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Interplay between the nematic and SDW states in iron-pnictides and iron-chalcogenides YAN ZHANG, SIMES, LBNL, MING YI, SIMES, Stanford University, DONGHUI LU, SSRL, SLAC National Accelerator Laboratory, ZHONGKAI LIU, WEI LI, JAMES LEE, SIMES, Stanford University, ROBERT MOORE, FELIX SCHMITT, SIMES, MASAMICHI NAKAJIMA, HIROSHI EISAKI, National Institute of Advanced Industrial Science and Technology, MAKOTO HASHIMOTO, SSRL, SLAC National Accelerator Laboratory, ZHI-XUN SHEN, SIMES, Stanford University — Utilizing the angle-resolved photoemission spectroscopy (ARPES) and detwinning method, we have studied the electronic structure reconstruction in the nematic and SDW states of iron-based superconductors. The key features associated with the symmetry breaking process across the structure and magnetic transitions have been resolved. In the nematic state, we found that the energy splitting of the d_{xz} and d_{yz} bands is strongly momentum dependent. It is negligible in the zone center and reaches maximum at the zone corner, which is inconsistent with the ferro-orbital ordering scenario. In the SDW state, the reconstruction of the electronic structure is dominated by the SDW gap opening, whose orbital dependence and momentum dependence could be well described by the theoretical calculations. More intriguingly, we found that the coupling between the nematic and SDW states is strong in iron-pnictides, but very weak in iron-chalcogenides. Our findings resolve controversies on the electronic structure reconstruction in the nematic and SDW states of iron-based superconductors, and have strong implications on theory.

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