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Generalizing Models of Vacuum Arcs

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Useful models of arcing capable of predicting operating gradients in limited environments are beginning to be produced, but generalizing these models to many applications is coming very slowly. We will show how each stage of the arcing process can be explained by many possible mechanisms, each with its own parameter space and peculiarities, and outline how a general model, applicable to many applications such as fusion, power transmission and accelerators, might be produced. The system must consider mechanisms able to cope with a wide range of environments, (plasma/surface, solid/liquid surfaces, wide ranges of temperatures, pressures and densities, classical/non-Debye plasmas. .), over many different timescales, in a consistent way. We prioritize the outstanding questions and suggest some simplifying assumptions.

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