Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Strain-induced time-reversal odd superconductivity in graphene[1]

VLADIMIR JURICIC, Institute for Theoretical Physics, Utrecht University, The Netherlands, BITAN ROY, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, USA — I will discuss the possibility of realizing a time-reversal-symmetry breaking superconducting state that exhibits an $f+is$ pairing symmetry in strained graphene [1]. Although the underlying attractive interactions need to be sufficiently strong and comparable in pristine graphene to support such pairing state, I will argue that strain can be conducive for its formation even for weak interactions. I will show that quantum-critical behavior near the transition is controlled by a fermionic multicritical point, characterized by various critical exponents computed in the framework of an ϵ-expansion near four spacetime dimensions. I will then discuss the scaling of the superconducting gap with the strain-induced axial pseudo-magnetic field. Furthermore, a vortex in this mixed superconducting state hosts a pair of Majorana fermions supporting a quartet of insulating and superconducting orders, among which quantum spin Hall topological insulator. Finally, I will mention some experimental signatures of this $f+is$ time-reversal odd superconductor. These findings suggest that strained graphene could provide a platform for the realization of exotic superconducting states of Dirac fermions.

[1] B. Roy and V. Juricic, arXiv: 1309.0507.

[1]VJ is supported by the Netherlands Organization for Scientific Research (NWO).

Vladimir Juricic
Institute for Theoretical Physics, Utrecht University, The Netherlands

Date submitted: 15 Nov 2013 Electronic form version 1.4