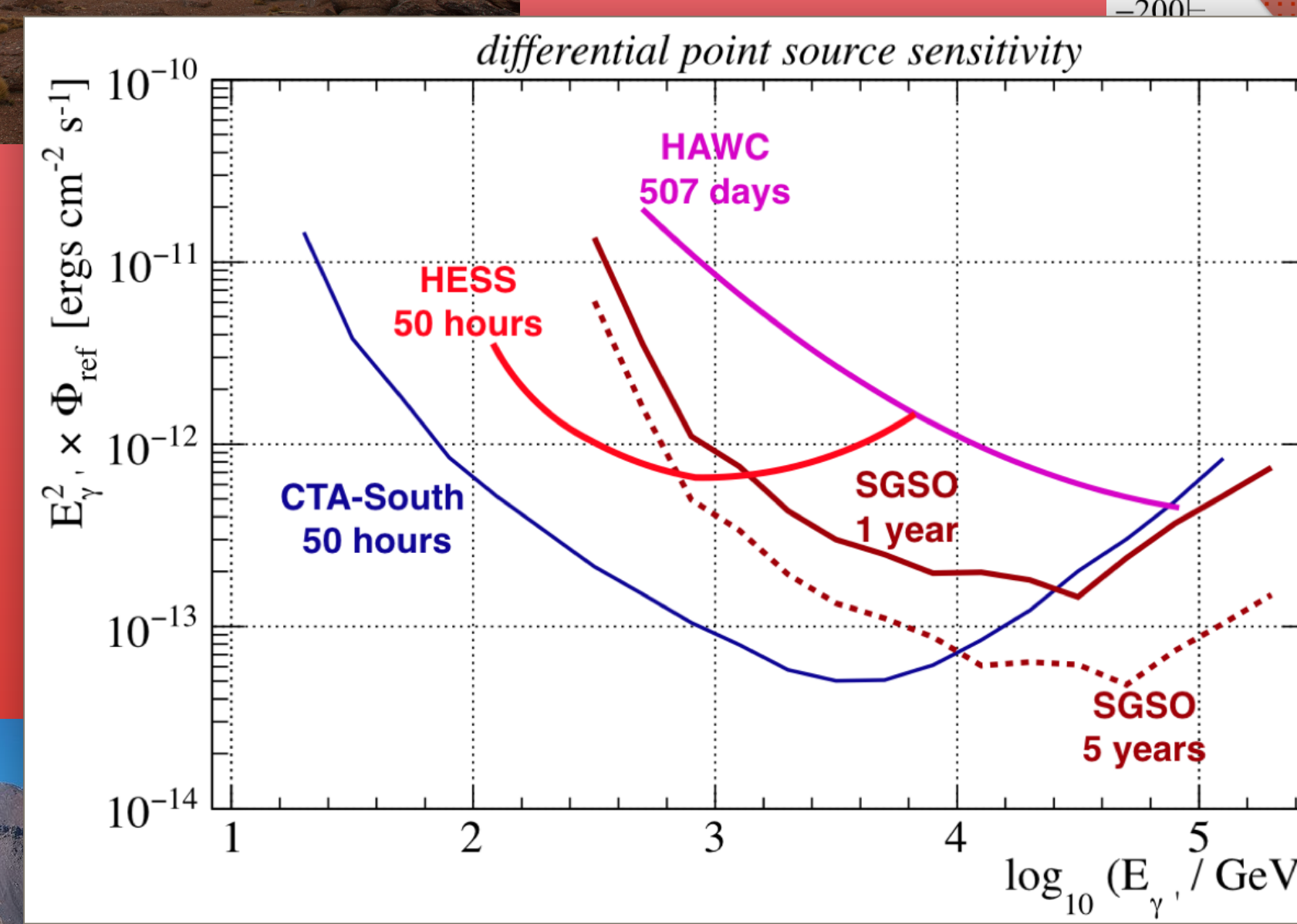
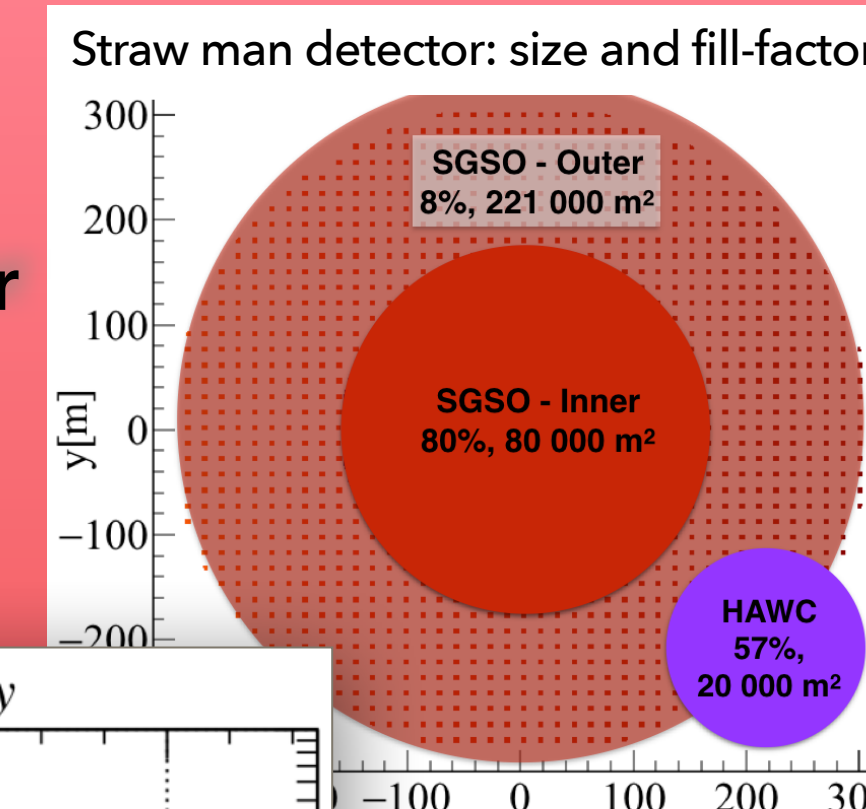
- Daily monitoring of AGNs
- long-term LCs for O(10) sources
- LC(min) for brightest flares
- alerts to the community (e.g. CTA)
- Access to Extreme HBLs
- GRBs + Gravitational waves
- High-energy neutrinos



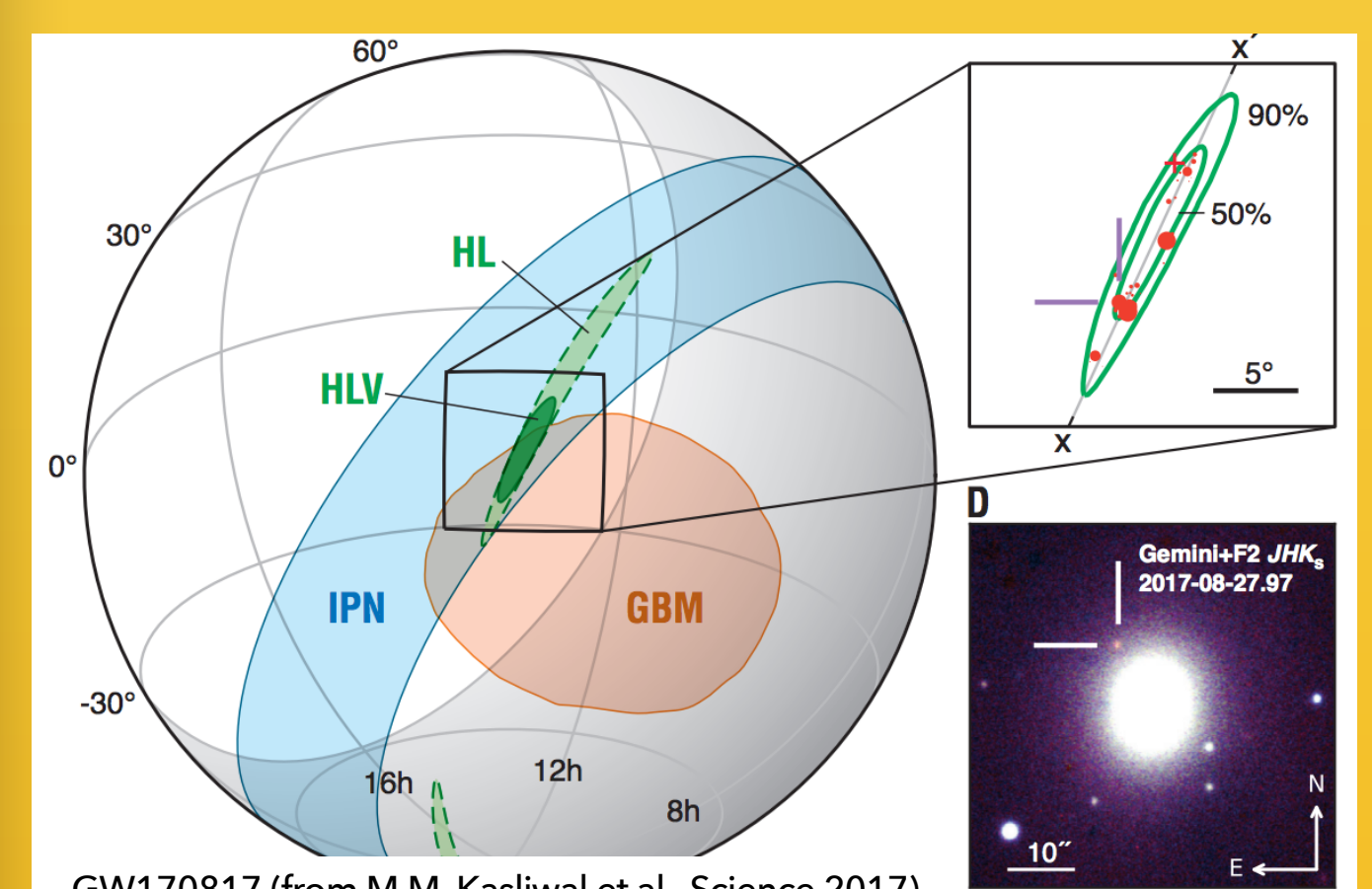
Potential SGSO site joint with JAMA+CUBIC (near San Antonio de los Cobres, Argentina)



### Straw man detector

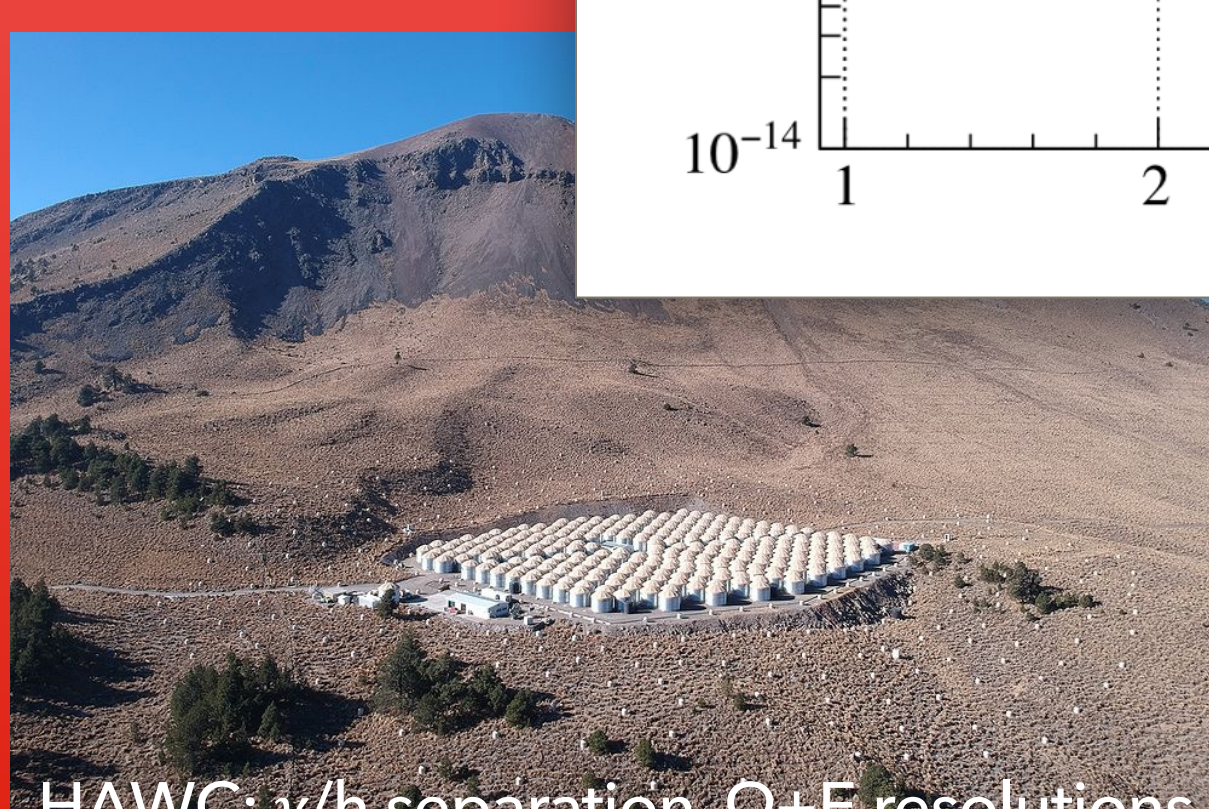
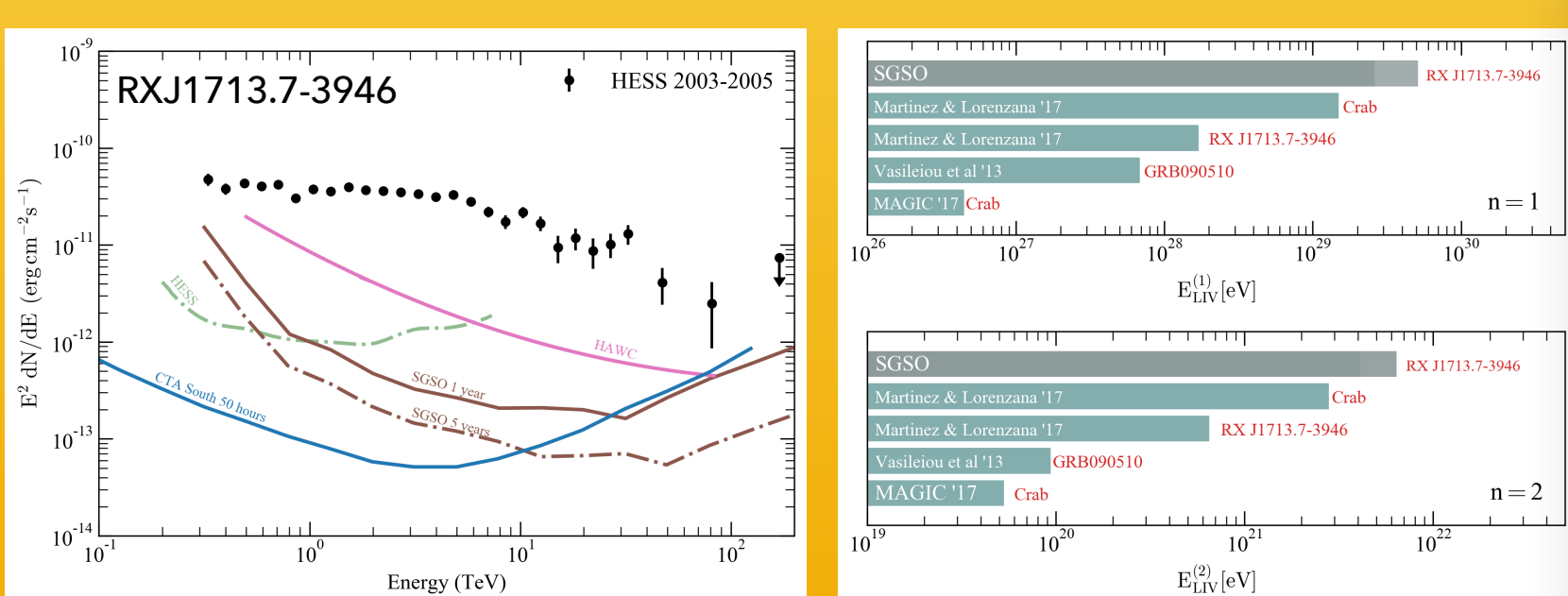


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### Physics beyond the SM

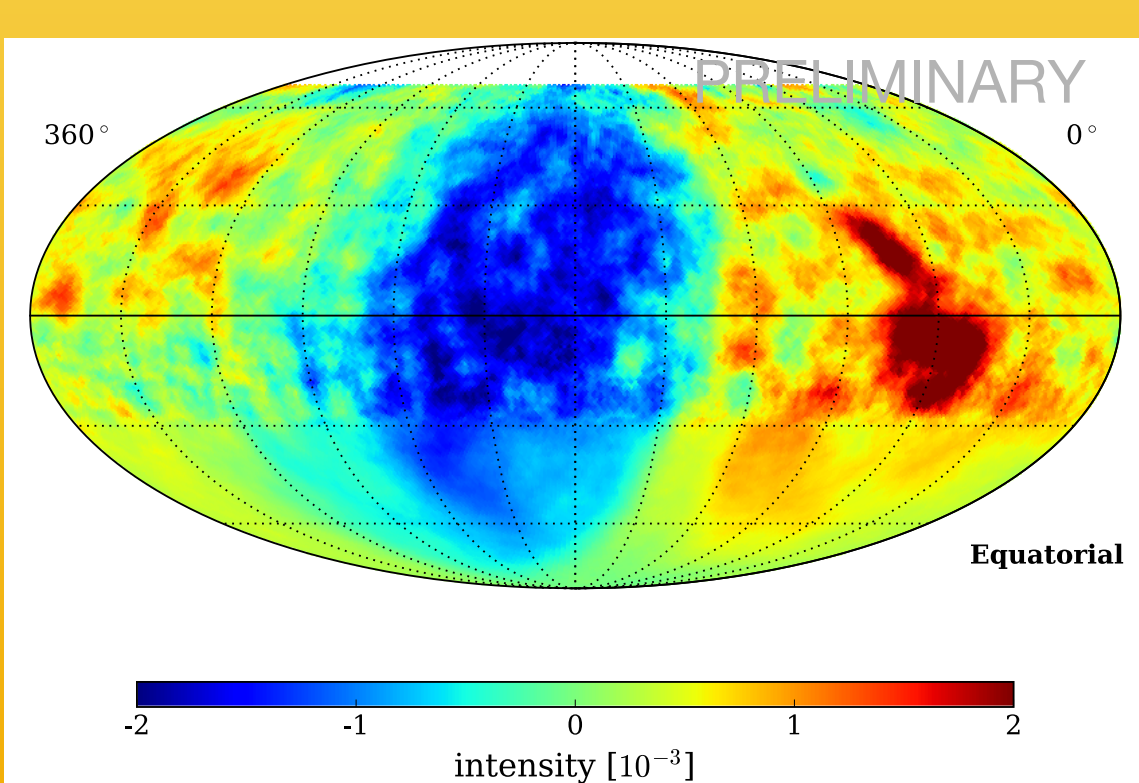
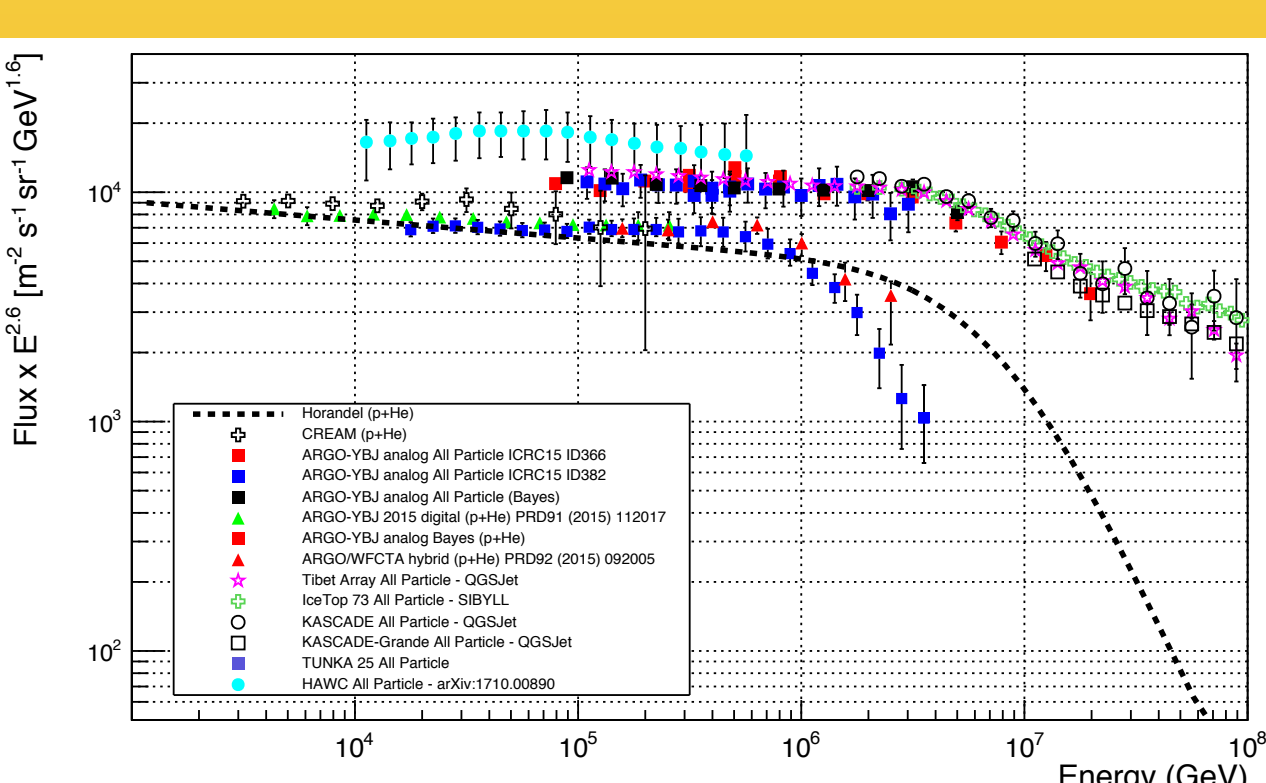
- Dark Matter
- Galactic Center
- dSph: many new candidates
- Lorentz Invariance Violation
- Reach to the highest  $\gamma$ -ray energies



HAWC:  $\gamma/h$  separation,  $\Omega$ +E resolutions

### Cosmic Rays

- Spectrum (CR + electrons)
- Mass composition + interaction model studies
- Anisotropies (CR + electrons)



11 days between IC-170922 and TeV flare of TXS 0506+056

