Weyl Fermions in HgTe

seminar

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Abstract

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HgTe is so far mostly known for its topological insulator properties. Recently, however, it became apparent that HgTe should also host a Weyl semimetalic phase. Applying compressive strain to bulk HgTe will result in a band overlap of the Gamma-8 bands with 3-dimensional Dirac points emerging at the band crossings. The inversion symmetry breaking due to the zinc-blende crystal structure will than result in a further splitting into Weyl points. The experimental realization of such a Weyl semimetalic state relies on controlling the strain in the HgTe layer. For this purpose we developed the growth of HgTe layers on artificial substrate structures based on CdTe/ZnTe superlattices.

Magnetoresistance measurements of such HgTe layers reveal a strongly anisotropic negative magnetoresistance consistent with the proposed chiral anomaly in Weyl systems. I will also give a brief overview on our results on induced superconductivity in the topological insulator phase of HgTe. Here we see indications of unconventional superconductivity resulting from the interplay of topology and s-wave superconductivity.

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