

Abstract Submitted
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Neon Cluster Formation and Phase Separation during White Dwarf Cooling MATT CAPLAN, Illinois State University, CHUCK HOROWITZ, Indiana University, ANDREW CUMMING, McGill University — Recent observations of Galactic white dwarfs (WDs) with Gaia suggest there is a population of massive crystallizing WDs exhibiting anomalous cooling the Q branch. While single-particle ^{22}Ne sedimentation has long been considered a possible heat source, recent work suggests that ^{22}Ne must separate into clusters, enhancing diffusion, in order for sedimentation to provide heating on the observed timescale. We show definitively that ^{22}Ne cannot separate to form clusters in C/O WDs using molecular dynamics simulations, and we further present a general C/O/Ne phase diagram showing that strong ^{22}Ne enrichment is not achievable for ^{22}Ne abundance $> 30\%$. We conclude that the anomalous heating cannot be due to ^{22}Ne cluster sedimentation and that Q branch WDs may have an unusual composition, possibly rich with heavier elements.

Matthew Caplan
Illinois State University

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