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$_3$.