

Abstract Submitted
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Paschen Curve Observations at Liquid Nitrogen Temperatures¹
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CZYK, PINGHAN CHU, Los Alamos National Laboratory — Paschen’s Law states
an equation giving the relationship between variables involved when forming an
electrical arc between two conductive objects, otherwise known as the breakdown
voltage. This equation for the breakdown voltage V_B is as follows:

$$V_B = \frac{apd}{\ln(pd) + b} \quad (1)$$

where p is the pressure in Atmospheres (or Bar), d is the gap or distance between the two conductive objects, and both a and b are constants that depend on the composition of the gas. In our experiment, the Paschen curve for gases (such as nitrogen) at temperatures lower than -200 degrees Celsius will be measured. The Paschen curve for air at room temperature will also be measured in order to test and calibrate our system. The goal of this experiment is to test how accurately Paschen’s Law can predict the breakdown voltage in these specific, cold conditions. This experiment is being performed to gather information for a possible future experiment, which might use high purity germanium (HPGe) detectors in a similar cold environment to search for neutrinoless double beta decay, a rare hypothesized process that may yield valuable insight into the fundamental properties of the neutrino. This work is being supported by the DOE through the LANL LDRD program.

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