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**Up-Gradient Particle Flux driven by Nonlinear Flow-to-Fluctuation Energy Transfer** LANG CUI, GEORGE TYNAN, PATRICK DIAMOND, SAIKAT THAKUR, CHRISTIAN BRANDT, University of California, San Diego — We report a fluctuation-driven particle flux that transports particles up the mean density gradient when density-gradient driven collisional drift waves generate a sufficiently strong radially sheared azimuthal zonal flow in a cylindrical magnetized plasma. Time-domain and bispectral Fourier domain analysis shows that at the peak of the shear layer, where the particle flux is outward, the turbulent stress acts to nonlinearly reinforce the shear flow. Between the peak of the shear layer and the maximum density gradient, the zonal flow nonlinearly drives fluctuations which give rise to an up-gradient particle flux carried mostly by blobs (holes) that move up (down) the gradient, resulting in a steepening of the mean density gradient. The observations show that spatially separated multiple free-energy sources can drive non-diffusive up-gradient transport that affects global plasma equilibrium. Possible links to toroidal confinement and space plasma systems are discussed.

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