



The Beginnings and Ends of Double White Dwarfs

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A white dwarf with an unusual composition as a possible product of a binary merger

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The merger of two white dwarfs with a combined mass below the Chandrasekhar-limit is expected to be non-explosive, resulting in a single massive white dwarf. However, because single star evolution can also produce massive white dwarfs, few known degenerate stars have categorically been confirmed as merger products.

We report the identification of a $1.15 M_{\odot}$ white dwarf with a unique photospheric composition which is not explained through standard models of single star evolution. The stellar atmosphere is dominated by hydrogen, but with a C/H ratio of 0.15. The spectroscopic non-detection of helium and maximum convection zone mass of $M_{\text{cvz}}/M_{\text{wd}} = 10^{-10}$, imply an extremely small stellar envelope with a remarkably low helium fraction (considering the dredge up carbon from the interior). This new discovery potentially provides a new avenue to investigate a rare channel of binary-star evolution.

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