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Argon Expulsion from Runaway Electron Plateau by Massive D_2 Injection in DIII-D[1] E.M. HOLLMANN, I. BYKOV, R.A. MOYER, A.YU. PIGAROV, D.L. RUDAKOV, UCSD, J.L. HERFINDAL, D. SHIRAKI, ORNL, J. WATKINS, SNL, N.W. EIDIETIS, P. PARKS, C. PAZ-SOLDAN, GA, A. LVOVSKIY, ORAU — Massive (500 Torr-L) injection of D2 gas is seen to reduce Ar content of DIII-D runaway electron (RE) plateaus, resulting in greatly reduced RE collisional dissipation but increased excitation of kinetic instabilities. The mechanism for Ar reduction appears to be penetration of the injected neutrals into the RE plateau, which cools the background thermal plasma by elastic and inelastic collisions. This lowers the ionization source term, allowing Ar to recombine. The Ar neutral density is then lowered on-axis due to neutral pressure balance and on-axis heating of the Ar by REs. This sequence results in a rapid (ms) drop in line and bremsstrahlung emission. Comparison between wall heat loads and radiated power indicates that the power loss changes from Ar line radiation to D2 neutral heat transport. Test particle modeling and x-ray data indicate that the RE distribution function itself changes strongly in the keV region but only slightly in the mid-energy MeV region during the Ar expulsion.

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E.M. Hollmann
UCSD

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