UCLA College | Physical Sciences Physics & Astronomy

Special Plasma Physics Seminar

Physics & Astronomy Building (PAB) Room 4-330
Friday, June 5th at 12:30 PM
https://ucla.zoom.us/j/99287531363?pwd=XofhqtLzUBFleOiYhaNqj32ZFmP9Tp.1

Plasma Material Interaction and Low Temperature Plasma Physics

A cross-cuttng innovation space from fusion energy to plasma-based particle accelerators

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Plasma-material interaction in fusion pilot plants is one of the great frontiers of fusion energy development. The only plasma state compatible with solid-state material choices is a cold, i.e., few-eV-level, high-density, i.e., recombining, so-called detached regime in front of the materials. Such plasma conditions can be categorized as low-temperature plasma with high density (for magnetic confinement) or moderate density (for accelerator applications). In this presentation, recent findings on detached plasma conditions during the application of resonant magnetic perturbation (RMP) fields for controlling edge-localized modes in H-mode plasmas will be reviewed. A specific focus will be on the integration aspects of the fully three-dimensional boundary induced by the RMP fields, with the plasma-material interaction requirements. Results from tokamaks will be compared to stellarator boundary plasma effects, which are clearly related.

In the second part of the presentation, the application of a comparable plasma regime for next- generaon wakefield particle accelerator concepts will be discussed. This work is being conducted within the Advanced Proton Driven Plasma Wakefield Acceleration Experiment (AWAKE) collaboration at CERN. The Madison AWAKE Prototype (MAP), a newly developed prototype device for a helicon-based plasma source for AWAKE will be described. New findings on the ionization and wave propagation mechanisms that impact the extremely demanding density homogeneity of less than 0.5% at nominal densi.es of larger than 7.0 x 1020 m-3 will be summarized and discussed with respect to the next steps in the plasma source development program for AWAKE.

Host: Chris Niemann