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Strong electronic two-dimensionality and close relationship between spin nematicity and superconductivity in soft-chemistry synthesized (Li,Fe)OHFeSe and FeSe single crystals XIAOLI DONG, JIE YUAN, KUI JIN, FANG ZHOU, Institute of Physics University of Chinese Academy of Sciences, CAS, Beijing 100190, China, GUANGMING ZHANG, State Key Laboratory of Low Dimensional Quantum Physics and Department of Physics, Tsinghua University, Beijing 100084, China, ZHONGXIAN ZHAO, Institute of Physics University of Chinese Academy of Sciences, CAS, Beijing 100190, China — We have developed hydrothermal ion-exchange and ion-release routes to synthesize a series of big superconducting (Li,Fe)OHFeSe and FeSe single crystals out of insulating $K_2Fe_4Se_5$ matrix. In $(Li_{0.84}Fe_{0.16})OHFe_{0.98}Se$ crystal, a common temperature scale $T^* = 120$ K has been established. Below T^*, the normal state electronic behavior becomes highly two-dimensional prior to the superconducting transition and AFM spin fluctuations in the iron plane set in. In FeSe crystals, a spin-nematic order is identified by in-plane angular-dependent magnetoresistance and magnetism measurements, manifested as a rotational symmetry breaking and evident spin frustrations below a characteristic temperature T_{sn}. Remarkably, a universal linear relationship between T_c and T_{sn} is observed on a series of crystal samples, indicating that the spin nematicity and the superconductivity in bulk FeSe have a common microscopic origin. **References:** [1] X. Dong et al., ***JACS* 137**, 66-69 (2015). [2] X. Dong et al., ***PRB* 92**, 064515 (2015). [3] D. Yuan et al., ***Chin. Phys. B* 25**, 077404 (2016). [4] D. Yuan et al.,, ***PRB* 94**, 060506R (2016).

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