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☐ Theory ☐ Experiment

Fuel Retention and Removal from the Carbon First-Wall in DIII-D,* E.A. Unterberg, *ORNL*; S.L. Allen, *LLNL*; N.H. Brooks, *GA* – Experiments to determine the short-term retention of deuterium fuel (D) in a graphite first wall are done using a global particle balance. The global particle balance is calculated continuously through a discharge and shows a majority of the D wall retention occurs during the initial ohmic and L-mode phases. Typical wall uptake rates in these phases are $\sim 30 \pm 3.5$ Torr-L/s which is $\sim 2\%$ of the measured divertor ion flux. The continuous global particle balance is compared with a shot-integrated balance, and they agree to $\sim 5\%$. During the H-mode phase of typical ELM-y discharges, the uptake is near zero ($\sim \pm 5$ Torr-L/s), which is $\leq 0.2\%$ of divertor ion flux. This fluctuating retention rate leads to a wall *inventory* reduction during the H-mode phase that can be as much as 100% though typically ~ 20 -30%. A vacuum bake of first wall at 350°C after plasma operations recovered $\sim 80\%$ of the *retained* D, and left $\sim 9\%$ of the total fuel injected during the run-day in the first wall.

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