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Plausible loop currents in the GdBCO pseudogap phase C. BOEKEMA, San Jose State University, T. SONGATIKAMAS, Santa Clara University, M.C. BROWNE, San Jose State University — For the cuprate pseudogap phase, Varma [1] predicts loop currents above T_c. We search for fields near 100 Oe, created by such currents in $GdBa_2Cu_3O_{7-\delta}$ (GdBCO). Using MaxEnt-Burg (ME) we analyze zero-field (ZF) muon-spin-rotation (μSR) data of underdoped (δ1; T_c= 81 K) and optimal doped (δ0; T_c= 93 K) GdBCO. [2] ME-μSR applied to ZF-GdBCO data yields T-dependent signals at 0-MHz (f0) and 0.3-MHz (f1) and hints of 1.4-MHz signals. To cancel any systematic (f1) effect, we analyze DS(t,T) = S(t,T>T_c) - S(t,T'<<T_c). This ME-Burg analysis of GdBCO(δ0 & δ1) indicates weak signals near 1.4 MHz above T_c (and f1 disappears). These ME-peaks occur at ~1.3 MHz (95 Oe) for GdBCO(δ1) and ~1.5 MHz (110 Oe) for GdBCO(δ0). These μSR signals, plausibly due to fields created by loop currents, appear only above T_c. Below T_c, only ME background noise exist in DS(t,T) transforms. The ~1.4-MHz peak intensity to background ratio at its maximum is ~5 for GdBCO(δ1) and ~4 for GdBCO(δ0) at ~10 degrees above T_c. Validating predicted loop currents is essential for understanding the pseudogap phase. Research supported by REU NSF & DOE LANL. [1] CM Varma, Phys Rev Lett 83 (1999) 3538; [2] T Songatikamas et al, J Supercond & Novel Magn 23 (2010) 793.

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