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Effects of sudden density changes in disordered superconductors and semiconductors[1] HIBA ASSI, HARSHWARDHAN CHATURVEDI, MICHEL PLEIMLING, UWE TÄUBER, Department of Physics, Virginia Tech — Vortices in type-II superconductors in the presence of extended, linear defects display the strongly pinned Bose glass phase at low temperatures. This disorder-dominated thermodynamic state is characterized by suppressed lateral flux line fluctuations and very slow structural relaxation kinetics: The vortices migrate between different columnar pinning centers to minimize the mutual repulsive interactions and eventually optimize the system's pinning configuration. To monitor the flux lines' late-time structural relaxations, we employ a mapping between an effectively two-dimensional Bose glass system and a modified Coulomb glass model, originally developed to describe disordered semiconductors at low temperatures. By means of Monte Carlo simulations, we investigate the effects of the introduction of random bare site energies and sudden changes in the vortex or charge carrier density on the soft Coulomb gap that appears in the density of states due to the emerging spatial anticorrelations. The non-equilibrium relaxation properties of the Bose and Coulomb glass states and the ensuing aging kinetics are studied through the two-time density autocorrelation function and its various scaling forms.

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