

Gamma-ray Eclipses and Orbital Modulation Transitions in the Candidate Redback 4FGL J1702.7-5655

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Observations with the Fermi Large Area Telescope (LAT) of the gamma-ray source 4FGL J1702.7-5655, previously classified as a candidate millisecond pulsar, show highly-significant modulation at a period of about 6 hours. The folded light curve shows the presence of narrow eclipses and this is thus likely to be orbital modulation in a redback binary system. An examination of the long-term properties of the modulation over 13 years of LAT observations indicates that the orbital modulation of the gamma-rays changed from a simple eclipse before early 2013, to a broader quasi-sinusoidal modulation. In addition, the time of the eclipse shifts to ~ 0.05 later in phase. This change in the orbital modulation properties is, however, not accompanied by a significant overall change in gamma-ray flux or spectrum. The quasi-sinusoidal component peaks ~ 0.5 out of phase with the eclipse, which would indicate inferior conjunction of the compact object in the system. Swift X-ray Telescope observations reveal a possible X-ray counterpart within the Fermi error ellipse. However, radio observations obtained with the Australia Telescope Compact Array do not detect a source in the region. 4FGLJ1702.7-5655 appears to have changed its state, perhaps related to changes in the intrabinary shock in the system. We discuss how the properties of 4FGLJ1702.7-5655 compare to other binary millisecond pulsars that have exhibited orbital modulation in gamma rays. Chandra observations have also been approved and will be carried out before the symposium, and we will provide a preliminary report on these.

Track

Binaries

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