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**Orbital ordering at the surface of the layered manganite $\mathbf{La_{0.5}Sr_{1.5}MnO_4}$**[1] Y. WAKABAYASHI, Photon Factory, High energy accelerator research organization, Japan and Brookhaven National Lab., S. GRENIER, M.H. UPTON, J.P. HILL, C.S. NELSON, Brookhaven National Laboratory, J.F. MITCHELL, Argonne National Laboratory, J-W. KIM, P.J. RYAN, Argonne National Laboratory and Ames Laboratory, Iowa State Univ., A.I. GOLDMAN, Ames Laboratory, Iowa State Univ. — Surface x-ray diffraction measurements were made on a (001) cleaved surface of the orbitally ordered layered manganite, $La_{0.5}Sr_{1.5}MnO_4$ at X22C and X21 at the NSLS and at 6ID at the APS. The termination of crystal by a surface gives rise to rods of scattered intensity normal to that surface; so-called crystal truncation rods. The intensity distribution along such rods is sensitive to details of the surface order. In principle, similar rods should arise from the surface termination of orbital order. We have successfully observed such orbital truncation rods for the first time. We find that the intensity distribution of the orbital rod has a slightly steeper $L$ dependence than that for the allowed Bragg rods, indicating that the surface roughness of the orbital ordering is larger than the crystallographic roughness. As the transition temperature is approached, this orbital roughness is seen to increase.

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