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Topological Superconductivity in HgTe-based Devices

LAURENS MOLENKAMP, Wuerzburg University

Suitably structured HgTe has been shown to be a topological insulator in both 2- (a quantum well wider than some 6.3 nm) and 3 (an epilayer grown under tensile strain) dimensions with favorable properties for quantum transport studies, i.e. a good mobility and a complete absence of bulk carriers. In this talk I will summarize the results of our efforts (in collaboration with colleagues all over the globe) to induce superconductivity in the topological surface states of these materials. Special emphasis will be given to recent results on the ac Josephson effect. We will present data on Shapiro step behavior that is a very strong indication for the presence of a gapless Andreev mode in our Josephson junctions.