SFP 2011-06b

Physical properties of heavily boron doped silicon

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The discovery of superconductivity in heavily boron doped silicon in 2006 by [1] occurred shortly after diamond was found superconductor in 2004 by [2]. However, the superconductivity in these two materials occurs differently. For diamond, the superconductivity is obtained for a boron concentration close to the metal-insulator transition (MIT), while for silicon, the onset of superconductivity is obtained well above the MIT threshold using the out of equilibrium GILD technique, in the metallic state [3]. The highest reported superconductive critical temperature Tc for Si:B is 0.7K.

We report on a detailed analysis of the superconductive transition as a function of the doping rate, as well as on anomalous behaviours occuring in the normal high temperature state in magnetoresistance, Hall and Nernst effects that still remain an open question.

Références

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