

Abstract Submitted  
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**Search for the Coexistence of Magnetism and Superconductivity in  $Ce_{1-x}Gd_xRu_2$  using the Mossbauer Effect**<sup>1</sup> MICHAEL DE MARCO, RYAN HEARY, DERMOT COFFEY, Dept. of Physics, Buffalo State College, NY 14222, PE-CHUN HO, TODD SAYLES, BRIAN MAPLE, Dept. of Physics, University of California, San Diego, CA 92093, STEVE TOORONGIAN, MICHAEL HAKA, Nuclear Medicine Department, SUNY Buffalo, NY 14260 — We use the <sup>99</sup>Ru Mossbauer Effect (ME) to look for evidence for the coexistence of magnetism and superconductivity in  $Ce_{1-x}Gd_xRu_2$ . These compounds have superconducting and ferromagnetic phases. The  $T_c(x)$  and  $\theta(x)$  curves cross at  $x = 0.135$ . Here  $\theta(x)$  is the Curie temperature found by extrapolating magnetic susceptibility data below  $T_c$ . A sample of  $Ce_{0.93}Gd_{0.07}Ru_2$  was prepared with enriched <sup>99</sup>Ru(97%) for which  $T_c=4.5K$  and  $\theta=4.19K$ . The ME spectrum measured at 2.2K showed a pure quadrupole with a splitting of 0.36mm/s and an isomer shift of 0.12mm/s with no hyperfine field. The absence of the magnetic field in the sample brings into question the use of extrapolated magnetic susceptibility data as evidence for the coexistence of magnetism and superconductivity. Comparing the ME spectrum with that of  $CeRu_2(T_c=6.1K)$  one sees that there is an impurity Ru phase. This suggests that previous evidence for magnetism below  $T_c$  on the basis of <sup>57</sup>Fe ME could be attributed to an impurity Fe phase.

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