

Abstract Submitted
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Muon probing in optimal and under-doped GdBCO C. BOEKEMA, San Jose State University, H. SIO, Harvey Mudd College, M.C. BROWNE, San Jose State University — By means of MaxEnt-Burg, transverse-field (TF) μ SR data of underdoped ($\delta 1$; $T_c = 81$ K) and optimal doped ($\delta 0$; $T_c = 93$ K) $\text{GdBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (GdBCO) are analyzed. Site search studies for RBCO generated plausible candidates for muon sites [1] called the Balmer and Lin sites. We wish to confirm the muon-probe sites in GdBCO. One of the two Balmer sites and the Lin site are located near O vacancies. These two sites become unstable in underdoped GdBCO($\delta 1$). Positive muons are repelled by the positive O vacancies. This repulsion effects would be more pronounced as temperature increases. At 120 K, three signals are present in GdBCO($\delta 1$), while at roomtemperature (RT), only one dominant signal remains. In contrast, three signals occur at 120 K and RT for GdBCO($\delta 0$), which has much less O vacancies. These results support earlier studies [1] of muon-O sites. Thus, the muons probe away from the CuO_2 plane, allowing μ SR to detect magnetic fields originating from potential loop currents in these planes. [2] By ME- μ SR analysis, the Balmer & Lin sites in GdBCO are confirmed. Research supported by NSF-REU.

[1] WK Dawson et al, J Appl Phys 64 (1988) 5809 & Hpf Int 63 (1990) 219.

[2] CM Varma, PRL 83 (1999) 3538; T Songatikamas et al, J Superconductivity and Novel Magn 23 (2010) 793.

Carolus Boekema
San Jose State University

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