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Physical properties of heavily boron doped silicon AUDREY GROCKOWIAK, Institut Néel, CNRS and UJF, CHRISTOPHE MARCENAT, INAC, CEA, THIERRY KLEIN, Institut Néel, CNRS and UJF, GILLES PRUDON, CHRISTIANE DUBOIS, Institut des Nanotechnologies de Lyon, CNRS and INSA, France, THIERRY KOCINIEWSKI, DOMINIQUE DEBARRE, Institut d'Electronique Fondamentale, Université Paris Sud, Orsay, France — The discovery of superconductivity (SC) in heavily boron doped silicon in 2006 by [1] occurred shortly after diamond in 2004 by [2]. However, the SC in these 2 materials occurs differently. For diamond, the SC 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. The aim of this study is to determine the influence of different parameters that impact the SC, such as the doping concentration nB, or the thickness of the layer. Interpolation between resistivity measurements of Tc(nB) and ab initio calculations of the electron phonon coupling λ(nB) showed a complete mismatch of the dependency of λ(Tc) with the BSC MacMillan exponential law. The results obtained suggest rather a power law dependence such as λ α Tc^2. This dependency suggests a fractal dimension of the superconducting wave function as reported by Feigel'man et al. [3].

[1] E. Bustarret *et al.*, Nature (London) 444, 465 (2006).
[2] E. Ekimov *et al.* (2004). *Nature* **428**: 542
[3] Feigel'man et al., arXiv:1002.0859

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