Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Measurement of diamagnetic signal on UD YBCO** FAN YU, GANG LI, TOMOYA ASABA, BENJAMIN LAWSON, University of Michigan, Ann Arbor, MAX HIRSCHBERGER, Princeton University, JOHN SINGLETON, LANL, T. LOWE, B. KEIMER, Max Planck Institute, N.P. ONG, Princeton University, LU LI, University of Michigan, Ann Arbor — The ortho-II phase under-doped (UD) $YBa_2Cu_3O_{6+\delta}$ has shown a number of interesting phenomena such as quantum oscillations and field-driven charge ordering. An open question is the fate of the superconducting fluctuation in the magnetic field beyond the vortex melting field. To answer the question, we carried out the capacitance based cantilever torque magnetometry measurements on the $T_c = 60$ K phase $YBa_2Cu_3O_{6+\delta}$ up magnetic fields as high as 56T. At $T$ as low as 1.5 K, the magnetization hysteresis ends at 30 T, marking the melting of the vortex solid phase. Nonlinear diamagnetic signal exists beyond the melting field and persists at field 56T. Our observation suggests that the superconducting fluctuation persists into extensive field, as the Cooper pairing survives well above the vortex solid melting field.

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Date submitted: 14 Nov 2013 Electronic form version 1.4