BOSTON Boston University College of Arts & Sciences UNIVERSITY Institute for Astrophysical Research

2020–2021 ASTROPHYSICS SEMINAR SERIES

White dwarfs and zombies racing through the Galaxy

High velocity stars are messengers of violent astrophysical phenomena. Either ejected from the Galactic centre (hypervelocity stars), or from stellar clusters and binary supernova explosions (runaway stars), these stars are powerful tools to constrain the properties of the Galactic potential and to study distant stellar populations. Thermonuclear explosions, like those occurring in Type Ia supernovae, are expected to entirely disrupt an accreting white dwarf in a compact binary system, leading to the ejection of their companion stars at high velocities. Recent observations, also supported by the astrometric Gaia mission, have revealed new exhotic objects that may form via the (failed) thermonuclear explosions of white dwarfs. Among the new discoveries, we find unusual white

dwarfs with carbon or oxygen-dominated atmospheres, as well as stars with neon-dominated atmospheres that could be the formerly accreting white dwarf survivors of peculiar thermonuclear supernovae. As we are just starting to find these rare objects, the accurate characterisation of their unusual atmospheres is improving our understanding of the formation scenarios and evolution, and it is already having an impact on theoretical works that aim to constrain the pathways to thermonuclear birth supernovae, rates. and nucleosynthetic yields.



Monday, September 28th

3:30 - 4:30 p.m. See website for Zoom details

Image credit:University of Warwick/Mark Garlick

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