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Construction of an Alpha Particle Spark Detector and Fusor for research in plasma physics and radiation detection[1] OLORUNSOLA AKINSULIRE, FABRICE FILS-AIME, JAKE HECLA, MICHAEL SHORT, ANNE WHITE, Massachusetts Inst of Tech-MIT — This project delves into the realms of plasma physics and nuclear engineering by exploring systems used to generate plasmas and detect radiation. Basic plasma processes can be explored using inertial electrostatic confinement, in a device commonly called a "fusor". The fusor will generate neutrons and x-rays. The breakdown of air within a spark gap can be achieved with alpha particles and the avalanche effect; and constitutes an Alpha Particle Spark Detector (APSD), relevant for studies of basic nuclear processes and detectors. In the fusor, preliminary data was collected on breakdown voltage versus pressure in an air plasma to see how well the current system and geometry match up with expectations for the Paschen curve. A stable plasma was observed, at voltages roughly consistent with expectations, and it was concluded that a more controlled gas introduction system is needed to maintain a steady plasma over wider pressure ranges, and will allow for introduction of D2 gas for the study of neutron and x-ray producing plasmas. This poster will discuss the design, construction, and initial operation of the Alpha Particle Spark Detector and the fusor as part of an Undergraduate Research Opportunity (UROP) project.

[1]MIT UROP Program and the NSE department

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