Contribution ID: **629** Type: **Poster**

2P70 - Experimental approach of the dielectric strength of a vacuum insulator

Tuesday 25 June 2019 13:00 (1h 30m)

One of the main limiting factors in the design of high-power vacuum systems is a surface flashover occurring over the insulator surface between two conducting regions separated by a high-voltage gap. To decrease the probability of this phenomenon, traditional approaches include an increase in the area of insulators, screening tricks of triple junctions and limitation techniques of the secondary electron multiplication.
The design of multi-pulse systems such as multi-MeV, multi-kA induction injector needs to consider radial vacuum insulator stacks which can withstand multiple (two or more) mechanical impulses and multiple electric stresses coming from the generation of multiple high-power pulses. Those high-voltage components are generally designed from J.-C. Martin and Bluhm laws describing the breakdown probability as a function of the electric field, surface concerned and time of exposure.
We take the opportunity of having a dual-pulse high-voltage generator to manage an experimental study on a dedicated setup in order to improve our understanding breakdown phenomena in such geometries and to verify the validity of Martin's law for a two times stressed insulator. The experimental setup is a vacuum chamber in which one can test different dielectric materials compressed between different electrode shapes and stressed by two 250kV-70ns high voltage pulses. Main results of the first campaign will be presented.

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Session Classification: Poster - Microwave Generation and Plasma Interactions and Pulsed Power Switches and Components

Track Classification: 5.5 Insulation and Dielectric Breakdown