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Séminaire

PHYSIQUE NUCLÉAIRE
NUCLEAR PHYSICS

"Spectroscopy of ^{36}Ca and its role in proton capture reaction in X-Ray burst"

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IJCLab

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Zoom:
https://ijclab.zoom.us/j/93201131373?pwd=ZXdjMzYvTm9GRXV1TkNNWVhaQ0cxdz09

A recent sensitivity study has shown that the ^{35}K(p,γ)^{36}Ca reaction is one of the ten (p,γ) reaction rates that have a significant impact on the shape of the calculated X-ray burst light curve. Its reaction rate used up to now in Type I X-ray bursts calculations was estimated using an old measurement for the mass of ^{36}Ca and theoretical predictions for the decay partial widths of the first 2^+ resonance with arbitrary uncertainties.

In this work, we re-investigate the ^{35}K(p,γ)^{36}Ca reaction rate, as well as related uncertainties, by measuring key structural properties in ^{36}Ca. The excited states of ^{36}Ca and their decay branches were studied by means of the one neutron pick-up transfer reaction ^{37}Ca(p,d)^{36}Ca in inverse kinematics using a radioactive beam of ^{37}Ca at 48 A MeV. The experiment was performed at the GANIL facility using the liquid Hydrogen target CRYPTA, the MUST2 silicon detectors array for the detection of the light charged particles and a zero degree detection system for the outgoing heavy recoil nuclei.

The atomic mass of ^{36}Ca is confirmed and new resonances have been proposed together with their proton branching ratio. This spectroscopic information, completed by very recent theoretical predictions for the γ-width, was used to calculate the reaction rate using the RateMC Monte-Carlo code. Implications for the X-ray burst's light curve will be discussed.

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