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Angular Dependency and Kinematics of Light Atom Nuclear Reactions with Positive Q Values JOSE PACHECO, Tarleton State University, FABIAN NAAB, University of North Texas, DANIEL MARBLE, Tarleton State University, JEROME DUGGAN, University of North Texas — Einstein's relationship, E=mc^2 implies that energy can be changed into mass and vice versa. Using nuclear reaction analysis, the interchange of mass into energy can be used to analyze trace elements in a material since each given element has a set of nuclear reactions that are unique to it. These nuclear reactions have positive Q values, which show up as excess energy in the emitted particle spectrum. However accurate interpretation of these spectra for materials analysis can be complicated as knowledge of both the angular dependency of the reaction and the geometry of the detection setup is required. The angular dependence is usually easily taken into account provided the reaction is well known and there are no nuclear interferences. In this experiment, a 1 MeV proton beam from a 2.5 MeV Van De Graff was applied to targets made up of light atoms, mainly 7Li, 6Li, and 19F. The results demonstrate the importance of accurately knowing the detection configuration, geometry, and the effect of detection system resolution when doing NRA. For instance, our system failed to give any information about the nuclear reaction for angles less than 30 degrees from the incoming beam due to its resolution.

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