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**A Pyroelectric Crystal Particle Accelerator** AMANDA GEHRING[1], RAND WATSON, Cyclotron Institute - Texas A&M University — Recent experiments have shown that the electric field produced by heating or cooling a pyroelectric crystal can be utilized to accelerate deuterons to sufficient energies to initiate the d + d fusion reaction., which suggests the possibility of developing a pyroelectric crystal neutron generator. The objective of this project was to investigate parameters that determine the energy and intensity of the particle beam with the final goal of maximizing the neutron output. A lithium tantalate pyroelectric crystal and two 25 W resistors were mounted on a copper block. An external power supply was connected to the resistors. Upon heating, the front face of the crystal becomes positively charged, creating positive ions from field ionization of nearby gas molecules. The positive ions are accelerated toward the target, and electrons from the target are accelerated toward the crystal where they collide, producing x rays and bremsstrahlung. Resulting spectra are measured with a Si(Li) detector, and the endpoint of the bremsstrahlung is used to determine the accelerating potential. Upon cooling, the polarity reverses. Heating cycles at different heating currents were observed, and the highest potential (88 kV) and intensity were achieved at 2.0 A. Next, a deuterated polyethylene target, deuterium gas, and a liquid scintillator neutron detector were added to the system. Runs were carried out at gas pressures ranging from $5x10^{-3}$ to $1x10^{-4}$ Torr, but the observed neutron counting rates were never above the background rate.

[1]Home Institution: Rose-Hulman Institute of Technology

Amanda Gehring
Cyclotron Institute - Texas A&M University

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