Alexander James Mustill

Lund University

Presentation Title: Scattering bodies towards white dwarfs with low-mass planets

Work Package: WP116 370 Post-Main Sequence Evolution of Planetary Systems

Over a quarter of white dwarfs show evidence of hosting remnant planetary systems: accretion of metals into the white dwarf atmosphere, circumstellar discs, or transiting asteroids as in the case of WD1145+017, detected by K2. Study of these remnant systems can offer important insights into planetary and asteroidal interior compositions, and into the nature of planetary systems orbiting stars more massive than the Sun.

These observed planetary remnants lie within ~1 Solar radius of the white dwarf, yet they must originate further out. I show how the material can originate from scattering amongst planets in the Earth–Neptune mass range, on orbits sufficiently distant to survive the host star's AGB evolution, and which are destabilised by stellar mass loss at the AGB tip. Planets in this mass range provide delivery of material from nearby planetesimal belts with a time dependence that well reproduces observations of accretion rates at white dwarfs of different ages (see Mustill et al., 2018, MNRAS, 476, 3939). K2 searched just over 1000 white dwarfs for transiting bodies, and a larger sample from PLATO would help to further constrain models of scattering and delivery of asteroids and planets to the white dwarf.