High-redshift blazars are difficult to study with Fermi/LAT, as their emission peaks are often downshifted to energies below the GeV band and at their large distances, only the very brightest objects are detectable. On the other hand, high-redshift blazars are disproportionately important targets, because they serve as cosmological probes and represent the most powerful class of γ-ray emitting sources in the Universe. Unfortunately, only a small number of high-redshift blazars could be detected with Fermi/LAT so far. We developed a strategy to increase the detection statistic at redshift $z \geq 2.5$ via a search for flaring events in high-redshift γ-ray blazars which long-term flux is just below the sensitivity limit of Fermi/LAT.

**Motivation & Sample Selection**

High-redshift blazars are of particular interest in the field of γ-ray Astronomy, as they account for one of the most powerful (non-transient) astrophysical sources ever detected by Fermi/LAT. These sources possess the highest jet powers and accretion luminosities and have black-hole masses often in excess of $10^7 M_\odot$. They are important as cosmological probes and serve as test objects for blazar evolution models, which directly implies, that the detection of new high-redshift blazars would test the hypotheses of blazar evolution. In fact, only a small number of high-redshift blazars has been detected by Fermi/LAT, some of them only because of bright flaring states.

A systematic search for γ-ray undetected high-redshift blazars is performed by targeting a sample of 176 blazars with a redshift of $z \geq 2.5$ and a radio flux density of more than 50 mJy, taken from the Roma BZCAT Multi-frequency Catalogue of Blazars and the SHAO list of high-redshift radio loud quasars. The total sample consists of 169 BZCAT blazars, as well as 7 SHAO sources, fulfilling the selection criteria mentioned before. Monthly binned Fermi/LAT γ-ray light curves are calculated for the entire sample to keep the computing effort at a reasonable level.

We introduce a new method to search for hitherto undetected high-redshift γ-ray emitting blazars, which are too faint to be detected significantly on long time periods typically considered for Fermi catalogs, but can show up as significant sources during shorter (~ monthly) periods of increased activity.

**Detection Strategy**

14 day binned Pass 8 Fermi/LAT γ-ray light curve of PKS0438–43 over ~ 9 years from 2008 August 4 to 2017 July 1. The light curve is shown for an energy range of 100 MeV to 300 GeV. This source has been identified to Fermi/LAT for ~ 8 years, only identified in December 2016 by the Fermi Flare Advocate Service during a massive flaring state. Such periods of enhanced activity typically last only for several days, leading to a significant detection (TS ≥ 25) due to a drastic background reduction, compared to long-term averaged fluxes used in catalogs. Still, PKS0438–43 is identified to any published Fermi catalog.

Recently, 5 new high-redshift blazars have been identified by Fermi/LAT, making NVSS J151002+570243 the most distant known γ-ray emitting blazer at $z = 4.31$.

We identified 30 γ-ray flares from 7 high-redshift blazars, which were too faint to be detected on long-term time scales of several years, but showed significant γ-ray activity at $z \geq 5$ e-level significance on monthly time scales. With a redshift of $z = 3.63$, the source 5BZQ J2219–2719 represents the farthest new γ-ray blazar identified by this analysis. Still, these sources represent only a small fraction of potentially detectable high-redshift blazars. Some studied sources are detected significantly below the $\geq 5 \sigma$ threshold and thus are not included in this table. A total of 411 intervals have been detected at a significance level of $TS \geq 9$, with several sources showing multiple detections. While such an individual detection would not be significant enough to claim the detection of a new γ-ray source, multiple detections from a single source could lead to a robust source identification. However, a detailed understanding of the expected background fluctuation is required for such an analysis.