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Direct observation of electronic nematicity in charge and orbital ordered $La_{0.33}Ca_{0.67}MnO_3$ J. TAO, Condensed Matter Physics & Materials Science Dept., Brookhaven National Laboratory, K. SUN, Dept of Physics, University of Michigan, J.M. ZUO, Department of Material Science and Engineering and F. Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign, Y. ZHU, Condensed Matter Physics & Materials Science Dept., Brookhaven National Laboratory — Nematic and smectic states have been demonstrated to be very important in understanding high-T_c superconductivity. Here we report similar observations of electronic nematicity in doped manganites. Both the electron diffraction results and HRTEM images obtained from single crystal domain of $La_{0.33}Ca_{0.67}MnO_3$ clearly show a C4 to C2 symmetry broken in charge ordered (CO) and orbital ordered superstructures at intermediate temperature range. The electronic nematicity persists in the crystal until long-range CO forms as a stripe phase at lower temperatures upon cooling. During warming process, we observed topological defects in the charge ordering superstructures, indicating that the melting of the CO superstructure is defect mediated. Theoretical simulations will also be provided for better interpretation of the phenomenon. Research at Brookhaven National Laboratory was sponsored by the US Department of Energy (DOE)/Basic Energy Sciences, Materials Sciences and Engineering Division under Contract DE-AC02-98CH10886.

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