

Topological Insulators, Novel Superconductors, and 2D Atomically Thin Films Beyond Graphene

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I will discuss some of our work aimed at understanding the electronic structure and spectroscopy of novel superconductors, topological materials, and atomically thin 2D films beyond graphene. [1-10] Illustrative examples include: (i) How by exploiting electronic structure techniques we have been able to predict and understand the characteristics of many new classes of binary, ternary and quaternary topologically interesting materials, including topological crystalline insulators; (ii) How atomically thin 'beyond graphene' 2D materials such as silicene, germanene, stanene, and MoSe₂ offer exciting new possibilities for manipulating electronic structures and the associated topological phases, providing novel platforms for various applications; (iii) With regard to the high-T_c's, I will discuss the viability of the intermediate coupling picture of correlations, and the extent to which it gives insight into the doping dependent spectra of the cuprates. Work supported by Basic Energy Sciences, United States Department of Energy.

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