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Plasma Breakdown at Low Pressure¹

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Plasma ignition, the process by which an insulating gaseous medium turns into a conducting plasma, is considered to be well-understood in simple circumstances, involving processes such as electron multiplication, secondary electron emission and ionisation waves. In many practical cases, however, complicated geometry, different material surfaces, different gas mixtures, complex voltage waveforms and varying initial conditions lead to ignition processes that are much less easily described. The aim of this research is to study plasma ignition in simple electrode geometries, in order to identify the main breakdown mechanisms. We use a combination of space- and time-resolved measurements of plasma properties and modelling and simulation tools to study the breakdown behaviour. Phenomena occurring during the pre-ignition and ignition phases will be described.

¹In collaboration with Erik Wagenaars, Wouter Brok, and Gerrit Kroesen, Eindhoven University of Technology, Netherlands.