ACCELERATOR SEMINAR

Lorenzo Neri
INFN

Thursday, 9. June 2022 at 4 pm

Online-Seminar via Zoom
(ID: 670 2846 1767/ PW: 975940)

High Stability and Low Emittance Microwave Discharge Ion Sources Magnetic Configuration and Ion Source Simulation Tool Development

A completely new high stability magnetic configuration was discovered during the commissioning of the Proton Source for the European Spallation Source (PS-ESS). Region of unprecedented beam stability was found between several thousand source configurations tested with a custom control system able to operate on the source without humans' interaction. The stability shown in this new configuration, denominated High Stability Microwave Discharge Ion Source (HSMDIS) [1], is excellent (±1.5% flat-top stability, ±3% pulse-to-pulse stability) and the emittance of the produced beam (0.1769 π.mm.mrad RMS normalized) is lower than produced by standard MDIS configuration. High linearity between power and extracted beam current was observed making easier the use of the source. This new mode of operation can be easily implemented in all existing sources. Plasma simulation revealed that the new behaviour is generated by a new plasma heating paradigm activated by a precise magnetic configuration peculiarity. Detailed analysis will be presented thanks to the recent upgrades of our ion source simulation tool, now able to simulate from the plasma formation to the beam extraction.

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