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Impurity Transport Experiments at the HSX Stellarator[1] J.F. CASTILLO, B. GEIGER, A. BADER, S.T.A. KUMAR, K.M LIKIN, D.T. ANDERSON, University of Wisconsin - Madison, HSX PLASMA LAB, UNIVERSITY OF WISCONSIN-MADISON TEAM — The laser blow-off technique is used to inject aluminum atoms into the confined region of HSX. To study the radial propagation and confinement properties of the injected impurities, signals from several arrays of AXUV diodes are evaluated and compared with modeling results from the impurity transport code STRAHL. For plasmas with an ECH power (P) of 11.3 kW, the average impurity decay time (τ) is 1.59 ms while an average τ of 3.16 ms is observed when reducing P to 6.3 kW. A systematic study of the power shows a $\tau \propto P^{-1.0}$ dependence, similar to the ISSO4 scaling. In addition, neoclassically-predicted calculations from the PENTA code show much longer decay times compared to experimental measurements. Thus, neoclassical diffusion alone is insufficient to explain these results and suggest a substantial impact of turbulence on the impurity confinement. This finding is further supported by a sensitivity analysis using STRAHL, showing that uncertainties based on the background neutral density and the scrape-off layer loss time are low enough to differentiate between neoclassical and anomalous transport.

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