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Argon Expulsion from Post-Disruption Runaway Electron Plateau using Massive D Injection in DIII-D[1] E.M. HOLLMANN, I. BYKOV, R.A. MOYER, D. RUDAKOV, UCSD, A.YU. PIGAROV, COMPX, J.L. HERFINDAL, D. SHIRAKI, ORNL, J. WATKINS, SNL, N.W. EIDIETIS, A. LVOVSKIY, P. PARKS, C. PAZ-SOLDAN, GA — It has been found that massive (500 Torr-L) deuterium injection rapidly (<5 ms) expels existing argon from the runaway electron (RE) plateau current channel in DIII-D, creating a low-dissipation RE plateau regime which could give reduced RE-wall energy deposition in ITER. The Ar expulsion has been found to result from rapid cooling of the background thermal plasma due to D and D_2 neutral cooling. In the resulting neutral-dominated plasma, radial transport of argon changes from slow cross-field ion transport to more rapid neutral transport, resulting in a hollow total density profile and the bulk of the argon found outside the RE current channel. The Ar-purged RE plateaus appear to result in a very rapid final loss instability, resulting in reduced RE energy deposition to the wall. This reduced energy deposition is consistent with coupled-circuit modeling of the RE plateau-wall interaction, which predicts low energy deposition if the final loss is rapid compared with the plasma resistive timescale.

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Eric Hollmann
UCSD

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