

Abstract Submitted
for the APR05 Meeting of
The American Physical Society

Protonic Theory of Dielectric Breakdown of Water¹ JAMES ESPINOSA, DMITRIY PLAKS, State University of West Georgia — We are investigating how electric sparks form in heavy water (D_2O) in order to test our model of dielectric breakdown in regular water (H_2O). The precursors to these sparks are called leaders, which are charged plasma filaments with densities greater than liquid water. Our model is a one dimensional plasma wave that relies on a concomitant increase in dissociation rates and proton mobility. Since there is no electronic mechanism in this model, it predicts a significant difference between breakdown in water and heavy water. We have measured both the electric field necessary and the time needed to create an electric spark in samples of heavy water and regular water that have identical electrical conductivity. The electrodes have a point to plate geometry and were examined under a scanning electron microscope before and after each discharge in order to test the leading electronic theory of Jones and Kunhardt², which is based on the existence of microscopic asperities. We will also show the agreement between our model and our experimental results, including preliminary calculations showing the density of a leader.

¹Partially funded by the Student Research Assistant Program

²H.M. Jones and E.E. Kunhardt 1995 *J. Phys. D: Appl. Phys.* **28** 178-188

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Date submitted: 09 Mar 2005

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