

Seminar

Friday, 26th March 2010

11 am - Room 701

Prof Geoffrey C. Clayton

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Department of Physics & Astronomy, Baton Rouge, LA, USA.

The Evolutionary History of the R Coronae Borealis Stars

The R Coronae Borealis (RCB) stars are rare hydrogen-deficient carbon-rich supergiants, all apparently single stars which are consistent with being post-AGB stars. RCB stars undergo massive declines of up to 8 mag due to the formation of carbon dust at irregular intervals. The mechanism of dust formation around RCB stars is not well understood but the dust is thought to form in or near the atmosphere of the stars. Their rarity may stem from the fact that they are in an extremely rapid phase of the evolution or in an evolutionary phase that most stars do not undergo. Several evolutionary scenarios have been suggested to account for the RCB stars including, a merger of two white dwarfs (WDs), or a final helium shell flash in a PN central star. The large overabundance of ^{18}O found in most of the RCB stars favors the WD merger scenario while the presence of Li in the atmospheres of four of the RCB stars favors the FF scenario. In particular, the measured isotopic abundances imply that many, if not most, RCB stars are produced by WD mergers, which may be the low-mass counterparts of the more massive mergers thought to produce type Ia supernovae. I will present recent visible and IR observations of various RCB stars obtained with HST, Spitzer and ground-based telescopes.

All Welcome

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Contact Details

For further information phone 364 2404, or visit our website: www.phys.canterbury.ac.nz

Background on Geoffrey C. Clayton

My research involves the study of dust in various astrophysical environments: circumstellar, interstellar and extragalactic. I am studying how dust grain properties change from quiescent cloud to star-forming cloud to circumstellar environments. With my collaborators, I am modeling dust on microscopic and macroscopic scales to determine the role of dust in the energy budget of these various environments. We use extinction, polarization, abundance and spectroscopic observations from the UV to the IR for the same sightlines obtained from Hubble and Spitzer Space Telescopes as well as other space- and ground-based telescopes. The goal is to produce a unified model of dust which will satisfy observational constraints from all wavelengths (UV to IR) in these different environments using the DDA and MEM codes. To this end we are investigating Radiative Transfer in circumstellar, star formation and extragalactic environments. The capabilities of our Monte Carlo codes include, scattering, radiative equilibrium solutions, emission from PAHs, and scattering from aligned grains. These codes produce spectra, images, and polarization (images and spectra) for comparison with observations.