

Abstract Submitted
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Long-term radio observations of varying orbital parameters in six eclipsing pulsar binaries. BRIAN PRAGER, University of Virginia, SCOTT RANSOM, National Radio Astronomy Observatory, JASON HESSELS, ASTRON, the Netherlands Institute for Radio Astronomy, INGRID STAIRS, University of British Columbia, PAULO FREIRE, Max-Planck-Institut für Radioastronomie, RYAN LYNCH, National Radio Astronomy Observatory, PHIL ARRAS, University of Virginia — We present our results from the long-term radio observations of six eclipsing pulsars with low-mass companion stars. Studies of eclipsing pulsars have been rife with difficulties in explaining why some sources experience large stochastic changes in their orbital properties over the timescale of a few years. A possible explanation was put forth in the early 1990s by Applegate, proposing that gravitational coupling between the orbit and the shape of the magnetically active star could drive this effect. We investigate the applicability of the Applegate model to our sources by performing a power spectrum analysis of the varying orbital properties in order to detect time-variation in the gravitational force exerted by the companion star. Using 15 years of pulsar timing data, we discuss the energetics of the required mass rearrangements in the context of the Applegate model for each source. We also calculate a lower-limit on the Rossby numbers assuming tidal-locking of the orbit for the low-mass stars that make up our sample. Finally, we discuss the importance of these results in the context of the greater body of works focused on understanding the internal properties of low-mass stars, for which our sources represent some of the lowest masses studied to date.

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