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Fractional metals and superconductivity in graphene heterostructure BITAN ROY, Lehigh University, ANDRAS SZABO, Max Planck Institute for the Physics of Complex Systems — Graphene-based layered materials accommodate nodal quasiparticles that (a) feature continuous SU(2) chiral symmetries stemming from the valley or isospin and real spin degrees of freedom, for example, each of which leads to two-fold band degeneracy and (b) can develop (spontaneously or externally) Dirac masses leading to uniform and isotropic spectral gap. Irrespective of the band curvature of such chiral quasiparticle dispersion, I will show that it is always conceivable to construct a right number of mutually commuting masses that systematically lift the band degeneracy. I then show how such generic picture can be germane to recently observed half and quarter metal in Bernal bilayer and rhombohedral trilayer graphene in the presence of external electric displacement field. Finally, I will also discuss the possible superconducting states originating from such fractional metal.

Bitan Roy
Lehigh University

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