Abstract Submitted
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Radial Distribution of Plasma Parameters in an Asymmetric Coaxial Capacitive Discharge[1] JEREMY PESHL, MILKA NIKOLIC, JANARDAN UPADHYAY, SVETOZAR POPOVIC, LEPSHA VUSKOVIC, Old Dominion University — It has been shown that plasma processing is a promising technique for material removal from the inner surface of superconducting radiofrequency (SRF) cavities used in large particle accelerators. A radiofrequency (rf) Capacitive Coupled Plasma (CCP) is created in a coaxial setup with the powered electrode inside a hollow cylindrical cavity. While a great deal of knowledge has been gathered on effective plasma etching criteria in Ar/Cl_2 discharge such as pressure, temperature, rf power, dc bias voltage, and experiment construction, little is known about important plasma specific parameters. The determination of plasma parameters is important due to the unique cylindrical geometry of the plasma defined by the SRF cavity geometry. This configuration leaves many questions regarding the structure and distribution of the discharge as it relates to radial position. Presented here are the diagnostic methods and subsequent results for both electropositive (Ar) and electronegative (Ar/Cl_2) discharges in a cylindrical coaxial rf CCP. Optical Emission Spectroscopy in conjunction with a robust kinetic model of Argon produces electron temperatures and metastable populations with respect to radial positions of the discharge.

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Jeremy Peshl
Old Dominion University

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