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Overcoming the Mass Gap in Light-Element Nucleosynthesis

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Overcoming the mass A = 5 and A = 8 gaps are important for understanding nucleosynthesis processes. This typically requires a 3-body reaction, which are the bottlenecks for light element formation. The ^{8}Li(α,n)^{11}B reaction is potentially important for light-element nucleosynthesis as it provides an alternate pathway for overcoming the A = 5 and A = 8 mass gaps. Measurements of its cross-section have proven a challenge as there has been a persistent disagreement in its value. It is important to perform an independent measurement to resolve this discrepancy. The Active Target-Time Projection Chamber (AT-TPC) uses the target gas as a tracking medium providing detailed information for charged particle tracks and reaction cross-sections. In particular, a high efficiency, large angular coverage, vertex reconstruction, as well as precise angle and energy measurements can be obtained. Preliminary calculations have been performed using LISE++ providing an estimate on the secondary beam rate for ^{8}Li. The beam production and plans for a measurement that can potentially resolve the past experimental discrepancies will be presented.

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