

THE ORIGIN OF LITHIUM ENHANCEMENT IN POLLUTED WHITE DWARFS

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White dwarfs present the unique opportunity to measure the bulk abundances of extrasolar planetesimals when the planetesimals are accreted by their host white dwarf. Kaiser et al. (2021) and Hollands et al. (2021) recently discovered lithium for the first time in several white dwarfs. The accreted rocky planetesimals appear to be enhanced in lithium compared to the primordial lithium abundance of the Solar System. Three explanations have been offered for this lithium excess: accretion of nucleosynthetically metal-poor material (Kaiser et al. 2021), accretion of continental crust material (Hollands et al. 2021), and accretion of an icy exomoon comprised of icy ring material that was spalled by protons (Doyle et al. 2021). We compare the measured abundances of the planetesimals accreted by these white dwarfs to the predictions of these three hypotheses. We present newly obtained spectroscopic observations of three of the white dwarfs with lithium detections (LHS 2534, WD J1824+1213, and WD J2317+1830) and a new null lithium detection in another cool, metal-polluted white dwarf. Using these new data, we evaluate all three hypotheses and compare their relative merits.