

The AGN Key Science Project with CTA0

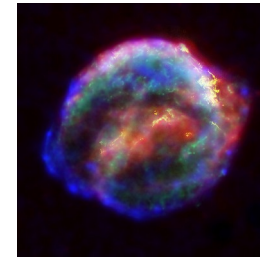
Discussion session – ASTROVIBE workshop

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CTAO AGN Key Science Project (KSP)

Connected to all CTAO science drivers

- Cosmic Particle Acceleration
 - How and where are pparticles accelerated?
 - How do they propagate?
 - What is their impact on the environment?
- Probing Extreme Environments
 - Processes close to neutron stars and black holes
 - Processes in relativistic jets, winds and explosions
 - Exploring cosmic voids
- Physics frontiers – beyond the Standard Model
 - What is the nature of Dark Matter? How is it distributed?
 - Is the speed of light a constant for high-energy photons?
 - Do axion-like axion like particles exist?



See also:
[CTA consortium \(2019\)](#)

CTAO AGN Key Science Project (KSP)

Programme	total N [h]	total S [h]	duration [yr]	observation mode
Long-term monitoring	1110	390	10 †	full array
AGN flares				
snapshots	1200	475	10 *	LSTs
snapshots	138	68	10 *	MSTs (assuming 10 sub-arrays)
verification ext. trig.	300	150	10 *	LSTs or MST sub-arrays
follow-up of triggers	725	475	10 *	full array
High-quality spectra				
redshift sample	195	135	3	full array
M 87 and Cen A	100	150	3	full array

Table 12.3 – Summary of required observing times for the northern site (“N”) and the southern site (“S”) for the different parts of the observation programme. The total duration of each programme is given in the fourth column, where a “*” (“†”) indicates a reduction of the yearly exposure time after 2 (5) years.

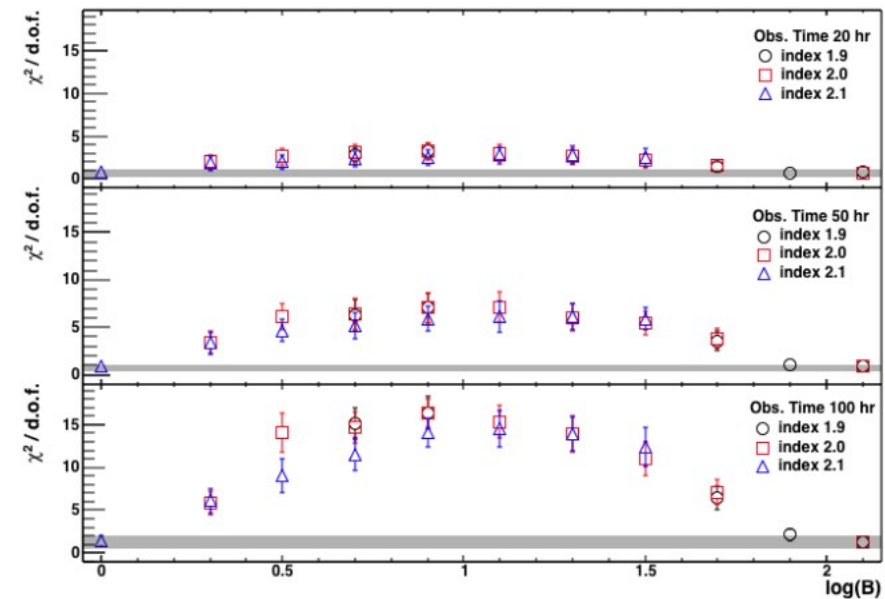
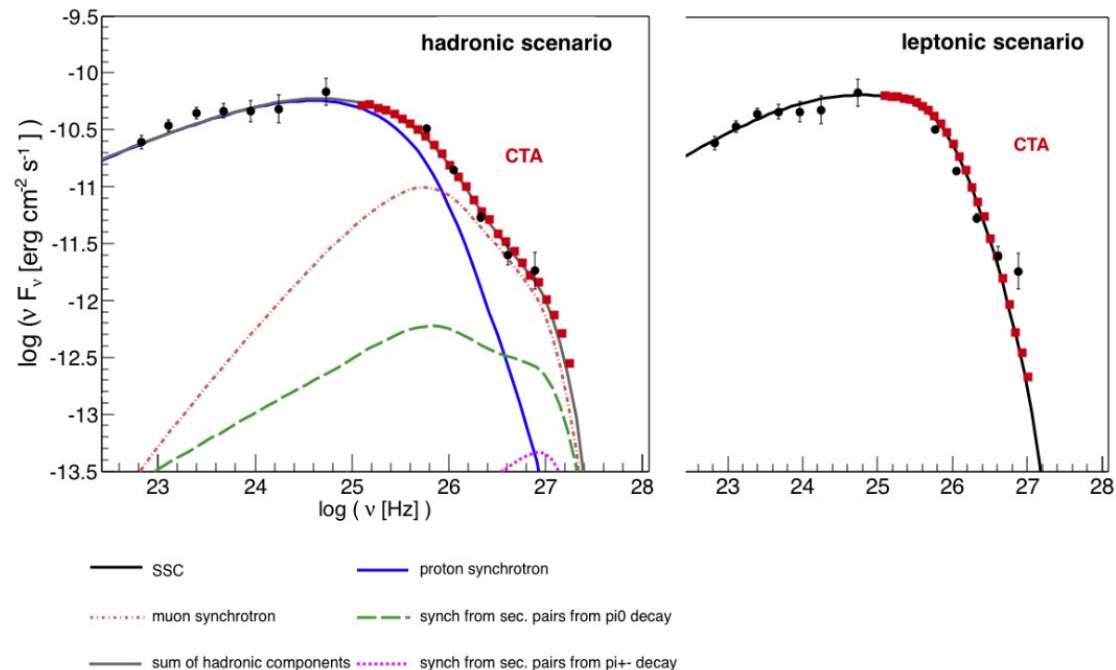


See also:
[CTA consortium \(2019\)](#)

Nature of γ -ray emitting particles in AGN

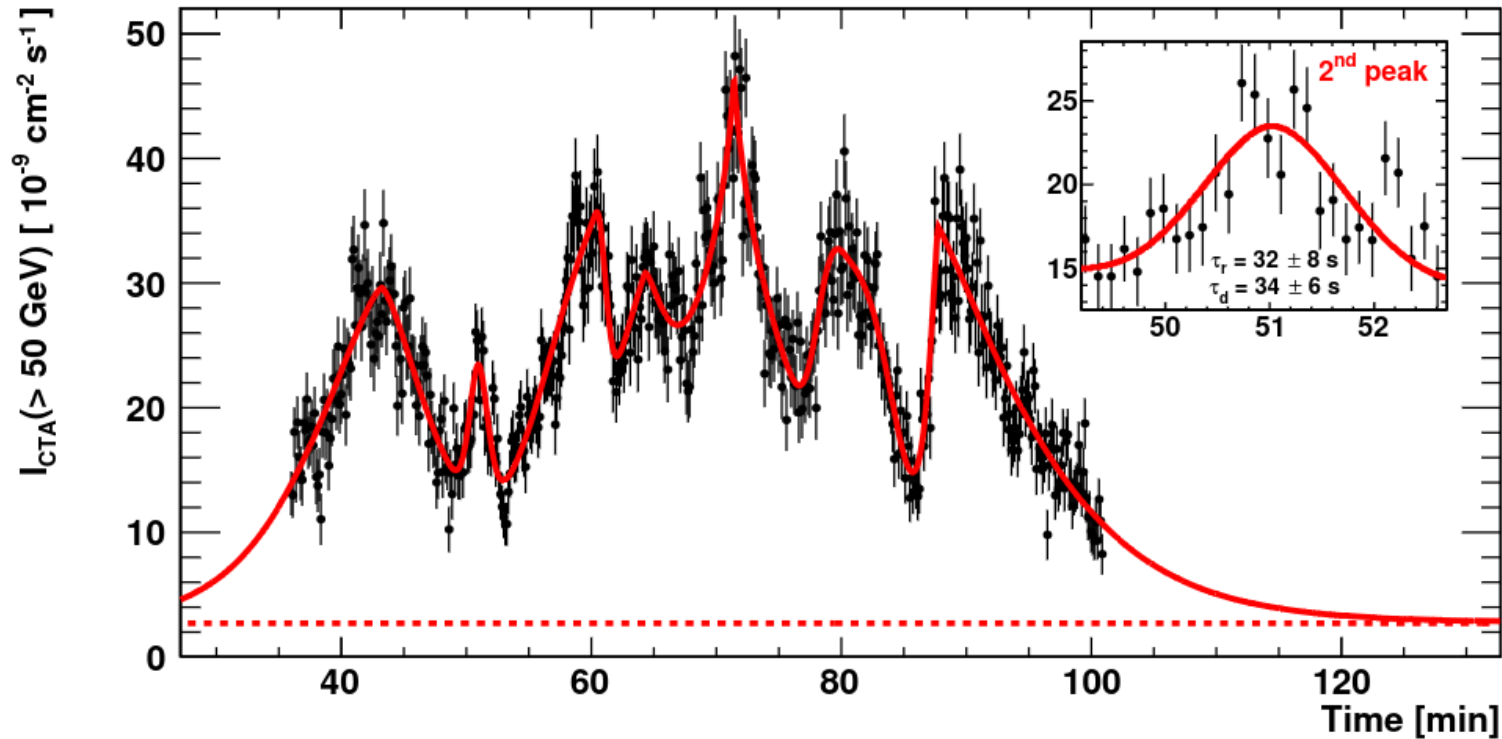
High quality spectra

- Zech et al. (2017)



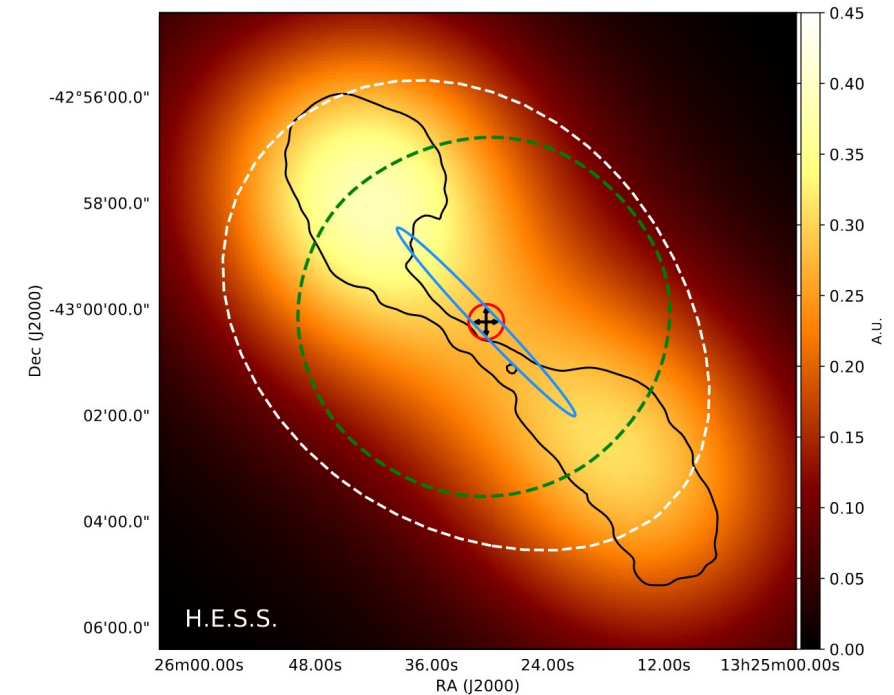
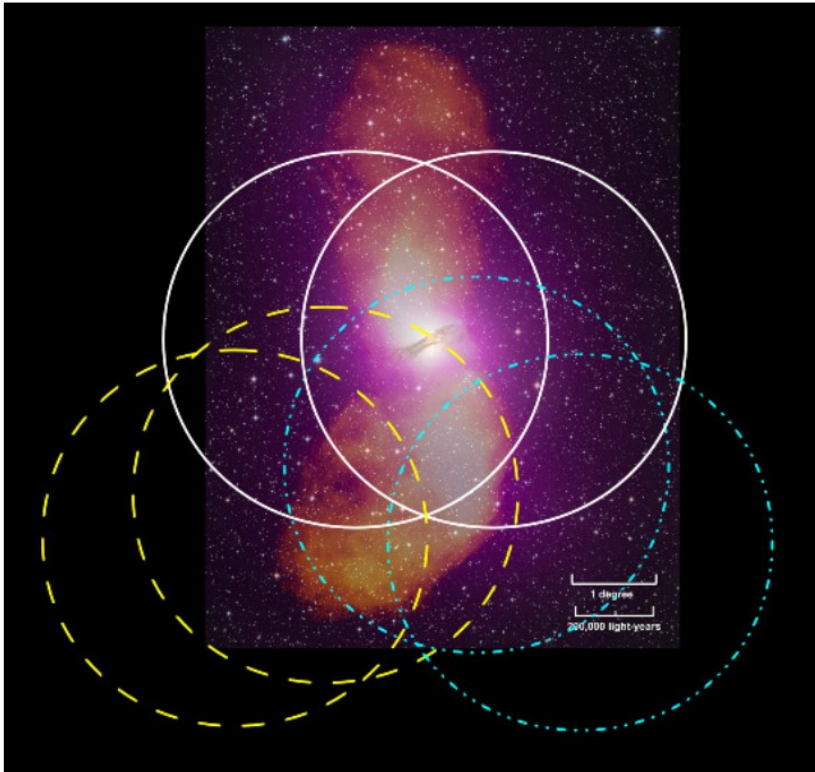
AGN variability

- Long-term monitoring & AGN flares
- See session “AGN fast variability modelling” from yesterday



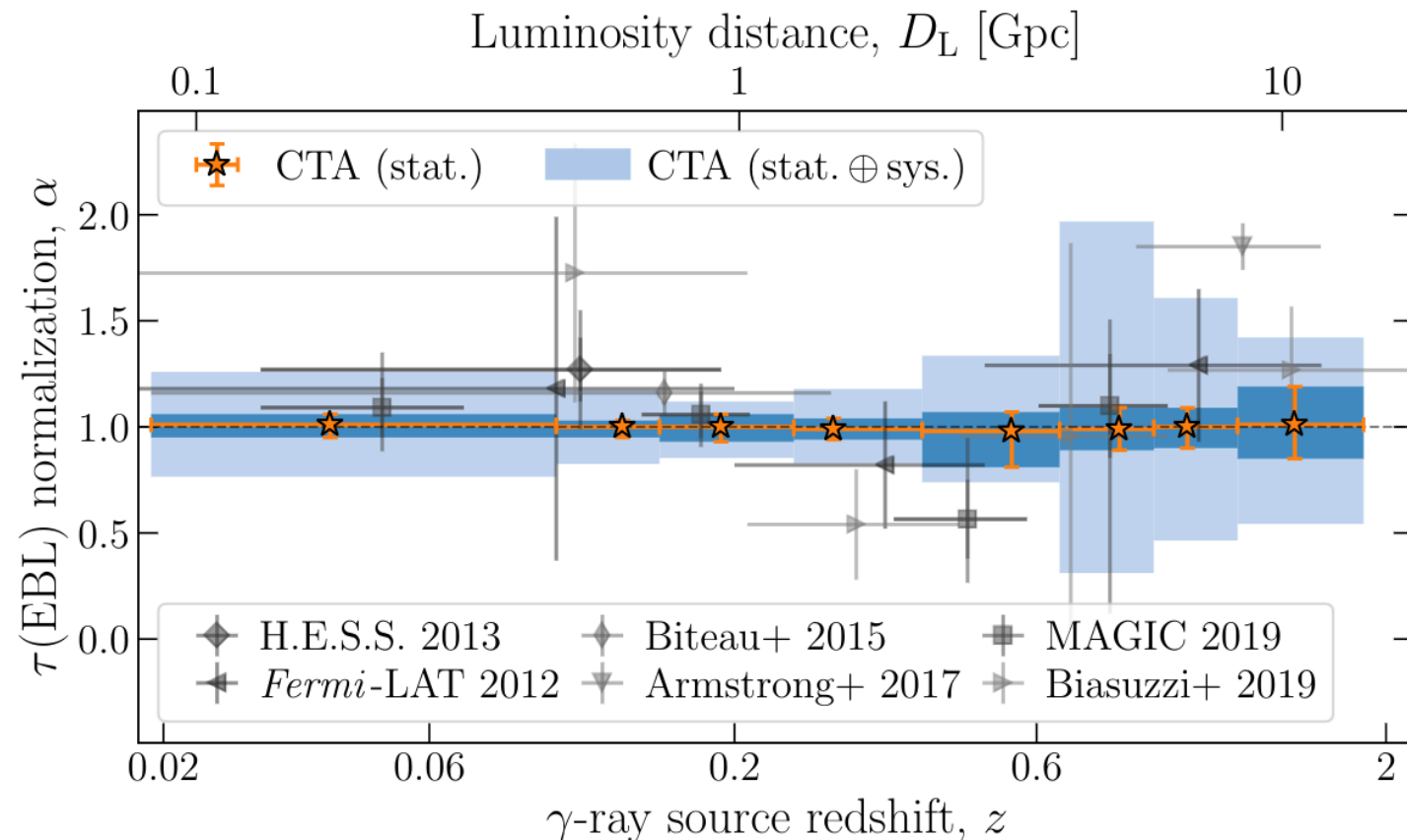
Localization of acceleration zone in AGN jets

- Mini-survey of Cen A & M 87
- Resolve relativistic jets (cf. also [H.E.S.S., 2020](#))



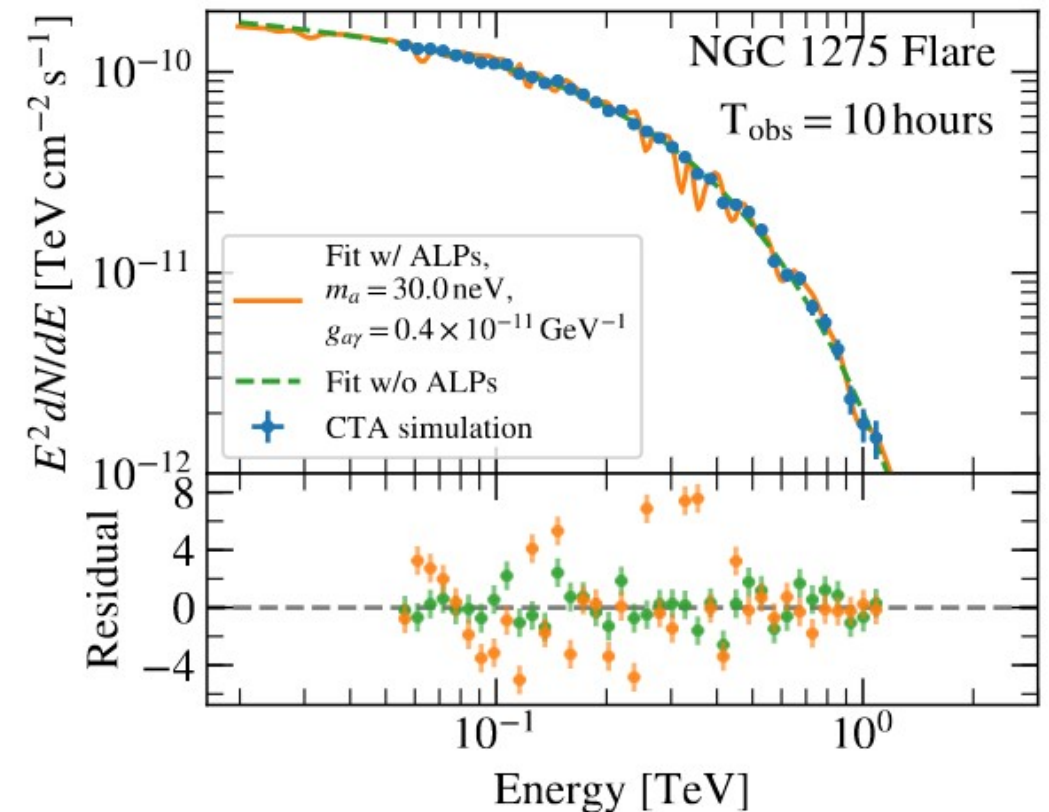
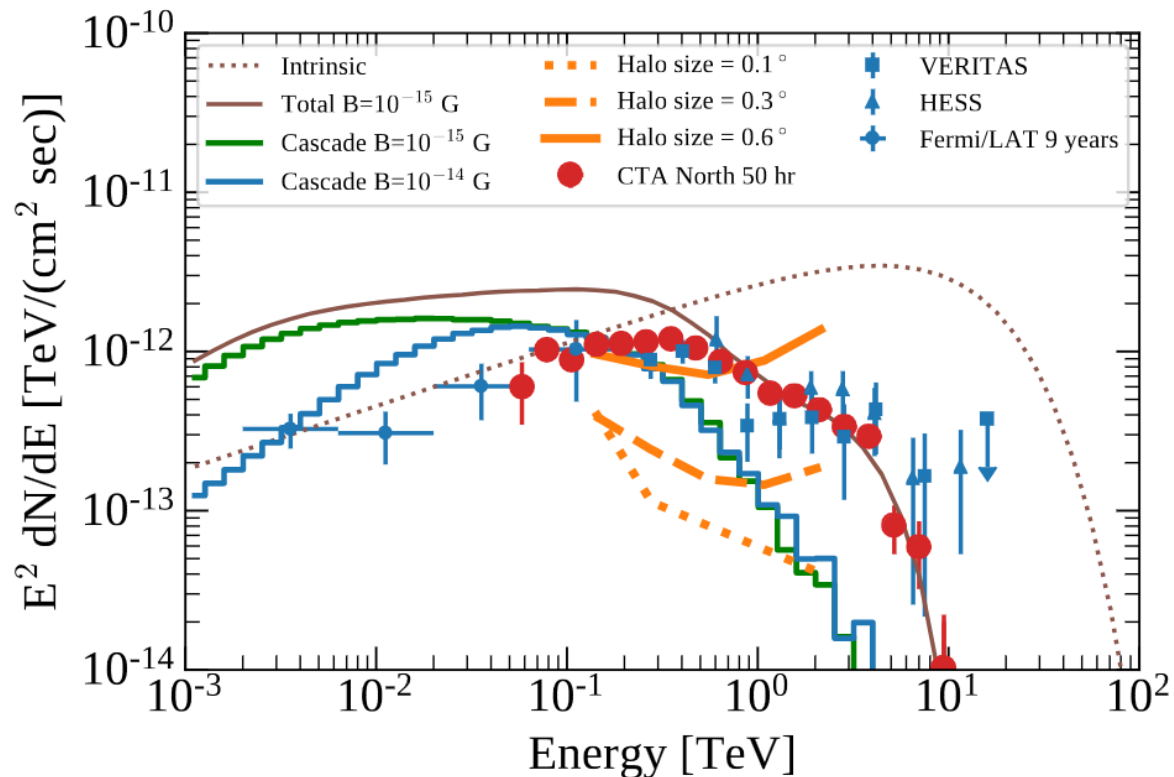
Sensitivity of the Cherenkov Telescope Array for probing cosmology and fundamental physics with gamma-ray propagation aka “ γ -propa paper”

- EBL, IGMF through pair haloes, LIV, axion-like particles, ...
- Abdalla et al. (2021)



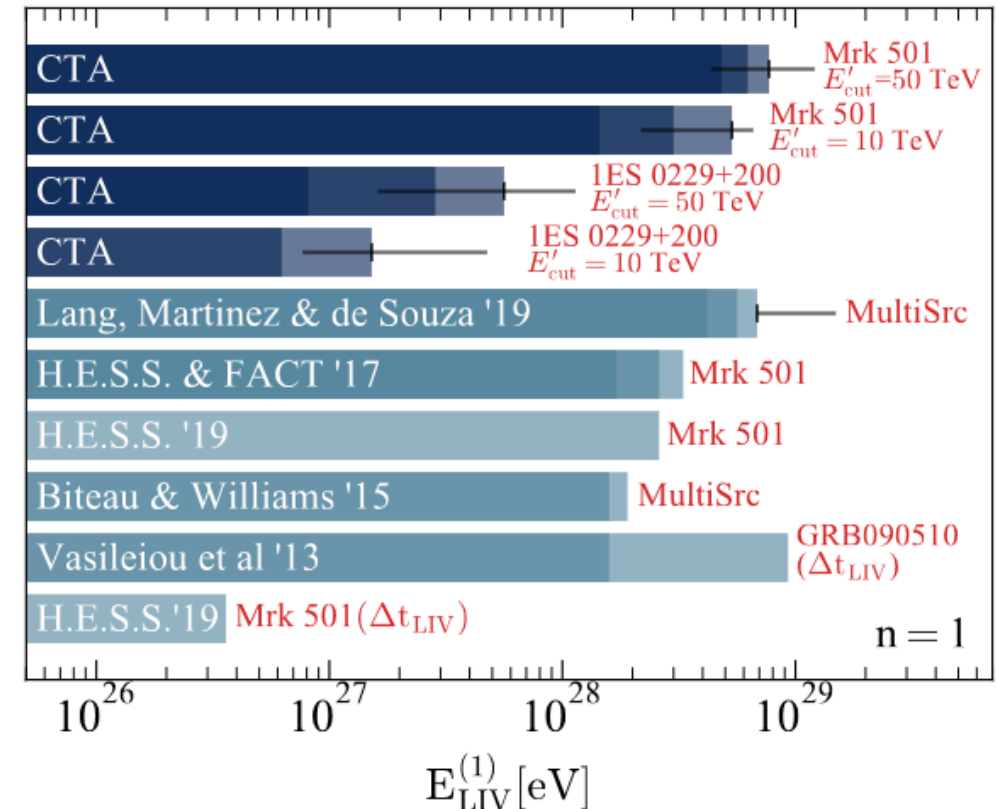
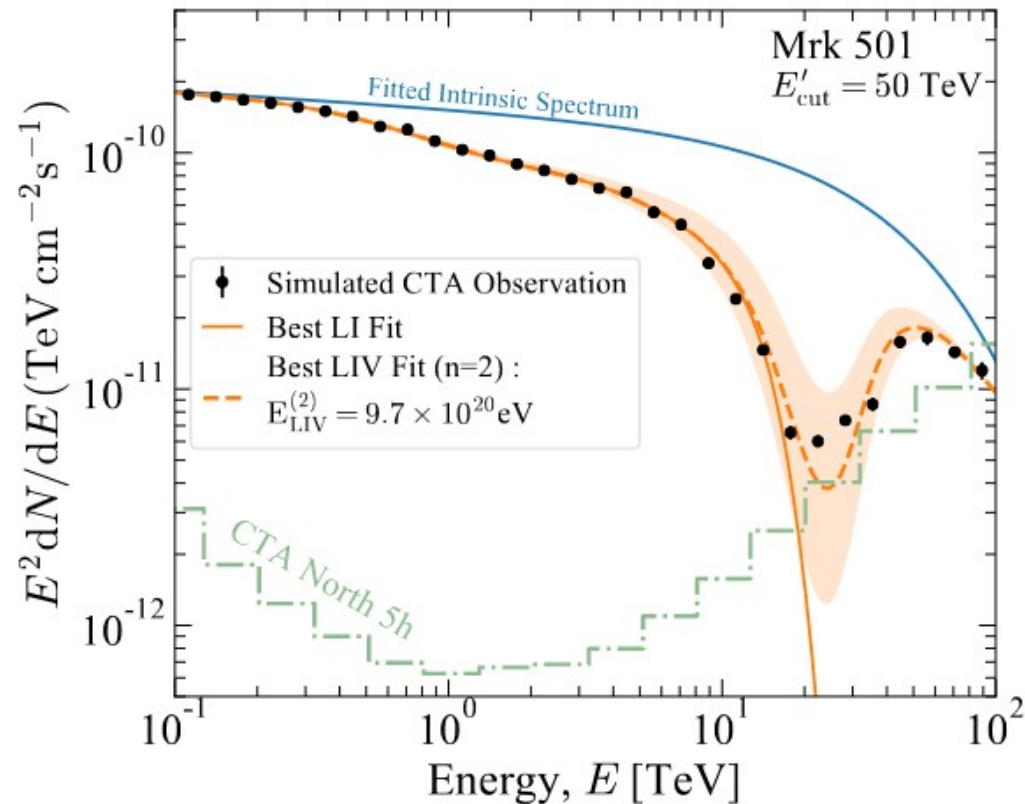
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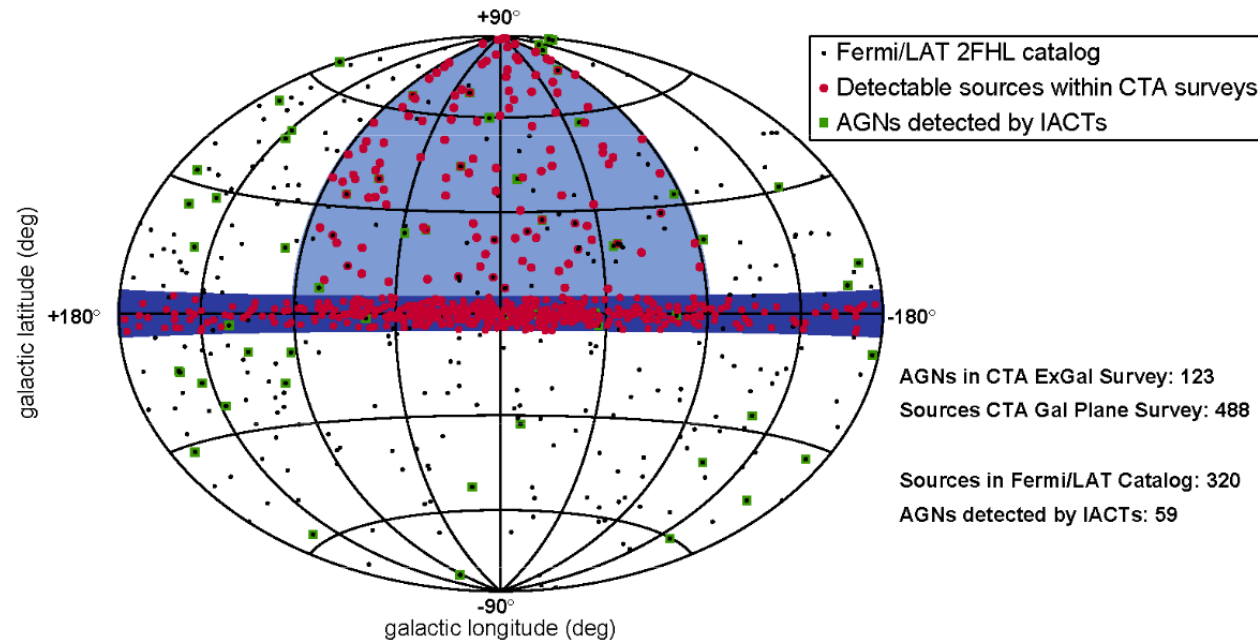


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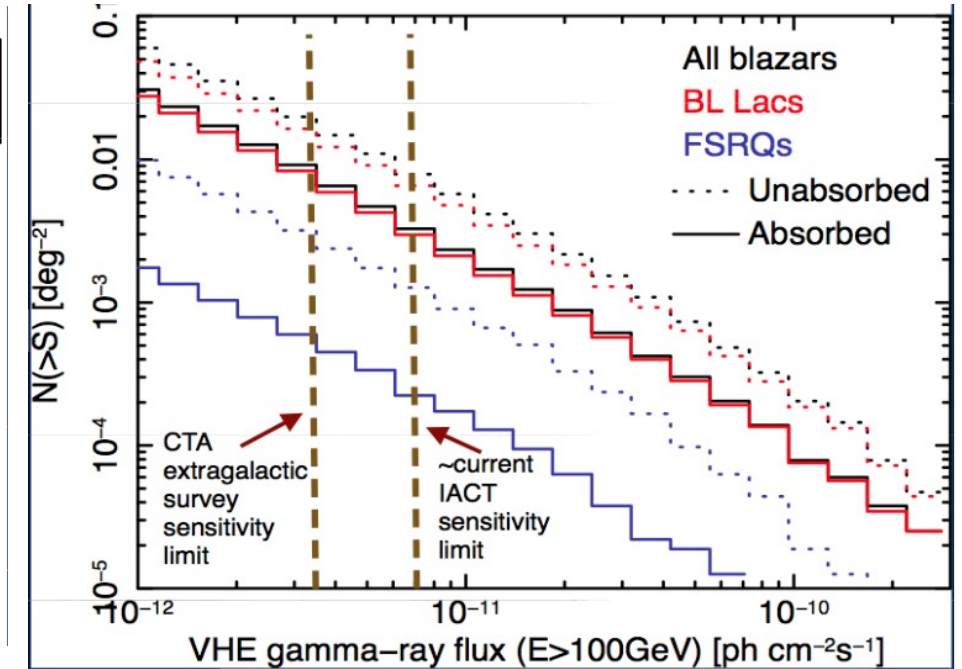
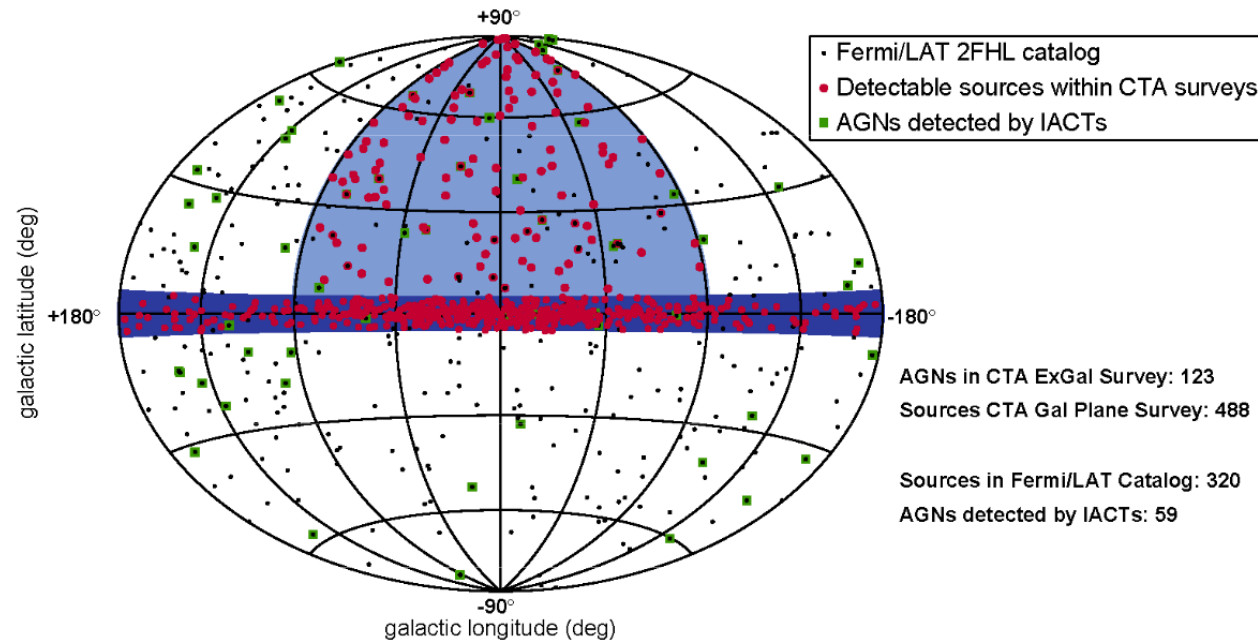


Extragalactic survey



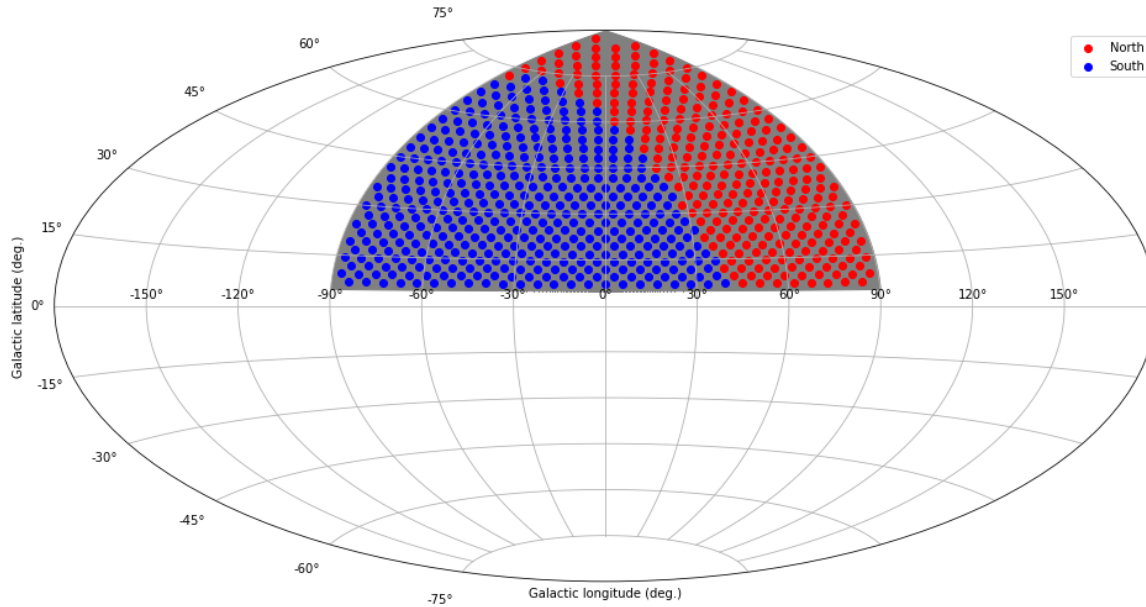
- Survey of $\frac{1}{4}$ sky to limiting sensitivity of ~ 6 mCrab.
- Unbiased determination of blazar luminosity function
- Unbiased view of VHE AGN duty cycle
- Wide-survey \rightarrow transients & unexpected !

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Extragalactic survey



400h N

600h S

- Survey of $\frac{1}{4}$ sky to limiting sensitivity of ~ 6 mCrab.
- Unbiased determination of blazar luminosity function
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- Wide-survey \rightarrow transients & unexpected !

Thank you