CENTRE D'ETUDES NUCLÉAIRES DE
BORDEAUX-GRADIGNAN

Vendredi 18 Septembre 2015

à

11H

Un café sera servi à partir de 10h45

Yi Hua LAM*

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The impact of new thermonuclear reaction rates of ^{64}Ge(p,γ)^{65}As and ^{65}As(p,γ)^{66}Se for type-I X-ray bursts

We derived new thermonuclear ^{64}Ge(p,γ)^{65}As and ^{65}As(p,γ)^{66}Se reaction rates based on recently evaluated proton separation energies S_p and nuclear structure data from large-scale shell model calculation with GXPF1a effective interaction. These two *rp* processes are sensitive to adequately small change of S_p values, spectroscopic factors of proton captures, and densities of excited states of the final nucleus. The precisely measured and evaluated proton separation energies, S_p(^{65}As) and S_p(^{66}Se), largely influence the rates compared to currently available JINA data sets (REACLIB), particularly about two order different for ^{64}Ge(p,γ) rate. By using one-zone post-processing type I X-ray burst model simulating the nucleosynthesis within accreted envelopes of neutron stars in close binary systems, we found that the new rates based on newly evaluated S_p(^{65}As) and S_p(^{66}Se) values, resonant energies, and spectroscopic factors estimated from shell model significantly affects the productions of nuclide in the range of $64 \leqslant A \leqslant 110$ about one to ten times compared to productions of nuclide based on presently available REACLIB data. The astrophysical impact of our new rates will be presented.

* *Travail réalisé avec Jian Jun He et Anuj Parikh*

Salle des Séminaires du CENBG

Le Haut Vigneau - BP 120 - F-33175 Gradignan Cedex