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Nematic Order, Superconductivity and their Evolution with Doping in Single-Layer FeSe/SrTiO₃ Films YONG HU, XINGJIANG ZHOU, Chinese Academy of Sciences (CAS), QIKUN XUE, Tsinghua University, ZUYAN XU, CHUANGTIAN CHEN, Chinese Academy of Sciences (CAS), XU COLLABORATION, XUE COLLABORATION, ZHOU TEAM — The discovery of high temperature superconductivity with a T_C higher than 65K in single-layer FeSe films epitaxially-grown on SrTiO₃ substrate (FeSe/STO films) has attracted much attention. The origin of such a dramatic T_c enhancement remains to be further investigated. While the nematic state has been reported in bulk FeSe and multi-layer FeSe/STO films, its presence in the single-layer FeSe/STO films remains under debate. In this talk, we will present our high-resolution angle-resolved photoemission investigations on the electronic structure evolution of single-layer FeSe/STO films with electron doping by *in-situ* potassium deposition. We have confirmed the existence of a nematic order in single-layer FeSe/STO films at low electron doping. By increasing electron doping, the nematic order is suppressed and superconductivity emerges. Our results establish a unified picture about the nematicity in bulk FeSe, multi-layer FeSe/STO films, and single-layer FeSe/STO films. The relation between nematicity and superconductivity in single-layer FeSe/STO films will be discussed.

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