

21世紀COEセミナー

Probing Gaps and Pseudogaps in Cuprates by Infrared Spectroscopy

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場所:理学部H棟6階中セミナー室 (H601)

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概要: Identifying how remote high critical temperature superconductors are from conventional metals is an important clue for these materials. Infrared spectroscopy can provide a model independent insight about the properties of these “strange metals”. Indeed the optical conductivity integrated up to a set of cut-off frequencies (spectral weight) has clear signatures when studied versus temperature and cut-off frequency, for a metal (full Fermi surface) or a partially gapped state.

We will first present our data deduced from in-plane reflectivity measurements, in electron doped cuprates ($\text{Pr}_{2-x}\text{Ce}_x\text{CuO}_4$, $x=0.11, 0.13, 0.15, 0.17$). There, we find a clear spectroscopic signature of the onset of a pseudogap up to $x=0.15$. Recent infrared results in a reduced (superconducting) sample and an oxidized non superconducting sample for $x=0.17$, together with inelastic neutron scattering data, point towards a magnetic origin of the pseudogap. In contrast, in hole doped materials (two layers cuprate $\text{Bi}_2\text{Sr}_2\text{CaCuO}_{8+\delta}$), the pseudogap is hardly seen in the in-plane conductivity. This may imply that the pseudogap in electron doped and hole doped compounds has a different origin.