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High Temperature EXAFS Studies of $La_{1-x}Ca_xMnO_3$: New Evidence for Magnetic Dimers L. DOWNWARD, F. BRIDGES, T.A. O'BRIEN, Univ of California Santa Cruz, J.J. NEUMEIER, Montana State University — We present Extended X-ray Absorption Fine Structure (EXAFS) data on the CMR perovskite manganites $La_{1-x}Ca_xMnO_3$ ($0.2 < x < 0.5$) to high-temperature (300-600 K) We have recently reported[1] changes in the Mn-O distortion (measured as a broadening, σ of the Mn-O pair distribution function) as a function of magnetic field, temperature and Ca-concentration, x. Extensive data indicate that there is a universal relationship between changes in the local distortion ($\Delta\sigma^2$) and the sample magnetization. These data suggest that small magnetic clusters containing equal numbers of electron and hole sites must exist just above T_c. These clusters have little Jahn-Teller distortion and must form at some higher temperature; the smallest such unit would be an electron/hole site pair, which we call a dimeron. The new high temperature data presented here shows another significant step in the Mn-O distortion near 450 K, which we associate with the dimeron formation temperature, T*. This second step occurs at the same temperature for which other authors have observed a break in the inverse magnetic susceptibility. [1] L. Downward *et al.*, Phys Rev Lett **95**, 106401 (2005).

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