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Fluctuations at the superconductor/normal phase transition of YBCO thin films HUA XU, SU LI, CHRISTOPHER LOBB, STEVEN ANLAGE, Center for Superconductivity, Department of Physics, University of Maryland, College Park, MD 20742 — The zero-field phase transition of high T_c superconductors has been studied by a number of techniques, such as penetration depth, magnetic susceptibility, specific heat and thermal expansion, which reveal information about the static, properties of fluctuations. Transport properties (such as the conductivity) which probe the dynamics near T_c are less explored, and a wide range of critical exponents were reported experimentally. We investigated fluctuation effects of $YBa_2Cu_3O_{7-d}$ (YBCO) around T_c by doing frequency-dependent microwave conductivity measurements and dc current-voltage characteristics on the same film. For each experiment the scaling behavior of the data was investigated. The critical exponents ν and z from the two different experiments will be extracted and compared. We also investigated YBCO frequency-dependent conductivity fluctuation effects for different powers or currents and for different film thickness. The finite size effects in both the microwave and DC voltage current experiments will also be discussed. (This work was supported by NSF grant number DMR-0302596)

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