## Optical properties of electron and hole-doped 122 iron-arsenic superconductors

**Y.M. Dai**[a, b], B. Xu[a], A. Forget[c], D. Colson[c], B. Shen[a], H.H. Wen[a], R.P.S.M Lobo[b], and X.G. Qiu[a]

[a]National laboratory for Superconductivity, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China
[b]LPEM, UPMC, ESPCI-ParisTech, CNRS, 10 rue Vauquelin, F-75231 Paris Cedex 5 France
[c]IRAMIS, SPEC, CEA, 91191 Gif sur Yvette, France

Superconductivity in the iron-arsenic compounds have various interesting aspects. One of the most distinguishing features of this family of superconductors is that a set of Fe *3d* bands are crossing the Fermi Level and can participate in the forming of the cooper pairs. Multiple superconducting gaps may exist in iron-arsenic superconductors.
We present optical conductivity measurements on the electron-doped 122 system $Ba(Fe_{1-x}Co_x)_2As_2$ and hole-doped 122 system $Ba_{1-x}K_xFe_2As_2$ single crystals. In both samples, a clear signature of the superconducting gap is observed when the temperature is below $T_c$, but a simple s-wave description fails in accounting for the low-frequency response. In the electron-doped sample $Ba(Fe_{1-x}Co_x)_2As_2$, the data and the model can be reconciled by introducing an additional Drude peak which accounts for the additional low energy absorption. In the hole-doped sample $Ba_{1-x}K_xFe_2As_2$, the low-frequency optical response can be well described by introducing a second isotropic superconducting gap which is a strong evidence for the existence of multiple superconducting gaps in iron-arsenic superconductors.