The Beginnings and Ends of Double White Dwarfs

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A 0.3% measurement of orbital decay in the 12.75-min WD+WD J0651+2844

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I will present a refined measurement of orbital decay from gravitational radiation in the second-most compact detached stellar binary known, the eclipsing 12.75-min double white dwarf system J0651+2844. Based on more than 490 hr of ground-based photometry over a nearly 8-year baseline, we measure a shift in mid-eclipse times caused by an orbital decay that can constrain the orbital decay to better than 0.3%. Our measurement is slightly faster than but still 1.2-sigma consistent with pure gravitatational wave losses. Spin-up from tides is expected to accelerate orbital decay, but uncertainties in the component masses still dominates our estimate of predicted orbital decay. Our updated orbital period predicts a strong gravitational wave signature at 2.6136734171(99) mHz, making J0651+2844 an exceptionally clean and well-characterized verification binary for future space-based gravitational wave detectors like the Laser Interferometer Space Antenna.

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