

Radiative alpha capture on 7-Be with DRAGON at energies relevant to the vp-process

Tuesday, 26 June 2018 19:00 (1h 30m)

The origin of about 35 neutron-deficient stable isotopes with mass number $A = 74$, known as the p-nuclei, has been a long-standing puzzle in nuclear astrophysics. The vp-process is a candidate for the production of the light p-nuclei, but it presents high sensitivity to both supernova dynamics and nuclear physics [1,2]. It has been recently shown that the breakout from pp-chains through the $7\text{-Be}(\alpha,\gamma)11\text{-C}$ reaction, which occurs prior to vp-process, can significantly influence the reaction flow, and subsequently the production of p-nuclei in the $90 \leq A \leq 110$ region [2]. Nevertheless, this reaction has not been studied well yet in the relevant temperature range - $T = 1.5\text{-}3$ GK. To that end, the first direct study of important resonances of the $7\text{-Be}(\alpha,\gamma)11\text{-C}$ reaction with unknown strengths using DRAGON [3] was recently performed at TRIUMF. The reaction was studied in inverse kinematics using a radioactive 7-Be ($t_{1/2} = 53.24$ d) beam provided by ISAC-I and two resonances above the 11-C α -separation energy - $Q_\alpha = 7543.62$ keV - were measured. The experimental details, in particular how the recoil transmission and BGO efficiencies were accounted for considering the large cone angle for this reaction, will be presented and discussed alongside some preliminary results.

References

- [1] C. Frohlich et al., Phys. Rev. Lett. 96, 142502 (2006).
- [2] S. Wanajo, H.-T. Janka and S. Kubono, Astrophys. J. 729, 46 (2011).
- [3] D.A. Hutcheon et al., Nucl. Instr. Meth. Phys. Res. A 498, 190 (2003).

Primary authors: CHEN, Alan (McMaster University); PSALTIS, Athanasios (McMaster University)

Co-authors: Mr WEN, Alex (University of British Columbia); Dr LENNARZ, Annika (TRIUMF); Prof. DAVIDS, Barry (TRIUMF); Dr RUIZ, Chris (TRIUMF); Dr HUTCHEON, D. A. (TRIUMF); Dr CONNOLLY, Devin (TRIUMF); Mr TENKILA, Gaurav (University of British Columbia); Ms GILARDY, Gwenaelle (University of Notre Dame); Mr LIANG, Johnson (McMaster University); Mr KARPESKY, Jonathan (Colorado School of Mines); Mr LOVELY, Matthew (Colorado School of Mines); Mr WILLIAMS, Matthew (University of York / TRIUMF); Dr ESKER, Nicholas (TRIUMF); Mr GIRI, Rekam (Ohio University); Mr PANERU, Som Nath (Ohio University); Prof. GREIFE, Uwe (Colorado School of Mines); Mr HUANG, William (University of British Columbia)

Presenter: PSALTIS, Athanasios (McMaster University)

Session Classification: Poster session