

Stellar nova simulations

December 5 2004

New results from experiments at the Holifield Radioactive Ion Beam Facility will lead to improved models and perhaps a better understanding of what happens when stars explode. Dan Bardayan, Jeff Blackmon and Michael Smith of Oak Ridge National Laboratory's Physics Division obtained the measurements utilizing unique beams of fluorine-18, a radioactive subatomic nucleus.

The researchers were surprised to find a factor of two to three decrease from what was previously thought in the rates of certain nuclear reactions in exploding stars.

This is significant because these reactions destroy naturally occurring fluorine-18 and make it difficult to observe its decay. The team performed new computer simulations developed by colleague Raph Hix using the revised reaction rates and found that three times more radioactive fluorine-18 survived to be ejected into space.

The decay of this fluorine-18 should be visible to multi-million dollar orbital satellites and provides an important window into the workings of novae. Future research will focus on better defining other fusion reactions that are crucial input to stellar explosion studies. The work is funded by the Department of Energy's Office of Science.

Source: ORNL

Citation: Stellar nova simulations (2004, December 5) retrieved 25 April 2024 from <https://phys.org/news/2004-12-stellar-nova-simulations.html>

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