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Anomalous Slow Relaxation of the Magnetization in $\mathbf{Y_{1-x}Pr_xBa_2Cu_30_{7-\delta}}$[1] P. GYAWALI, V. SANDU[2], C. C. ALMASAN, Kent State University, B. J. TAYLOR, M. B. MAPLE, University of California at San Diego — We have investigated the time t evolution of the irreversible magnetization M_{irr} in a series of single crystals of $Y_{1-x}Pr_xBa_2Cu_30_{7-\delta}$, $x = 0.13$ ($T_c = 82$ K), $x = 0.34$ (($T_c = 50$ K), and $x = 0.47$ (($T_c = 34$ K), all displaying a second peak in magnetization. In all cases, $M_{irr}(t)$ follows the well known law of relaxation, $M_{irr}(t) \propto [\mu k_B T/U_o ln(t/t_0)]^{-1/\mu}$. For fields/temperatures lower than the corresponding values of the second magnetization peak, μ is anomalously large, $2.5 \leq \mu \leq 4$, in contrast with theoretical predictions which gives a maximum value of 2.5, and with data reported for other cuprates. These large μ values in the vortex glass state, which give rise to a low relaxation rate, occur for all Pr doping and could be due to the presence of Pr ions. In contrast, at fields/temperatures above the second magnetization peak, μ decreases to values expected from theories of plastic vortex liquid and validated by most experimental reports.

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