

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Far-infrared Studies of the Two-Gap Behavior in Epitaxial MgB₂ Films¹ JIUFENG TU, The City College of New York, G.L. CARR, BNL, R.P.S.M. LOBO, ESPCI, P. ORGIANI, X.X. XI, Penn State — Far-infrared transmission and reflectivity measurements have been carried out for a series of pure and carbon-doped epitaxial MgB₂ films. While the carbon-doped film exhibits the typical characteristics for a dirty BCS superconductor in the T_S/T_N and R_S/R_N ratios, the pure MgB₂ films can only be understood knowing the multi-gap nature of the superconducting state in MgB₂. As a function of increasing T_c , the fraction of the Cooper pairs having the larger gap increases. Both gaps appear to follow the BCS temperature dependence. However, the two gaps exhibit different behavior when a magnetic field is applied along c -axis. While the smaller gap can be suppressed by a relatively small field, the larger gap can persist up to 10 T. These infrared measurements indicate that the two superfluids coexist quite independently in the superconducting state of MgB₂.

¹Supported by CUNY-RF-80212-13-04, DOE-AC02-98CH10886, ONR-N00014-00-1-0294 and NSF-DMR-0306746.

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Date submitted: 30 Dec 2005

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