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**Study on the non-bulk superconductivity in  $\text{CaFe}_2\text{As}_2$  single crystals under different annealing conditions.** K. ZHAO, B. LV, L.Z. DENG, Y.Y. XUE, Texas Center for Superconductivity and Department of Physics, University of Houston, C.W. CHU, Texas Center for Superconductivity and Department of Physics, University of Houston; Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley — The interplay between SDW and tetragonal/collapsed tetragonal(T/cT) structural transition in  $\text{CaFe}_2\text{As}_2$  single crystals under different annealing conditions has been thoroughly investigated, while the occurrence of filamentary superconductivity with  $T_c \sim 10\text{K}$  remains mysterious. In this talk, I will present our studies on the interplay of magnetism, structural transition, and superconductivity in the undoped  $\text{CaFe}_2\text{As}_2$  single crystals obtained under different synthetic conditions and annealing procedures. The diamagnetic shift has been detected for the first time and taken as an evidence of superconductivity. High temperature annealing and low temperature annealing drive  $\text{CaFe}_2\text{As}_2$  into the cT ground state and the T ground state, respectively. The superconductivity signal is maximized in the condition where the sample reaches the unstable region at the border of these two. The detailed results and their implications will be presented and discussed.

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