Comparative study of flux creep in superconductors over a broad spectrum of pinning properties\textsuperscript{1}  LEONARDO CIVALE, SCOTT BAILY, BORIS MAIOROV, Superconductivity Technology Center, Los Alamos National Laboratory — Thermal fluctuations are responsible for the phenomenon of flux creep in type-II superconductors, which allows some level of vortex motion even when the current density is below the critical current density ($J_c$). Creep studies in the high temperature oxide superconductors (HTS) have been a topic of continuous attention since the discovery of these materials. The topic is of both fundamental interest, as HTS vortex matter exhibits a rich variety of dynamic regimes, and practical relevance, as creep reduces the “effective” $J_c$ in wires that are used for power applications. To gain a more general understanding of creep phenomena, we have performed comparative studies of the time relaxation of the persistent superconducting current, $J(t)$, in a variety of type-II superconductors. The $J(t)$ was determined from magnetization (via the critical state model) using a SQUID magnetometer. The materials studied include thin films and single crystals of HTS, pnictides, MgB$_2$ and conventional low $T_c$ superconductors. This allows the spanning of several orders of magnitude in $J_c$, in the fraction $J_c/J_0$, where $J_0$ is the depairing current density, and in the Ginzburg number ($G_i$), which measures the importance of thermal fluctuations. I will discuss the evidence for glassy or non-glassy relaxation in the various systems.

\textsuperscript{1}Research supported by the U.S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering

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Date submitted: 20 Nov 2009
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