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Detecting tip-induced superconductivity in topological materials

GOUTAM SHEET, Indian Inst of Sci Ed Research — It has been found that in certain topological materials, including the topological Dirac semimetal Cd_3As_2 and Weyl semimetal TaAs, a mesoscopic superconducting phase emerges at point contact junctions with elemental metals. For such superconducting phases, existing only at mesoscopic point contacts, the characterization tools like transport and magnetization measurements fail due to extremely small volume fraction of the superconducting phases. In such cases, however, it is possible to detect the local superconducting phases by performing point contact spectroscopy in different regimes of mesoscopic transport and studying the temperature and magnetic field evolution of the spectroscopic features. In this talk I will present how such experiments are performed to realize and detect tip-induced superconductivity (TISC) on topological materials. Experiments on certain new topological insulators will also be presented.

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