Abstract Submitted
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Probing unconventional superconductivity in inversion-symmetric doped Weyl semimetal[1] MATTHEW GILBERT, MOON JIP PARK, YOUNGSEOK KIM, Univ of Illinois - Urbana — Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase and nodal BCS states are known to be possible superconducting ground states in inversion symmetric doped Weyl semimetals (WSM). In order to resolve the two distinct pairing states, we propose two separate four terminal transport experiments in which each potential pairing exhibits a unique transport signature. We begin by considering a Josephson junction that consists of a doped WSM and a normal BCS superconductor. Under the application of a transverse uniform current in the BCS superconductor, which resonates with the momentum carried by FFLO states in doped WSM, we find that the Josephson current is largely enhanced resulting in a peak of the current amplitude that distinguishes from conventional Josephson junction. In the case of nodal BCS states, we find that the nodal points may be shifted in the Brillouin zone by an application of the transverse uniform current. We analyze the topological phase transitions induced by nodal pair annihilation in non-equilibrium and find a characteristic decrease in the density of states that serves as a signature of the quantum critical point in the topological phase transition, thereby identifying nodal BCS states in doped WSM. Reference: Youngseok Kim, Moon Jip Park, and Matthew J. Gilbert Phys. Rev. B 93, 214511

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