

THE ULTRA-MASSIVE FAST-SPINNING WHITE DWARF COMPANION OF HD 49798

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The existence of ultra-massive white dwarfs ($M > 1.2 M_{\odot}$) is of particular interest for several fields, ranging from the physical properties of matter at high density, to the evolution of single and binary stars. Ultra-massive white dwarfs are also relevant as likely progenitors of Type Ia supernovae. Using X-ray observations taken with the XMM-Newton satellite, we recently obtained compelling evidence, based only on dynamical measurements, for the presence of a white dwarf with mass $1.28 \pm 0.05 M_{\odot}$ in the 1.5 days binary HD49798/RXJ0648–4418. This is a peculiar binary system, composed of a hot sub-dwarf and a fastly rotating white dwarf, resulting from common envelope evolution. The ultra-massive white dwarf is rotating only a factor two slower than break-up and it must have a weak magnetic field in order to accrete. Thus this system is a white dwarf analogue of the X-ray binaries in which weakly magnetic neutron stars are spun-up and then recycled as millisecond radio pulsars. The future evolution of this system might lead to a new phase of high mass transfer causing the already massive white dwarf to exceed the Chandrasekhar limit and explode as a Type Ia supernova.