Fermi Gamma-ray Space Telescope

Detection of new gamma-ray transient sources in the extra-galactic sky with Fermi LAT (1FLT Catalog)

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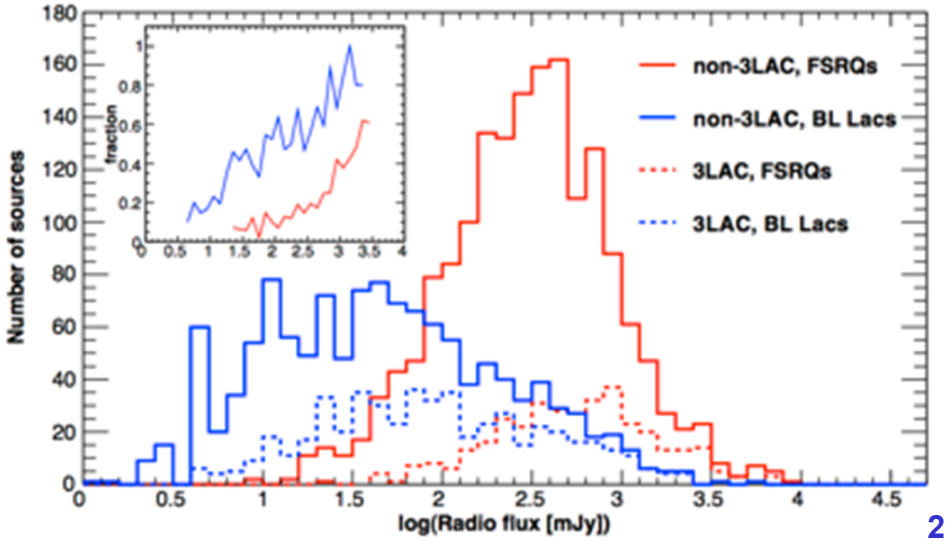
on behalf of the Fermi-LAT collaboration

Introduction

We search for transient sources missed from the LAT catalogs. The expected candidates are gamma-ray emitters which showed faint and fast time variability (typical of FSRQs). These sources flare only once or twice but not enough to reach the Fermi-LAT gamma-ray source catalog selection threshold.

We have chosen 1-month time bin of integration.

FROM 3LAC:
Radio flux density at 1.4 GHz for 3LAC (dashed) and non-3LAC (solid) BZCAT sources. The inset displays the fraction of 3LAC sources relative to the total. Red: FSRQs; blue: BL Lacs.



Sample and Analysis

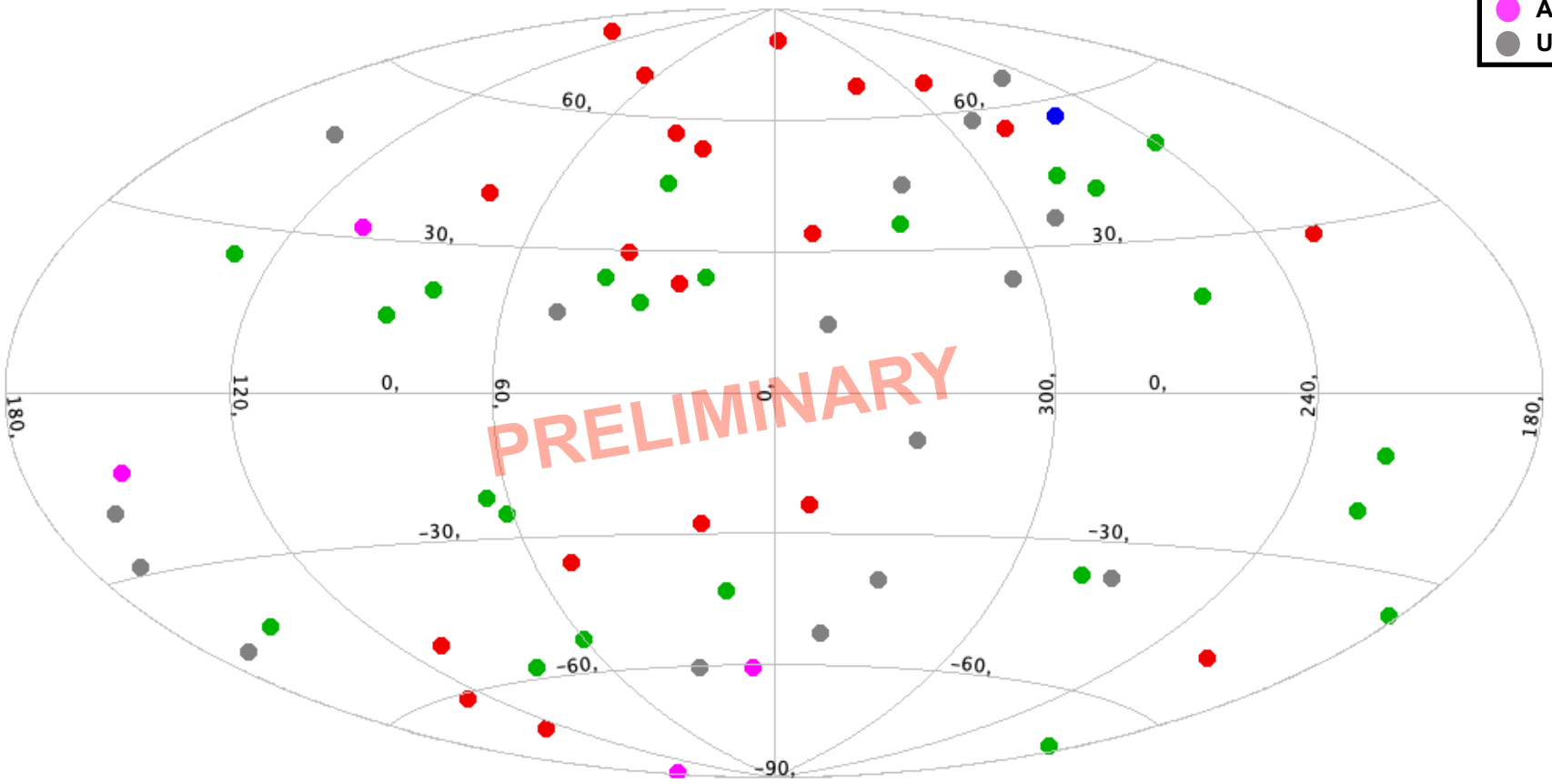
- 8 years of LAT data
- 0.1 - 300 GeV
- Pass8, P8R2
- Galactic diffuse: gll_iem_v06.fits
- |b|>10 deg
- 96 months + 96 15-day shifted months: 192 different skies

(from 4 August 2008 to 2 August 2016 / from 17 August 2008 to 17 August 2016)

- PGWave to perform the seed search
- fermipy to perform the ML and define gamma-ray parameters
- 1FLT sources are > 1deg apart from 0,1,2,3,4 FGL

We have obtained a sample of 64 sources with TS > 25.

Sky map



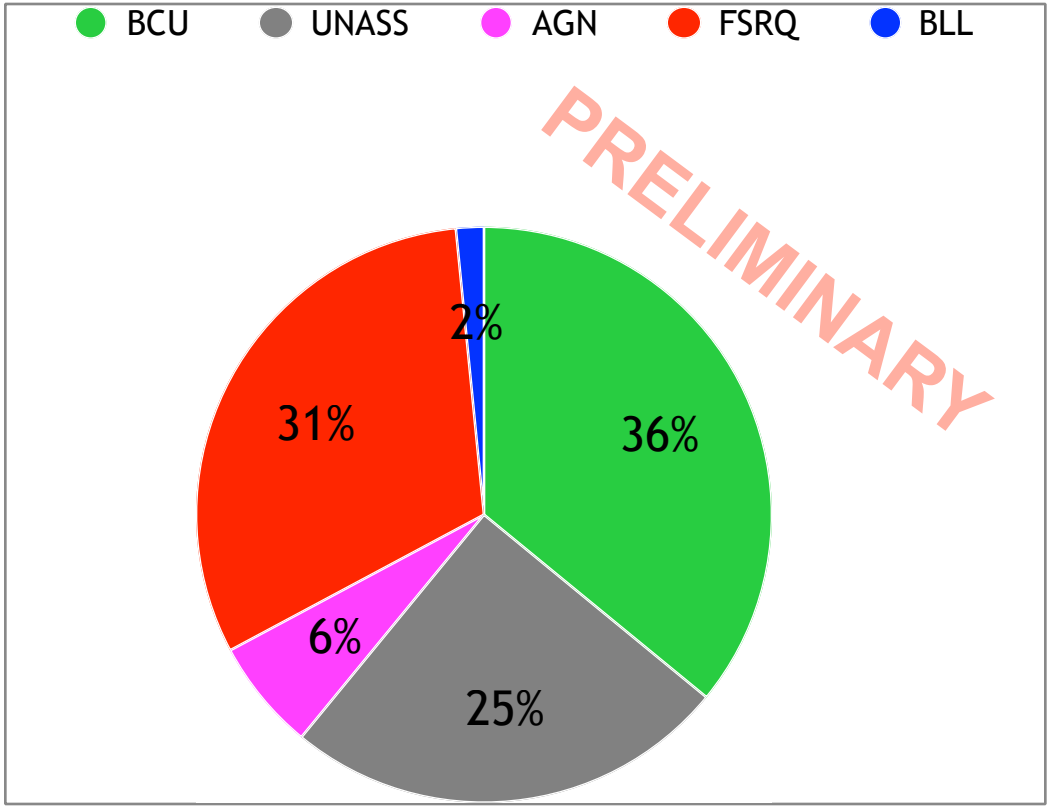
All transient sources with TS>25 outside gamma-ray catalogs

Association and Classification

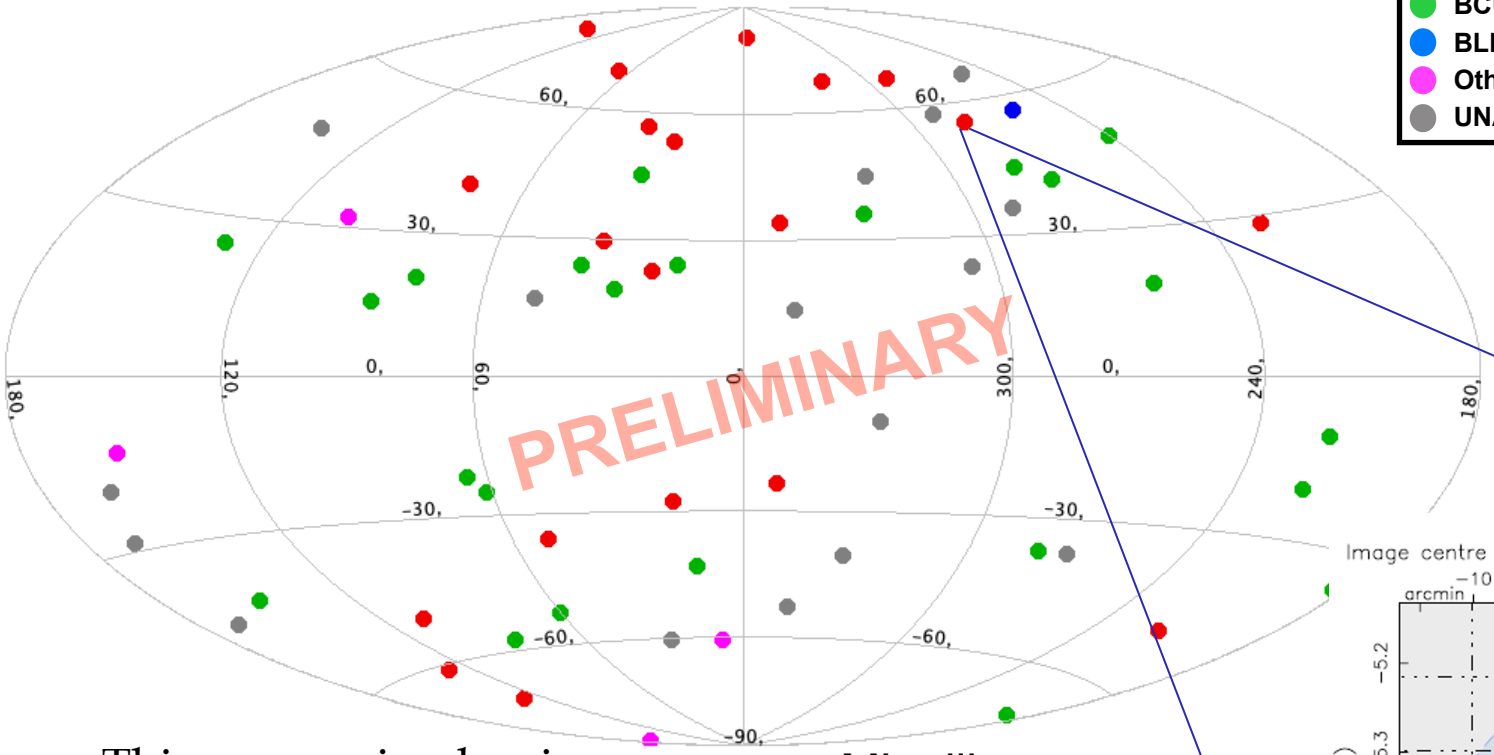
We look for possible counterparts with sources in other wavelengths.

Bayesian association: as in FGL catalogs (B. Lott)

Positional association: SSDC Tools (https://tools.ssdc.asi.it/) and VOU-Blazar Tool (by Chang Y-L., Giommi P. & Brandt C. http://www.openuniverse.asi.it/).



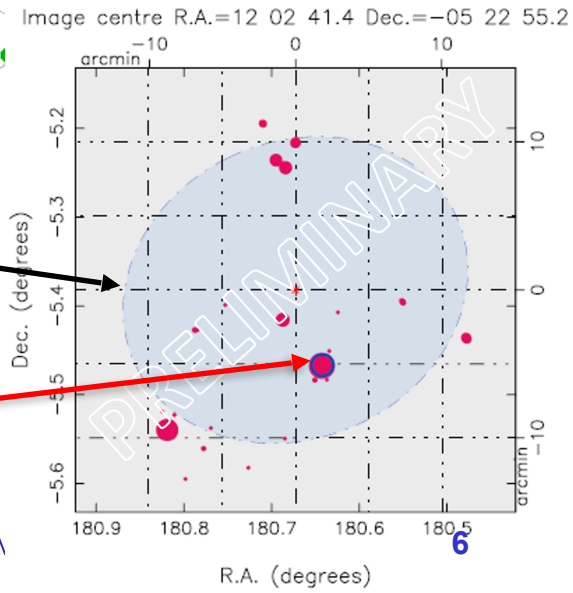
1FLT J1202-0524 TBIN_88



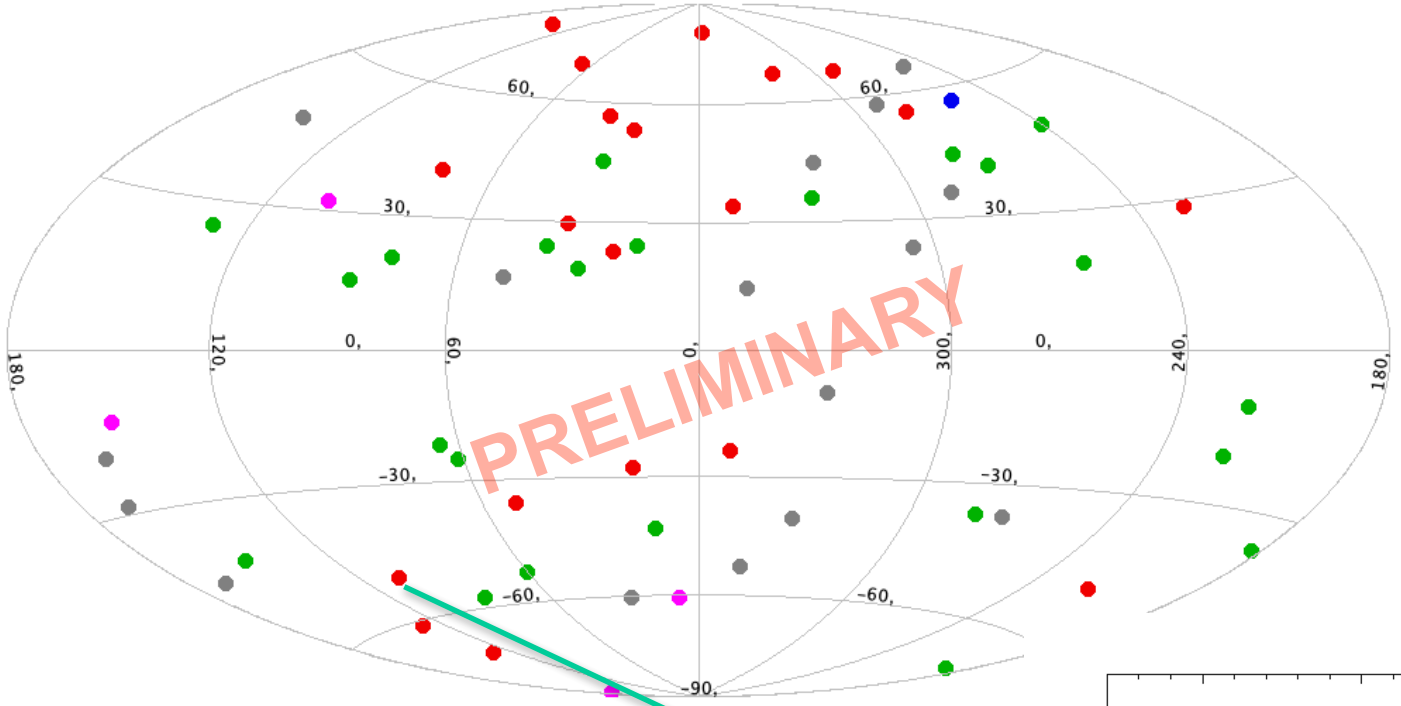
This source is also in the FAVA list (2FAV J1202-05.2) in a compatible period of time to our detection.

ML ellipses

5BZQJ1202-0528



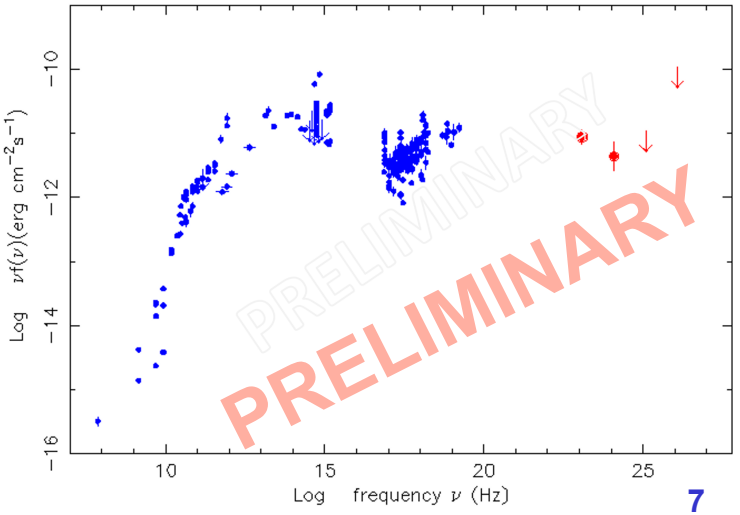
1FLT J0009+1047 TBIN_21 shifted



FSRQ
BCU
BLL
AGN
UNASSOC

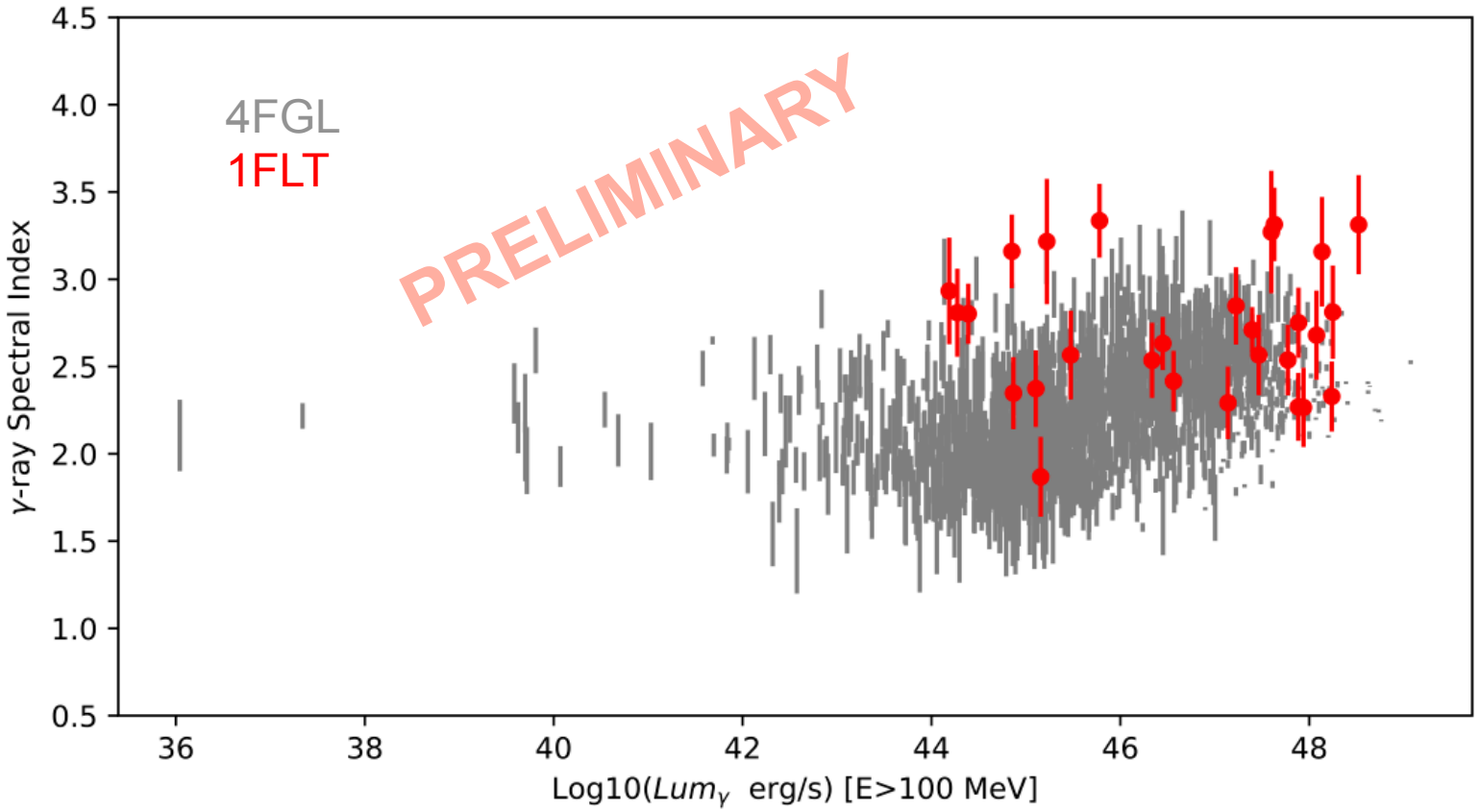
Positional associated with **Mrk 1501**

Mrk 1501 SED. In blue the archival data (available from SSDC SED builder tool https://tools.ssdc.asi.it/SED/) and in red the flaring state data points from our analysis. We point out that the two data sets are not simultaneous.

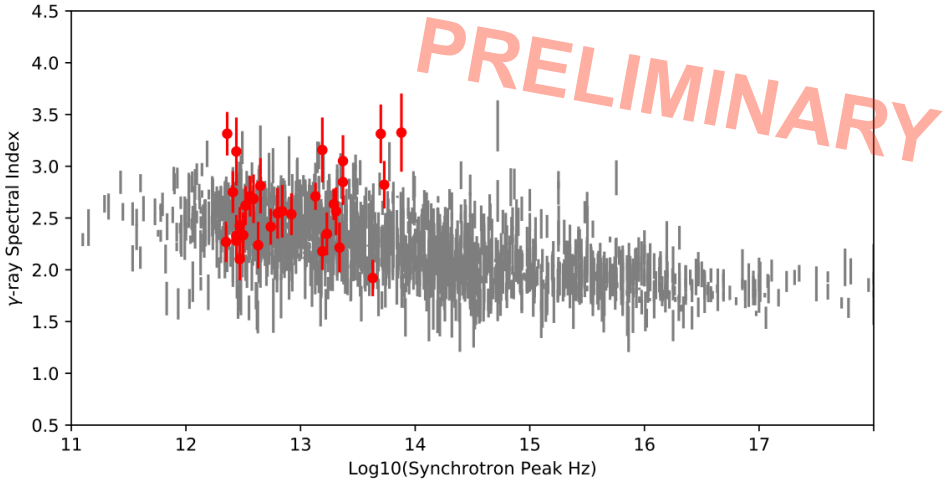


1FLT source properties

AGN-like monthly transients reach high gamma-ray luminosity

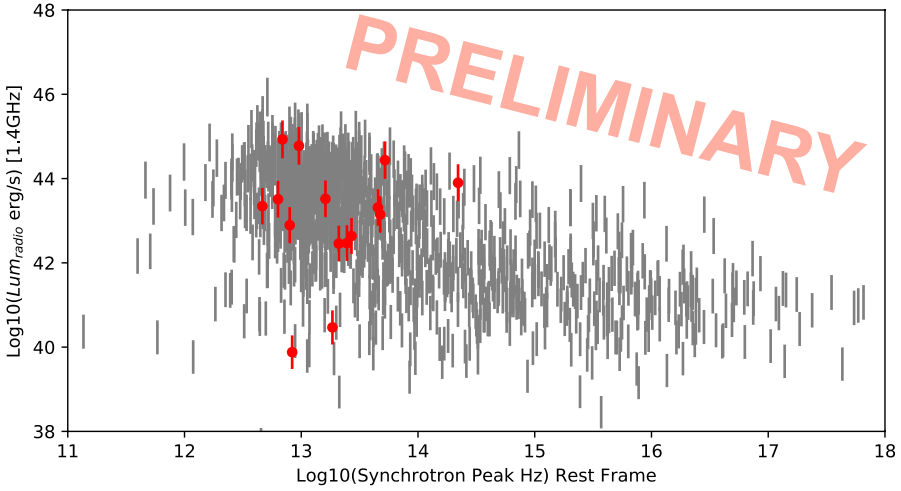


1FLT source properties



4FGL
1FLT

AGN-like monthly transients show very soft spectral indexes and they are principally Low Synchrotron Peaked Blazars.



Summary

* 1FLT sources are LSP and with very soft spectral index
* 1FLT includes soft gamma-ray sources otherwise hard to detect in longer integrations
* 1FLT unassociated sources are valuable targets for Multi-Wavelength follow-up and Multi-Messenger physics