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Polaron dynamics in $La_{0.7}Ba_{0.3}MnO_3$ and $La_{0.7}Sr_{0.3}MnO_3$ Y. CHEN, University of Maryland and NCNR, B. G. UELAND, J. W. LYNN, NCNR, S. BARILO, Institute of Solid State and Semiconductor Physics, Belarus, Y. MUKOVSKI, R. PRIVEZENTSEV, Moscow Institute of Steel and Alloys, Russia
— In the pervoskite manganites $La_{1-x}A_xMnO_3$ (Ca, Sr and Ba), the spin, lattice, charge and orbital degrees of freedom are intimately coupled , leading to a rich phase diagram. $La_{0.7}Ca_{0.3}MnO_3$ (LCMO) is a metallic ferromagnet at temperatures below $T_c \sim 257$ K and colossal magnetoresistivity is observed and associated with the formation of nanoscale polarons that develop at elevated temperatures with an ordering wave vector of $\sim$ (1/4,1/4,0). As the paramagnetic-insulating state is entered, a purely elastic component to the structural polaron scattering signals the development of the correlated polaron glass phase in LCMO. We investigated the structure and dynamics of these polarons through and above the ferromagnetic-metallic to paramagnetic-insulating transition by neutron scattering on single crystals of $La_{0.7}Ba_{0.3}MnO_3$ and $La_{0.7}Sr_{0.3}MnO_3$. In contrast to LCMO, no static polaron correlations are observed, however, we find that dynamic polaron correlations exist. We have measured the energy and temperature dependence of the dynamic polaron correlations. The formation of the dynamic polarons is not directly related to T_c.

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