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## INCEPTION VOLTAGE FOR ELECTRICAL DISCHARGES IN THE PRESENCE OF TRIPLE JUNCTIONS

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The prevention of electrical discharges is a classic problem in the design of electrical equipment, which is only becoming more important with the evolution of various technologies (electrification of airliners, increased voltage levels in various other applications). While the physics of discharge development is well described by Paschen's Law for the case of a gas gap between planar electrodes, deviations from this behavior may occur at high temperature[1] or in the case of a triple junction[2] (metal/solid insulator/gas).

In order to investigate discharge inception under these conditions, a customized system, which can operate at pressure up to 1MPa and temperature of 400°C, was used to test various electrode geometries with and without ceramic insulators.

Experimental results on the deviation from Paschen's law for different geometries of triple junction electrodes are presented compared with each other and with Paschen's law between two spherical electrodes without solid insulator.

In addition to the observed effects of the different conditions (geometry of triple junction electrodes or gas type) on electrical discharge inception voltage, the resulting impulsions have been examined and compared in terms of total charge, rise time, and other parameters.

- 1. G. Galli et al., "Characterization and localization of partial-discharge-induced pulses in fission chambers designed for sodium-cooled fast reactors," IEEE Transactions on Nuclear Science, 65 (2018) 2412.
- 2. C. Tran Duy et al., "Partial discharges at triple junction metal/solid insulator/gas and simulation of inception voltage", Journal of electrostatics, 66 (2008) 319.

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