Contribution ID: **42** Type: **Oral Presentation**

Measurement of (d, p) and (d, ^{3}He) reactions with ^{7}Be in the context of lithium abundance anomaly

The disagreement between abundances of observed ^{7}Li in metal-poor halo stars and primordial ^{7}Li as predicted by Big Bang Nucleosynthesis (BBN) theory is unsolved for decades. Before considering new physics beyond standard model, recent works tried to search for a nuclear physics solution. This includes studying the cross sections of relevant nuclear reactions, particularly those leading to the destruction of ^{7}Be. The d + ^{7}Be rate used in BBN calculations over the past thirty years was based on an estimate of a constant S-factor of 100 MeV-b. Thus the ^{7}Be(d,p)^{8}Be reaction was considered as a potential candidate to solve the lithium abundance anomaly. The ^{7}Be(d,^{3}He)^{6}Li reaction also needs to be studied in the context of the anomaly and there is only one measurement of this reaction.

We carried out an experiment at the HIE-ISOLDE radioactive ion beam facility at CERN to measure the ^{7}Be(d,p)^{8}Be and ^{7}Be(d,^{3}He)^{6}Li reactions in inverse kinematics using a 5 MeV/A ^{7}Be beam on a CD_2 target. An array of double-sided silicon strip detectors covering $8^\circ - 165^\circ$ in lab was utilised to detect the charged particles emitted from these reactions. The total cross sections of the (d,p) and (d,^{3}He) channels are obtained at a higher centre-of-mass energy than the required Gamow energies. We measured the higher excited states of ^{8}Be up to 22 MeV for the first time in the ^{7}Be(d,p)^{8}Be channel. The excitation functions of the reactions are calculated using TALYS by normalization to the present data and the S-factors are extrapolated to the Gamow energies. The experimental results in the context of the lithium anomaly will be presented.

Length of presentation requested

Oral presentation: 17 min + 3 min questions

Please select between one and three keywords related to your abstract

Nucleosynthesis

2nd keyword (optional)

Nuclear physics - experimental

3rd keyword (optional)

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