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Electronically smectic-like phase in a nearly half-doped manganite

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Charge/orbital ordering is one of the most important of phenomena in doped manganites [1-3]. In this talk, I am going to present our recent neutron scattering results on the charge/orbital ordering (CO-OO) and spin ordering in the nearly half-doped perovskite manganite $Pr_{0.55}(Ca_{0.8}Sr_{0.2})_{0.45}MnO_3$ (PCSMO) [4]. On cooling from room temperature, PCSMO first enters into a CO-OO state below T_{CO} and then becomes a CE-type long-range ordered antiferromagnet below TN. At temperatures above TN but below T_{CO} ($T_N < T < T_{CO}$), the spins in PCSMO form highly anisotropic smectic liquid-crystal-like texture with ferromagnetic (FM) quasi-long-range ordered one-dimensional zigzag chains weakly coupled antiferromagnetically. Such a magnetic smectic-like phase results directly from the spin-orbit interaction and demonstrates the presence of textured 'electronic soft' phases in doped Mott insulators [5,6]. This work was supported by the DOE No.DE-AC05-00OR22725 with UT/Battelle, LLC and U. S. NSF DMR-0139882. This work was performed under the US-Japan Cooperative Program on Neutron Scattering.

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