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Unusual temperature dependence of the oxygen-isotope effect on the exchange-energy of $\mathbf{La_{1-x}Ca_xMnO_3}$[1] GUO-MENG ZHAO, JOHN MANN, Department of Physics and Astronomy, California State University, Los Angeles — We report magnetic susceptibility $\chi(T)$ measurements on oxygen-isotope exchanged $La_{1-x}Ca_xMnO_{3+y}$ up to 700 K. The $1/\chi(T)$ data show that the ferromagnetic exchange-energy J depends strongly on the oxygen-isotope mass. The isotope effect on J decreases with temperature up to 400 K and then increases again with temperature above 400 K. This unusual temperature dependence cannot be explained by existing theories of the colossal magnetoresistance effect for doped manganites. We suggest that a correct model for description of the physics of manganites should be based on double-exchange and the formation of localized bipolarons in the paramagnetic state.

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