

ARIES Town Meeting on “Edge Plasma Physics and Plasma Material Interactions in the Fusion Power Plant Regime”

The plasma-material interface has long been recognized as a major challenge in the utilization of high-temperature plasmas for fusion energy applications. Recent activities such as the FESAC “Greenwald panel” and the DOE-sponsored ReNeW activity reiterated the importance of this topic. At the same time, our understanding of the edge plasma and its interactions with surrounding structures is insufficient to predict both steady and transient heat and particle loads on components, which is a prerequisite in order to transition from experimental research to energy applications.

The majority of the world’s resources devoted to this subject have been concentrated on existing experiments and ITER. It is becoming increasingly urgent to expand our predictive capabilities to future nuclear facilities and power plants. To that end, the ARIES Team hosted a “Town Meeting” on Edge Plasma Physics and Plasma Material Interactions in the Fusion Power Plant Regime. (*ARIES Town Meetings are held approximately once every 1-2 years in response to programmatic needs that align with the current mission of the ARIES Team. These meetings provide an opportunity for increased interactions between researchers in the field and the power plant design community.*)

The key questions addressed in this town meeting included:

- (1) What is the status of our current understanding and predictive capabilities in edge plasmas and PMI?
- (2) What R&D is needed in order to advance this field toward the power plant regime?, and
- (3) What contributions can new devices make toward advancing this field?

42 researchers from 17 organizations, including EU and Japan, participated in the two-day meeting held on the campus of the University of California in San Diego. The agenda included 7 sessions:

1. Background and power plant requirements
2. Physics of the edge - current understanding and projections to ITER and power plants
3. Modeling of the tokamak edge
4. Experimental benchmarking of models for power plants
5. Innovative solutions
6. New device contributions to edge physics benchmarking
7. Conclusions and future plans

Two of the sessions were organized as “directed panel discussions”. The panels were both lively and productive.

Highlights of the meeting are currently being compiled for publication as a journal article. More details on the meeting can be found at the web site, <http://cer.ucsd.edu/ATMPMI2010>.