# Addressing superconductivity with accelerator-based infrared and THz radiation sources

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Since the pioneering works from Tinkham in the 50's, infrared and THz studies have provided fundamental pieces of evidence towards the understanding of superconductivity. In the last 30 years, infrared spectroscopy supplied an outstanding contribution to the characterization of high-temperature superconductors. Infrared spectroscopy based on thermal sources is however limited in brightness and time structure, whereas recent research indicates the need to probe superconductors in the time-scales of the electron dynamics and length-scales characteristics of spatial dishomogeneities. These limitations can be overcome with the help of accelerator-based sources.

We review here recent results obtained with infrared synchrotron radiation at the SISSI@Elettra beamline, spanning from the study of superconducting gaps, to the characterization of the pressure-dependent electrodynamics in the normal state. We will present the new free-electron-laser based TeraFERMI facility, dedicated to time-resolved studies on the femtosecond timescale.

Possible future developments towards nanoscale probes will be finally presented.