Breakup following interactions with light targets: Investigating new methods to probe nuclear physics input to the cosmological lithium problem.

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A well known issue with concordance cosmology is the cosmological lithium problem, where models of Big Bang Nucleosynthesis indicate abundances of ^{7}Li three to four times larger than what is inferred via spectroscopic measurements of metal-poor halo stars [1]. Since the source of this discrepancy remains unclear [2], it is vital to fully understand the nuclear reactions that affect the production of ^{7}Li during the Big Bang [3].

At the Australian National University, experimental equipment and analysis techniques has been developed for nuclear reaction studies at energies near the fusion barrier, exploiting large solid angle detectors to enable the investigation of breakup without *a priori* assumption of the breakup kinematics. The extension to reactions of astrophysical interest may help shed light on these reactions. Recent experiments, using these new techniques, have provided a complete picture of the breakup mechanisms of light nuclei in collisions with heavy targets [4].

The present work focuses on obtaining complete pictures of breakup mechanisms of ^{7}Li and ^{9}Be following interactions with light nuclei, starting from ^{28}Si and ^{27}Al and moving down to deuterium. It has been found that breakup is almost exclusively triggered by nucleon transfer between the colliding partners, to a larger extent than was found for heavier targets. The findings of these experiments, as well as progress towards extensions to astrophysically relevant reactions, such as d + ^{7}Be [5] will be presented.

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