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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 $La_{2-x}Sr_xCuO_4$ (LSCO) and $Bi_2(Sr,La)_2CuO_{6+\delta}$ (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 $HgBa_2CuO_{4+\delta}$. 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 seemly 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.

[1] G. Yu, D.-D. Xia, N. Barišic, R.-H. He, N Kaneko, Yangmu Li, Yuan Li, T. Sasagawa, A. Shekhter, X. Zhao and M. Greven, unpublished

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