Puzzling Gamma-Ray Binaries from a Fermi perspective

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Abstract

Results from the first two year of Fermi LAT (Large Area Telescope) observations of the bright sources LS I +61 303 and LS 5039, well observed binary systems at X-ray and TeV energies, have yielded new questions at GeV energies about their nature. In survey mode the LAT observes every point in the sky every 3 hours making it an ideal monitor for these systems. These sources are proving to be surprising in terms of spectral behaviour and variability. The exponential cutoff seen in both sources is very reminiscent of the many pulsars Fermi has found, yet the orbital variability we see, consistent with inverse Compton scattering, is not expected in that interpretation. In addition, LS I +61 303 has shown remarkable, abrupt changes in its flux levels and orbital modulation, as well as a recent absence of TeV emission at apastron as reported by VERITAS and MAGIC. Torres has suggested that we are seeing the effects of both pulsar magnetospheric emission and pulsar wind to accommodate both seemingly exclusive properties. The LAT team is pursuing a follow-up publication for these two sources to exploit the additional data since the initial papers for each.