Fermi surface and quasiparticle dispersion of the highly-conductive perovskite oxide $SrMoO_3$

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$SrMoO_3$ single-crystals have the lowest room-temperature resistivity of any transition-metal oxide [1]. This remarkable material has therefore attracted substantial interest for its possible uses as an electrode in oxide-electronics applications [2–5]. Electrical conduction in $SrMoO_3$ arises from the 2 itinerant electrons in the Mo $4d$ t_{2g} shell [6]. This makes $SrMoO_3$ the particle-hole-symmetric counterpart to the ruthenate $SrRuO_3$, with 2 holes in the Ru $4d$ t_{2g} shell. The room-temperature resistivity of the latter is, however, more than one order of magnitude higher [7] and existing estimates for the effective masses hint to a markedly different strength of correlations in these two compounds. The reason for this remarkable difference is not known. Here, I will present our ARPES investigation of bulk-like $SrMoO_3$ thin films grown by pulsed-laser deposition. Our synchrotron measurements establish the full 3D electronic structure of $SrMoO_3$ and yield quantitative information about the quasi-particle (QP) band dispersion. We determine QP self-energies and compare our results to dynamical mean-field calculations, which provides new insight into the puzzle of the low resistivity of $SrMoO_3$.

[1] Nagai et al., Appl. Phys. Lett. 87, 024105 (2005).
[2] Radetinac et al., Appl. Phys. Lett. 105, 114108 (2014).
[3] Radetinac et al., J. Appl. Phys. 119, 055302 (2016).
[4] Salg et al., APL Mater. 7, 051107 (2019).
[5] Stoner et al., Adv. Funct. Mater. 29, 1808609 (2019).
[6] Wang et al., Journal of Vacuum Science & Technology A 19, 930 (2001).
[7] Alff et al., J. Phys. D: Appl. Phys. 47 034012 (2014).