Development of an Automated Target Oscillator For Use in Reaction Studies WILLIAM MARTIN, Univ. of Tenn., D.W. BARDAYAN, ORNL, K.L. JONES, Univ. of Tenn., J.A. CIZEWSKI, Rutgers — When a high current (greater than $10^6$ particles per second) of heavy ion beam bombards a plastic target, the energy deposition and heat buildup can cause target degradation. In the case of calibration/pilot beams used on thin (100-250$\mu$g/cm$^2$) deuterated polyethylene targets, even a short exposure has been found to result in damages such as cracking, burn through, and target carbonization/oxidation. One way to reduce the deleterious effects of this accumulated energy is to oscillate the target, thereby spreading the deposited energy over a larger area and allowing for an increased rate of heat dissipation. At the HRIBF in Oak Ridge, an automated target oscillation system has been developed using an electronic stepper motor and a control unit equipped with a custom Field Programmable Gated Array (FPGA) circuit board. Taking into consideration varying target sizes and beam densities, the algorithm loaded onto the FPGA allows the user to adjust both the frequency and amplitude of oscillation. Conclusive testing shows that incorporation of the target oscillator apparatus introduces no detectable electromagnetic noise to the detector array. Live beam testing is planned in the near future, and it is anticipated that the target oscillator will greatly assist HRIBF’s efforts to maintain target integrity during calibration and experiments.

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