APR10-2009-000377

Abstract for an Invited Paper
for the APR10 Meeting of
the American Physical Society

Nucleosynthesis in the Classical Nova Outburst[1]

SUMNER STARRFIELD, Arizona State University

Classical Novae are the consequences of the accretion of hydrogen-rich material onto white dwarfs in close binary stellar systems. They are the third largest stellar explosions that occur in a galaxy after Gamma-ray Bursts and Supernovae but are far more common. They are well studied in the Solar neighborhood and in nearby galaxies so that a large number now have measured chemical abundances of their ejected gases. Of importance to this meeting, our simulations show that the temperatures reached in the explosions sample the same conditions as realized in terrestrial laboratory measurements; therefore, no extrapolations are necessary. As a result, we have been doing new calculations that test the effects of new reaction rates on predictions of the observed properties of the outburst. We will show the results of these simulations and, in addition, the effects of including reaction rates that were not previously included in the calculations. We will also show how the evolution and properties of the explosion depends on the initial assumed composition of the accreting material and the characteristics of the white dwarf. Finally, the connection with Supernovae of Type Ia, the explosions currently being used the study the evolution of the universe, is that they are thought to be the consequences of the accretion of helium rich material onto a white dwarf. The results of new simulations of these events will be presented.

[1]We gratefully acknowledge support from NASA, NSF, and the DOE.