

# Strong and Weak Topology Probed by Surface Science: Topological Insulator Properties of Phase Change Alloys and Heavy Metal Graphene (MatWerk)

Christian Pauly

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Christian Pauly demonstrates the strong topological properties of the technologically relevant phase change materials Sb<sub>2</sub>Te<sub>3</sub> and Ge<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub> by using two powerful techniques for mapping the surface electronic structure: scanning tunneling spectroscopy (STS) and angle-resolved photoemission spectroscopy (ARPES). In the case of a phase change material, this opens up the possibility of switching between an insulating amorphous and a conducting topological phase on nanosecond-time scales. Moreover, the author presents first experimental results of a weak topological insulator, namely on the bismuth-based graphene-like sheet system Bi<sub>14</sub>Rh<sub>3</sub>I<sub>9</sub>, revealing a topologically protected one-dimensional edge channel as its fingerprint. The edge state is as narrow as 0.8 nm, making it extremely attractive to device physics. Those strong and weak topological insulators are a new phase of quantum matter giving rise to robust boundary states which are protected from backscattering and localization.



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