

A Fermi LAT Analysis unveils possible Gamma-Ray Emission in Magnetic Cataclysmic Variable Systems and highly magnetized isolated white dwarfs.

Contributed Talk //

Pulsars and Pulsar Wind Nebulae (PWNs)



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Gamma-ray emission from magnetic cataclysmic variable (MCV) systems, and highly magnetized isolated white dwarfs, was investigated using data from the Fermi Large Area Telescope (LAT). A total of 75 sources (19 polars, 24 intermediate polars, 6 solitary white dwarfs, 21 white dwarfs, 3 DQ hers, and 2 white dwarf pulsars) were analyzed, with a primary focus on those displaying strong magnetic activity and having short orbital periods or white dwarfs with short spin period. The preliminary results of binned likelihood analysis in the energy range 0.05-20 GeV revealed 28 sources above the Fermi LAT detection level, indicating the presence of gamma-ray emission in these systems. The search for pulsed gamma rays in the same energy range exhibits, at a lower level, a correlation between the emission and the orbital period in some of the MCVs. This modulation of the emission supports the notion that the gamma ray production mechanism is linked to the binary interactions occurring in these exotic systems. It also confirms that the emission is indeed emission from these sources rather than background emission. However, the analysis conducted in the broader energy range of 0.1-500 GeV yielded intriguing indications of gamma ray emission with significance below Fermi LAT detection level. This study sheds light on the intriguing connection between magnetic cataclysmic variable systems with short rotational periods and gamma-ray emissions. The observed gamma ray signals provide valuable insights into the underlying physical processes at work in these enigmatic binary systems. As our understanding of gamma-ray production mechanisms in MCVs continues to evolve, these findings contribute significantly to our knowledge concerning high-energy astrophysical phenomena.

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