Superconducting fluctuation regime in the cuprates revealed by torque magnetometry\(^1\) GUICHUAN YU, University of Minnesota — The extent of the superconducting fluctuation regime in the normal state of the cuprate superconductors has remained unclear. For the single-CuO\(_2\)-layer compounds La\(_{2-x}\)Sr\(_x\)CuO\(_4\) (LSCO) and Bi\(_2\)(Sr,La)\(_2\)CuO\(_{6+\delta}\) (Bi2201), one class of experiments indicates characteristic temperatures as high as 2-3 times \(T_c\) at optimal doping, whereas a second class reveals superconducting fluctuations in a relatively narrow temperature range above \(T_c\). Here we report a systematic torque magnetometry study of the superconducting fluctuation regime in three single-layer compounds, LSCO, Bi2201 and HgBa\(_2\)CuO\(_{4+\delta}\). We find in all three cases that the regime of fluctuating diamagnetism is narrow and closely tracks the doping dependence of \(T_c\), consistent with the second class of experiments [1]. The seemingly controversial results can be understood if short-range phase correlations develop only in the vicinity of \(T_c\), whereas local pair formation appears at a relatively high temperature that is universal among all single-layer cuprates.


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