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Pressure dependence of electrical breakdown in water vapour COLIN KELSEY, BILL GRAHAM, KEN STALDER, TOM FIELD, DAVID PATTON, TOM GILMORE, Centre for Plasma Physics, Queens University of Belfast — The relationship of breakdown voltage to the electric field strength and number density of a gas is a fundamental part of plasma physics. It is well studied and understood for parallel plate geometries where the relationship is described by Paschen's Law and thousands of experiments have been performed to measure such curves under a wide variety of conditions. Here we produce a plasma by applying a voltage in a point to plane geometry in a conducting liquid. Shadowgraph images show a vapour layer forming on the point and subsequent light emission indicates plasma creation within the vapour. However the processes are not spatially or temporally reproducible. In order to gain further understanding of the underlying physics of the plasma formation we are determining the electric field strength with at the aid of simulations,[1] experimentally determining the breakdown voltage and varying the gas density by performing the experiments and simulations at different pressures. Preliminary results indicate electric field strengths of about 10^7V/m and that the plasma persists throughout voltage pulses of up to 2 ms.

[1]L. Schaper PSST. 20 (2011) 034003

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