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Can La2CuO4 be made into an undoped metal / superconductor: insights from angle-resolved photoemission HAOFEI WEI, Cornell University, CAROLINA ADAMO, Stanford University, DARRELL SCHLOM, KYLE SHEN, Cornell University — La_2CuO_4 is a well-known parent compound for the hole-doped cuprate superconductors. However, by shiftings the apical oxygen away from the Cu-O plane, it can also be made into the parent for an electron-doped superconductor. La_2CuO_4 in this so-called T′ structure is metastable in bulk, but recent reports have succeeded in stabilizing thin films via molecular-beam epitaxy. These samples were reported to be metallic and even superconducting, in contrast to the Mott insulating state found in all other undoped cuprate parent compounds. To determine whether it is truly a metal in its undoped state, we have for the first time directly measured the electronic structure of epitaxially grown thin films of nominally undoped T′-La_2CuO_4 using in-situ angle-resolved photoemission spectroscopy (ARPES). We observe dispersive bands which form a well-defined Fermi surface with intensity modulations consistent with scattering from an underlying SDW order, similar to those observed in doped n-type cuprates. We have also characterized the carrier density using Luttinger's rule, and will discuss what information our measurements provide on the role of oxygen non-stoichiometry in determining the properties of this system and on the potential for a metallic undoped cuprate.

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