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Modulation doping of double-exchange ferromagnetism in an antiferromagnetic manganite: Magnetic Structure T.S. SANTOS, A. BHATTACHARYA, S.G.E. TE VELTHUIS, Argonne National Lab, B.J. KIRBY, J.A. BORCHERS, B.B. MARANVILLE, NIST NCNR, S.J. MAY, Drexel U., S. KUMAR, J. VAN DEN BRINK, IFW Dresden, J. ZARESTKY, Ames Lab — In his pioneering work, de Gennes described a canted antiferromagnetic (AF) state that arises when mobile carriers are added to an insulating AF manganite. However, attempts to realize this canted AF state have been impeded by phase segregation into mixed F and AF phases for x=0.1-0.2. Using a digital synthesis technique to carry out modulation doping of charge carriers into an AF host near x=0.5, we exploit the competing double-exchange and superexchange interactions to realize the canted AF state predicted by de Gennes. We observed the canted AF state using polarized neutron reflectometry and neutron diffraction using polarized neutrons and polarization analysis. Theoretical consideration using the two-orbital model shows that these additional carriers cause a local enhancement of F double-exchange with respect to AF superexchange, resulting in local canting of the AF spins, where the canting angle depends on the doping level. We observe that the canting angle varies with the spreading of charge near the delta-doped layer. Funded by DOE-BES: Scientific User Facilities Div. & Div. of Materials Science & Engineering, and US Dept. of Commerce

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