

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Disorder induced evolution of two energy gaps in MgB₂¹ YONG-JIHN KIM, University of Puerto Rico — We study disorder effect on MgB₂ superconductivity using the two band model by Suhl, Matthias, and Walker. We stress the importance of the Cooper pair size effect in the response of the BCS superconductor to the perturbation: the bounded Cooper pairs see the impurities within the range of the coherence length. This effect will undermine the initial decrease of the T_c and the big energy gap due to disorder, until the resistance ratio reaches about ~ 3 . For the resistance ratio less than 3, weak localization starts to decouple electrons and phonons, leading to the significant decrease of both the T_c and the big gap. In particular, we trace the evolution of two energy gaps of MgB₂ as a function of disorder. Estimating the inter-band scattering rate from the experimental data, we compare our calculations with experiments. We also calculate the transition temperature, T_c as a function of the resistance ratio.

¹This work is based on work supported by the National Science Foundation under grant No. 0351449.

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Date submitted: 19 Nov 2006

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