Berliner Physikalisches Kolloquium

im Magnus-Haus, Am Kupfergraben 7, 10117 Berlin

Eine gemeinsame Veranstaltung der Physikalischen Gesellschaft zu Berlin e.V.,
der Freien Universität Berlin, der Humboldt-Universität zu Berlin,
der Technischen Universität Berlin und der Universität Potsdam

– gefördert durch die Wilhelm und Else Heraeus-Stiftung –

Am Donnerstag, dem **1. Februar 2018, um 18:30 Uhr**

spricht

Prof. Dr. Laurens W. Molenkamp
Physikalisches Institut (EP3), Universität Würzburg

über das Thema

„Topological Physics in HgTe-based Quantum Devices“

Moderation: Henning Riechert, Paul-Drude-Institut und
Humboldt-Universität zu Berlin

Topological insulators are a novel class of materials that exhibit a novel state of matter – while the inside (bulk) of the materials is electrically insulating, their surface is metallic. This effect occurs because the band structure of the materials is topologically different from the outside world.
We discovered this type of behavior while studying the charge transport properties of thin, two-dimensional layers of the narrow-gap semiconductor HgTe. These layers exhibit the quantum spin Hall effect, a quantized conductance which occurs when the bulk of the material is insulating. The transport occurs along one-dimensional, spin-polarized channels at the edges of the sample. Also thicker HgTe samples can be turned into topological insulators, but now the surface states are two-dimensional metallic sheets, which are rather exotic, since the band structure is similar to that encountered for elementary particles – the charge is carried by so-called Dirac fermions.
I will describe experiments where a supercurrent is induced in the surface states using Nb electrodes for contacts. AC investigations indicate that the induced superconductivity is strongly influenced by the Dirac nature of the surface states. Finally, using the strain in the layers, we can turn HgTe into a Dirac semimetal, which exhibits the axial anomaly known from particle physics when the Fermi level is tuned to the Dirac points.

Auch zu lesen im Internet: http://www.pgzb.tu-berlin.de/