Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Off-equilibrium dynamics and effective temperature of flux lines with random pinning and the vortex glass phase S. BUSTINGORRY, Centro Atomico Bariloche, Argentina, L.F. CUGLIANDOLO, LPTHE, Jussieu, France and LPT, Ecole Normale Superieure, France , D. DOMINGUEZ, Centro Atomico Bariloche, Argentina — We investigate the low-temperature off-equilibrium dynamics of elastic lines embedded in three-dimensional disordered media using Langevin dynamics. The model describes interacting vortex lines in high-temperature superconductors with random pinning. We first study the case of isolated flux lines. At high temperatures the dynamics is stationary and the fluctuation dissipation theorem (FDT) holds. At low temperatures a simple multiplicative aging is found, as recently observed numerically in the directed polymer problem in (1+1) dimensions or analytically in the $2d$ XY model in the spin-wave approximation. Besides, the FDT is violated and we found a well defined effective temperature characterizing the slow modes of the system. This implies the existence of a dynamic crossover between a high-temperature equilibrium dynamic phase and a low-temperature glassy dynamic phase. We then discuss how the off-equilibrium dynamics and effective temperature are affected when the flux line interactions are taken into account and its relationship with the vortex glass phase.

Daniel Dominguez
Centro Atomico Bariloche, Argentina

Date submitted: 30 Nov 2004 Electronic form version 1.4