

High-temperature surface superconductivity in topological flat-band systems

T.T. Heikkilä

Low Temperature Laboratory, Aalto University, P.O. Box 15100, FI-00076 AALTO, Finland
Landau Institute for Theoretical Physics RAS, Kosygina 2, 119334 Moscow, Russia

We show that the topologically protected flat band emerging on a surface of a nodal fermionic system¹ promotes the surface superconductivity due to an infinitely large density of states associated with the flat band.² The critical temperature depends linearly on the pairing interaction and can be thus considerably higher than the exponentially small bulk critical temperature. We discuss an example of surface superconductivity in multilayered graphene with rhombohedral stacking. Our predictions may be used for the search or for an artificial fabrication of layered systems with high- and even room-temperature superconductivity.

¹T.T. Heikkilä, N.B. Kopnin and G.E. Volovik, Flat bands in topological media, arXiv:1012.0905.

²N.B. Kopnin, T.T. Heikkilä and G.E. Volovik, High-temperature surface superconductivity in topological flat-band systems, arXiv:1103.2033.