"Enhancing superconductivity in FeSe thin films using oxide substrates phonons"

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A flurry of scientific activities has been generated by the discovery of a significantly enhanced superconductivity in ultra-thin films of FeSe grown on oxide substrates such as SrTiO3. At present there are two main groups of proposals for the origin of this enhancement: those involving excess electron doping by the substrate or those involving a more direct interaction between the substrate and the film. The latter has recently gained strong experimental support from the observation of replica bands in the electronic structure of FeSe/STO [1], which indicates coupling to an oxygen phonon mode in the substrate [2]. In this talk I will discuss several aspects of this scenario, including the unique momentum structure of this interaction, which is strongly peaked in the forward scattering direction. I will show that such a coupling leads to departures from the expectations gleamed from conventional BCS theory
and can account for the Tc enhancement in FeSe/STO. I will also discuss the implications of this scenario for other thin film systems.

1. J. J. Lee et al., Nature 515, 245 (2014).
2. L. Rademaker et al., NJP 18, 022001 (2016); Y. Wang et al., Supercond. Sci.Technol. 29, 054009 (2016).