Momentum-resolved electronic structure of the superconductor parent compound BaBiO$_3$

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— We use in situ angle-resolved photoemission to study thin films of BaBiO$_3$, a parent compound of bismuthate superconductors with $T_c$ up to 30 K. By simple electron counting, BaBiO$_3$ should be metallic. However, in analogy with many unconventional and high-$T_c$ superconductor families, it is instead insulating, and superconductivity emerges with doping. Our experiments reveal a folded band structure consistent with known BiO$_6$ breathing distortions. However, charge ordering often thought to accompany the distortions is virtually nonexistent. The data combined with DFT calculations indicate that states near $E_F$ are primarily oxygen-derived. Hence BaBiO$_3$ appears to be characterized by negative charge transfer energy. This can account for the seeming discrepancy between the atomic structure and “missing” charge order. It should also be relevant for understanding the doping evolution and superconductivity in bismuthates.