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**Bandwidth-controlled metal-superconductor-insulator phase diagram in iron-chalcogenides** XIAOHAI NIU, SUDI CHEN, JUAN JIANG, ZIRONG YE, TIANLUN YU, DIFEI XU, MIN XU, YU FENG, YAJUN YAN, BINPING XIE, JUN ZHAO, Fudan University, DACHUN GU, LILING SUN, Institute of Physics, Chinese Academy of Sciences, QIANHUI MAO, HANGDONG WANG, MINGHU FANG, Zhejiang University, C. J. ZHANG, High Magnetic Field Laboratory, Chinese Academy of Sciences and University of Science and Technology of China, J. P. HU, Institute of Physics, Chinese Academy of Sciences, ZHE SUN, National Synchrotron Radiation Laboratory, University of Science and Technology of China, DONGLAI FENG, Fudan University — Using angle- resolved photoemission spectroscopy, we studied isovalently doped K_$x$Fe_${2−y}$Se_${2−z}$S_$z$, Rb_$x$Fe_${2−y}$Se_${2−z}$Te_$z$ and (Tl,K)_$x$Fe_${2−y}$Se_${2−z}$S_$z$, in which the superconducting transition temperature decreases with either positive or negative chemical pressures. The bandwidths of Fe 3d bands in the energy window of [0, -0.5] eV in these materials change systematically with doping: with the decreasing of bandwidth, the ground state evolves from a metal to a superconductor, and eventually to an insulator. This systematic study of electronic structures discovered the correlation-driven insulator state by tuning the bandwidth, which is independent with carrier density. The results also indicate that moderate correlation strength is beneficial to enhance superconductivity.

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