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Bosonic Analogue of Dirac Composite Fermi Liquid DAVID MROSS, Weizmann Institute of Science, JASON ALICEA, OLEXEI MOTRUNICH, Caltech — The status of particle-hole symmetry has long posed a challenge to the theory of the quantum Hall effect. It is expected to be present in the half-filled Landau level, but is absent in the conventional field theory, i.e., the composite Fermi liquid. Recently, Son proposed an alternative, explicitly particle-hole symmetric theory which features composite fermions that exhibit a Dirac dispersion. In my talk, I will introduce an analogous particle-hole-symmetric metallic state of bosons at odd-integer filling. This state hosts composite fermions whose energy dispersion features a quadratic band touching and corresponding 2 Berry flux, protected by particle-hole and discrete rotation symmetries. As in the Dirac composite Fermi liquid introduced by Son, breaking particle-hole symmetry recovers the familiar Chern-Simons theory. I will discuss realizations of this phase both in 2D and on bosonic topological insulator surfaces, as well as its signatures in experiments and simulations.

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