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High Electric Fields in Cryogenic Liquids for EDM searches

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Experiments to search for the neutron's electric dipole moment (EDM) using ultracold neutrons (UCNs) stored in superfluid liquid helium are under development. In these experiments, being able to achieve a strong and stable electric field in superfluid liquid helium in the region where UCNs are stored is of critically importance because in EDM searches in general the sensitivity depends linearly on the strength of the applied electric field. However, the phenomenon of electric breakdown in liquid helium is poorly understood, and as such major R&D efforts are under way to study it for these experiments. In this talk, the current status of such R&D efforts and the implications of the findings on EDM searches and on possible other applications will be discussed.