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Understanding helium transport: experimental and theoretical investigations of low-Z impurity transport at ASDEX Upgrade ATHINA KAPPATOU, CLEMENTE ANGIONI, RACHAEL M. MCDERMOTT, PIERRE MANAS, THOMAS PÜTTERICH, RALPH DUX, CECILIA BRUHN, Max Planck Institute for Plasma Physics, Garching, Germany, ELEONORA VIEZZER, University of Seville, Seville, Spain, MARCO CAVEDON, MIKE DUNNE, RAINER FISCHER, GIOVANNI TARDINI, Max Planck Institute for Plasma Physics, Garching, Germany, THE ASDEX UPGRADE TEAM — The presence of helium is fundamentally connected to the performance of a fusion reactor. To predict the helium density profile in future fusion devices, understanding of helium transport is indispensable, as are experimentally validated theoretical models of the low-Z impurity turbulent transport. At ASDEX Upgrade, detailed, multi-species investigations of low-Z impurity transport have been undertaken in dedicated experiments, resulting in an extensive database of helium and boron density profiles over a wide range of parameters relevant for turbulent transport (normalised gradients of the electron density, the ion temperature and the toroidal rotation). Detailed comparisons of the experimental density gradients of both impurities with gyrokinetic simulations of the turbulent transport have shown that a qualitative agreement between experiment and theory cannot always be obtained, with strong discrepancies observed in some cases. The role of rotodiffusion and fast ions will be discussed as possible explanations for these discrepancies, which indicate a missing element in our understanding of low-Z impurity transport.

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