

Abstract Submitted
for the DNP17 Meeting of
The American Physical Society

Statistical Distribution of Electrical Breakdown in Liquid Helium NGUYEN PHAN, STEVEN CLAYTON, TAKEYASU ITO, JOHN RAMSEY, WANCHUN WEI, Los Alamos National Laboratory — Realization of large electric fields in noble liquid has many important applications in nuclear, particle, astroparticle physics. These include time projection chambers as well as the neutron electric dipole moment search experiment performed in superfluid helium, currently developed to be mounted at the Spallation Neutron Source at Oak Ridge National Laboratory. Although the electrical breakdown, which limits the applicable electric potential and field, in liquid helium is poorly understood, the breakdown is thought to be initiated at electrode surfaces. In order to obtain insight into this phenomenon, we collected data on the distribution of the breakdown voltage and the time before breakdown for small electrodes (effective area ~ 1 cm in diameter) immersed in liquid helium, at various temperature and pressures. In order to study the effect of the surface properties, both electropolished and mechanically polished stainless steel electrodes were studied. In this talk, we will describe the measurement, present the results, and our interpretation of the results.

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Date submitted: 29 Jun 2017

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