# Metastable Melting of an Superconductivity in an Iron-Based Superconductor

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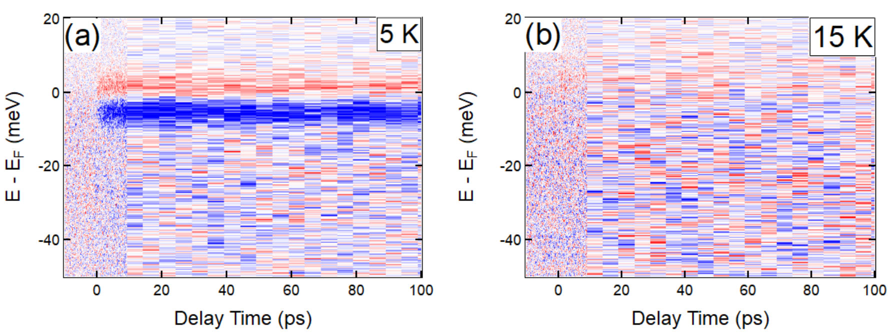
Pumping superconductors out of equilibrium is an excellent way to gain insight into the pairing mechanisms by observing the nonequilibrium response and subsequent recovery of the superconducting features. As an example, time-and-angle resolved photoemission spectroscopy (trARPES) has been applied to the cuprate superconductors for two decades, and has proved usedul in understanding the superconducting pairing mechanism. The iron-based superconductors provide a much more difficult medium for trARPES experiments because of the much lower energies required to access the superconducting bands. However, several recent works have established that pumping above $T_C$ leads to a photoinduced metastable state that forms within hundreds of femtoseconds, although its relationship to superconductivity remains a mystery[1-4].

Here, I will directly show, for the first time, how trARPES can be used to probe the photoinduced changes to the superconducting band structure in the iron-chalcogenide superconductor $FeSe_{0.45}Te_{0.55}$ by improving the energy resolution to 6 meV[5]. Pumping this iron-based superconductor destroys two features that are directly associated with superconductivity, indicating that it becomes melted on ultrafast timescales. Furthermore, no recovery is observed on a timescale of 100 ps, indicating that these changes are metastable, thus providing a link between our observations and the recently reported metastable state. Following this key result, I will discuss the dynamics at shorter delays, and our proposed mechanism for why superconductivity becomes melted, which involves the generation of double-stripe magnetic correlations.




**References**
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