Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Impact of the reduction process on the long-range antiferromagnetism in Nd1.85Ce0.15CuO4 PIERRE RICHARD, Universite de Sherbrooke, MARIO POIRIER, Universite de Sherbrooke, SERGE JANDL, Universite de Sherbrooke — In contrast to the hole-doped high-temperature superconductors, for which a Cu^{2+} long-range antiferromagnetic order is suppressed at low doping, the antiferromagnetic order is more robust in the electron-doped 2-1-4 cuprates $RE_{2-x}Ce_xCuO_4$ (RE = Pr, Nd, Sm, Eu) and persists up to optimal doping. Recent neutron measurements have suggested that the Cu^{2+} Néel temperature decreases after the reduction of the as-grown samples. This questions the competition between the antiferromagnetic and superconducting ground states, as well as the role of the reduction process which triggers superconductivity in these materials. A recent ultrasonic study have revealed ultrasonic anomalies around 4 K related to competing Nd^{3+}-Nd^{3+} and Nd^{3+}-Cu^{2+} interactions. We present an ultrasonic study of $Nd_{1.85}Ce_{0.15}CuO_4$ in the reduced and oxygenated states. While ultrasonic anomalies are found below 10 K in the oxygenated state, in both the C_{66} elastic moduli and the corresponding attenuation α, no anomaly is observed in the reduced and superconducting state. We attribute this effect to the suppression of the Cu^{2+} long-range antiferromagnetic order due to the presence of oxygen vacancies in the CuO_2 planes of reduced samples.

Pierre Richard
Universite de Sherbrooke

Date submitted: 01 Dec 2004 Electronic form version 1.4