STeVECat, the Spectral TeV Extragalactic Catalog

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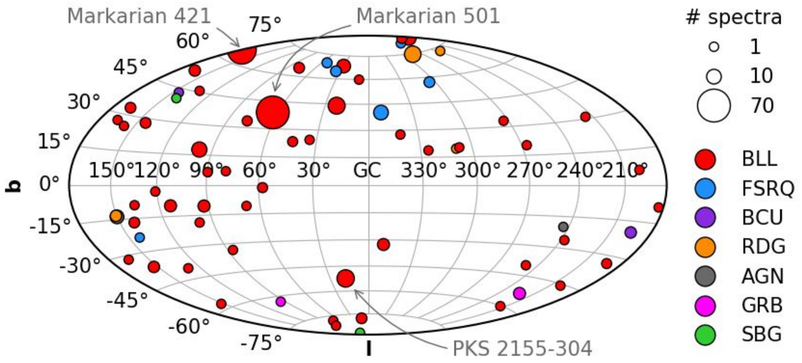
γ 2022
7th Heidelberg International Symposium on
High Energy Gamma-Ray Astronomy
Barcelona, July 4-8 2022

The three main collaborations operating the current generation of imaging atmospheric Cherenkov telescopes (H.E.S.S., MAGIC, VERITAS) publish their gamma-ray data in different formats and repositories. Extragalactic sources are highly variable at very-high energies (VHE, E>100 GeV), and a unified repository would enable joint analyses of collections of extragalactic VHE spectra. To this aim, we have developed the Spectral TeV Extragalactic Catalog, **STeVECat**, which gathers high-level products of VHE observations from 1992 to 2021.

STeVECat data collection

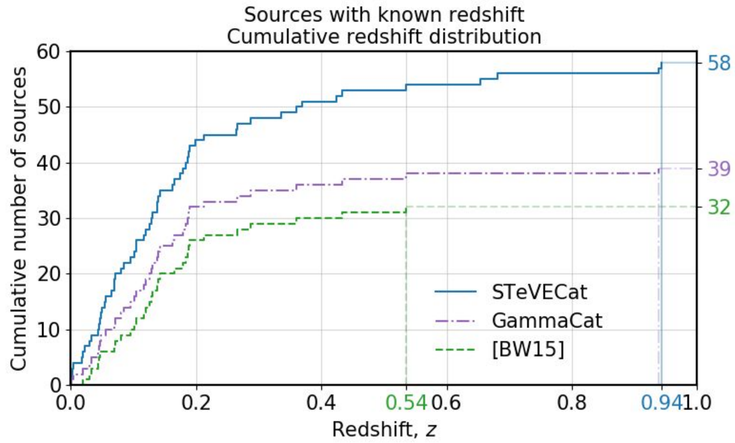
- All papers from TeVCat[a] with **at least two spectral points**: data from **270 journal publications** (previous catalog, [BW15]: 72 publications). Currently **366 spectra from 70 sources**.
- In case of redundant data across publications, or in case of reanalysis, the **most up-to-date** data is selected.
- Data-files contain **spectral points** and meta-data: **observation periods**, **livetime**, **excess**, **significance**, **coordinates**, **types** and **redshifts** of the sources whenever available.

Sky-map of STeVECat sources



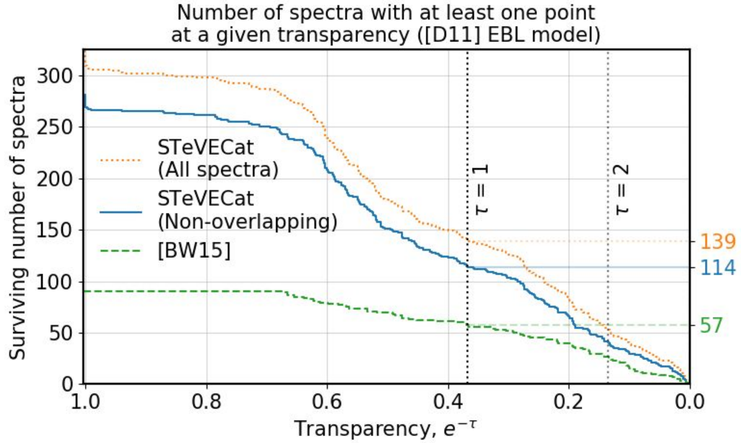
Redshift coverage

- Redshift from literature review and from dedicated spectroscopic observations **[G21]**.
- Each redshift value has a **reliability flag** (solid measurement, uncertain measurement, lower limit or unknown redshift).
- Currently **58 sources with known redshift** (32 for [BW15], 39 in GammaCat[b]). **Redshift coverage doubled** wrt [BW15].



Energy reach

- Some spectra cover the same observational period. We marked the **most extensive non-overlapping set** of independent observations. **Number of spectra tripled** wrt [BW15].
- STeVECat enables **population studies** of extragalactic gamma-ray sources, **studies of the GeV-TeV connection**, and **studies of absorption on the EBL**.



Outlook

The data is formatted following the convention adopted in available public repositories, and the full catalog can readily be loaded with **GammaPy**[c], the Science Analysis Tools selected by the Cherenkov Telescope Array Observatory.

STeVECat will be made **publicly available**.

References

[BW15] Biteau J. & Williams D. A. (2015). The extragalactic background light, the Hubble constant, and anomalies: conclusions from 20 years of TeV gamma-ray observations. *The Astrophysical Journal* 812, 60.

[G21] Goldoni, P. (2021). Review of redshift values of bright AGNs with hard spectra in 4LAC catalog.

[D11] Domínguez, A. *et al*. (2011). Extragalactic background light inferred from AEGIS galaxy-SED-type fractions. *Monthly Notices of the Royal Astronomical Society* 410, 2556–2578.

a - TeVCat: http://tevcat2.uchicago.edu/
b - GammaCat: https://gamma-cat.readthedocs.io/
c - GammaPy: https://gammapy.org/