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Relativistic Electron Cyclotron Maser as an Engine for Long Period Transients Associated with White Dwarfs

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We present the discovery and characterisation of a novel white dwarf binary system, identified through optical spectroscopy and radio-wavelength observations. This system displays a short orbital period of ˜1.3 hours, determined from Doppler shifts in Balmer emission lines, and exhibits unique radio emission characteristics.

We observed periodic bursts of elliptically polarised radio emission – displaying frequency drift and intermittency – aligned with the orbital period. As well as coincident X-ray and UV emission, which may indicate potential accretion.

This system occupies a crucial evolutionary space, bridging cataclysmic variables and long-period transients, with an orbital period shorter than other known long-period transient associated with white dwarfs. The radio emission's high brightness temperature and elliptical polarisation necessitates a coherent mechanism. We find the observations can be explained by a relativistic electron cyclotron maser operating within the magnetic field lines connecting the white dwarf and its companion.

Our analysis allows us to probe the system's magnetic field structure and plasma transfer dynamics. We will discuss the implications of these findings for understanding the emission mechanisms of long-period transients and the evolutionary pathways of close white dwarf binaries.

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