Searching for misaligned active galactic nuclei among blazar candidates in the Fourth Fermi-LAT catalog

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INTRODUCTION

Radio-loud sources with blazar-like properties but having a jet that does not directly point in the observer's direction are known as Misaligned Active Galactic Nuclei (MAGN). We searched for new MAGN candidates among blazars of uncertain type detected by the Fermi Large Area Telescope (LAT), in 4FGL, using a methodology based on characterizing their radio morphology.
We searched for new candidates associated with gamma-ray sources whose features are compatible with a source with a misaligned relativistic jet consistent with MAGN definition.

REFERENCE

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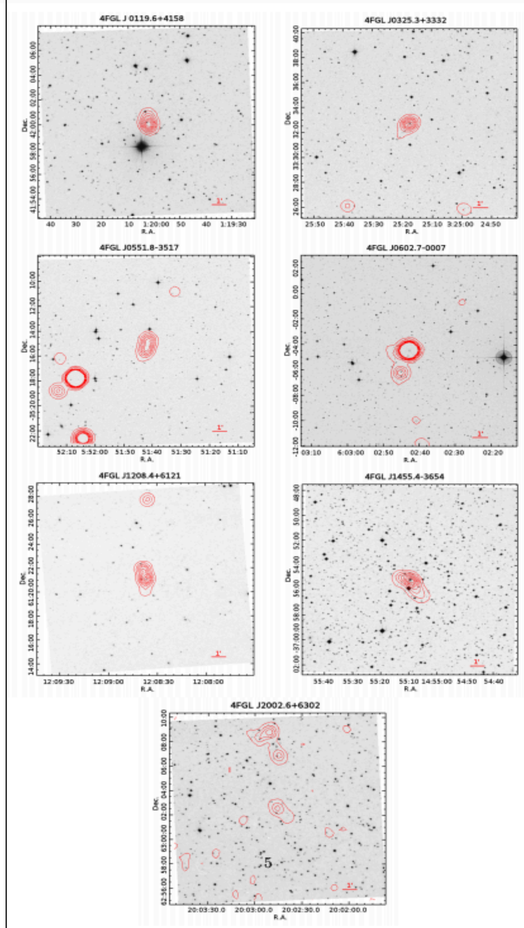
SAMPLE and RESULTS



We searched for MAGN candidates from the uncertain blazars population (BCU) in the 4LAC catalog. using known MAGN parameters . $1.6 < \Gamma < 2.7$, and $2.8 < VI < 30$. We restricted the list of candidates only to sources with a strong indication of extended contributions considering the ratio (MajAxis) / (MinAxis) > 1.5 consistent with an extended structure. We subsequently inspected the radio images of the candidates, in order to separate those with a confident extended structure. In this way, we obtained a list of seven objects with evidence of extended emission, collected in Fig. 1, five of which have publicly available optical spectra.
All the identified sources are radio emitters with a clear detection in major all-sky radio surveys featuring an extended component. The emission is still core-dominated, but, unlike the case of blazars, which tend to be compact and symmetric, these objects show an extended structure that suggests hints of partially resolved morphology.

TeV DETECTABILITY

Checking the detectability at the TeV energy range for the MAGN candidates we note that all of these sources are faint, with integrated energy fluxes from 100 MeV to 100 GeV lower than $8 \times 10{-}12$ erg/cm2/s, and none of them has been detected by LAT at energies larger than about 30 GeV. These sources are too faint to be detectable with Imaging Atmospheric Cherenkov Telescope (IACTs) in reasonable exposures unless they undergo a flare.

CONCLUSIONS

The known population of MAGNs classified in the 4LAC catalog was expanded by finding **seven new candidates** in the BCU population. Based on the morphological characterization of radio archive images and the study of the available optical observations, our method identifies objects with strong evidence of MAGN nature. Due to their radiative weakness, these sources cannot be observed in the TeV energy range.