Aktuelle Fragen
der Nanophysik

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# Charge Density Wave Dynamics and Topological Properties in Polycrystalline CuTe Thin Films



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The layered transition metal monochalcogenide CuTe comprises interconnected Cu- and Te-chains. With the Te p-orbitals dominating the Fermi surface, a charge density wave (CDW) ordering emerges, inducing a Peierls distortion along the Te-chains. This unique distortion occuring below 335 K in single crystals effectively diminishes the dimensionality of electron transport to a singular dimension. Previous studies have primarily focused on the properties of the low-temperature CDW phase in bulk single crystals.

In this talk, I will discuss our investigations on polycrystalline CuTe thin films of varying thicknesses, produced through sputter deposition. Interestingly, the CDW transition is also prominently observed in these polycrystalline samples. We aim to analyze the impact of film thickness on the transition behavior, particularly by examining the grain distribution. A key part of our approach involves developing a model to fit the measured resistivity curves, allowing us to extract relevant physical parameters. Furthermore, we attempt to explain phenomena such as the non-vanishing transversal resistance at zero magnetic field in the non-CDW phase by considering the material's polycrystallinity.

Additionally, CuTe is speculated to exhibit topological semimetal properties in its non-CDW state at higher temperatures. To explore this hypothesis, we investigate changes in key characteristics of topological semimetals, such as magnetoresistance and the planar Hall effect across the CDW transition.