

Edge and Divertor Plasmas, Atomic and Molecular Processes Group

Group Leaders

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This group performs studies of edge and divertor plasma physics, atomic and molecular processes, and plasma-wall interactions. In the twentieth experimental campaign, tungsten coated divertor tiles are installed in the closed helical divertor at the toroidal section of 9, and we conduct tungsten-related studies. We investigate the ECH wall conditioning, and edge and divertor properties in the high performance plasma experiment, for example, high ion temperature plasma experiments, to maximize the plasma performance. Divertor detachment is very important for fusion reactors, and we investigate the radiation power profile in the detached plasmas with RMP and impurity gases injection, respectively, with improved radiation power measurement. The results of the radiation measurements are compared to the edge plasma and neutral particle transport simulation with EMC3-EIRENE code to improve the code. In the PWI research field, distributions and amounts of retained hydrogen isotopes in vacuum vessel are evaluated.

Main Research Topics

1. Tungsten: effects on plasma performance, transport, density and spatial distribution, spectrum, migration, erosion and deposition
2. High performance plasma: wall conditioning, edge and divertor plasma properties
3. Detachment: isotope effects, RMP, impurity injection
4. Impurity transport: isotope effects, edge transport (C, Fe, W, impurities for detachment), helium transport, understanding of core and edge transport
5. Edge particle and energy transport: isotope effects, gas puffing modulation, RMP, divertor pumping, construction of divertor particle and heat load scaling
6. Atomic and molecular processes: high-Z atoms injection, hydrogen isotopes, development of spectroscopy
7. Steady state operation: ECH long pulse discharge, detachment operation with low heating power
8. PWI: retention of hydrogen isotopes, material migration, plasma irradiation to material specimens

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