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Pressurized LaMnPO: antiferromagnetic insulator to magnetic metal J.W. SIMONSON, Department of Physics and Astronony, Stony Brook University, M. PEZZOLI, Department of Physics and Astronony, Stony Brook University and Department of Physics and Astronomy, Rutgers University, J. GUO, Institute of Physics and Beijing National Laboratory for Condensed Matter Physics, Chinese Academy of Sciences, J. LIU, Institute of High Energy Physics, Chinese Academy of Sciences, L.L. SUN, Institute of Physics and Beijing National Laboratory for Condensed Matter Physics, Chinese Academy of Sciences, G. KOTLIAR, Department of Physics and Astronomy, Rutgers University, M.C. ARONSON, Department of Physics and Astronony, Stony Brook University — It is felt that high temperature superconductivity stems from proximity to an electron delocalization transition, such as the metal-insulator transitions exhibited by the cuprates or the antiferromagnetic transitions of the iron pnictides. We subjected the manganese pnictide LaMnPO to hydrostatic pressures up to 43 GPa, measured x-ray diffraction patterns, and solved the crystal structures at various pressures. We then performed LSDA electronic structure calculations using the observed lattice constants and atomic parameters to obtain the magnitudes of the insulating gap and the ordered state magnetic moment. While the calculations found the gap to close near 10 GPa, the magnetic moment persisted until a structural collapse at 31 GPa. These results imply that the metal-insulator transition and the antiferromagnetic transition are separated within the pressure phase diagram of LaMnPO. We discuss these results in light of the inherent differences between Mott-like and Hund's-like systems.

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