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(POS-41) Towards Controlled Plasma-Wall Interaction Studies: Pre-Ionization in the USASK 2 kJ DPF

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The breakdown, lift-off, and propagation of the initial plasma sheath current (PSC) in Mather-type dense plasma focus (DPF) devices play a critical role in achieving reproducible plasma outflows. These stages influence the initial conditions of the pinch compression phase and affect production of energetic ion beams which can be used for material damage studies. Pre-ionization methods, such as shunt resistors and corona-controlled discharges, have been shown to enhance the reproducibility of plasma outflows, improving the reliability of DPF operation. These methods and their applications are currently under investigation on the USASK DPF 2 kJ device, with the goal of establishing a facility to simulate plasma-wall interaction in fusion reactors. This presentation will provide an overview of these methods, a comparative analysis using the Lee Model, and potential enhancements of USASK DPF discharges. The final objective is to quantify the enhancement of ion flux and fluence that consistent and symmetrical pre-ionization provides for future experimental campaigns.

Keyword-1

Dense plasma focus

Keyword-2

pre-ionization

Keyword-3

Author: Mr VANEGAS, Jeisson (PhD candidate)

Presenter: Mr VANEGAS, Jeisson (PhD candidate)

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