

Nanostructured graphene: A platform for fundamental physics and applications

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Pristine graphene – the miracle material consisting of a hexagonal array of carbon atoms - has been in the focus of condensed matter physicists ever since its isolation in 2004 due to its extraordinary electrical, optical, and mechanical properties. Its electronic structure, which at low energies can be described by touching Dirac cones, underlies most of these unique features. But the touching Dirac cones imply an annoying difficulty for electronic applications: the lack of a band gap means that a graphene-based transistor cannot be properly turned off, a disaster for any digital device. In this talk, after reviewing graphene's basic properties and possible applications, I shall describe one possible method for achieving sizable band gaps, by periodic nanoscale perforations, and I shall give an account of recent progress in modelling and fabricating such structures.