

Interaction and Topological Effects in Two-dimensional Materials

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Symmetry, interaction and topological effects, as well as environmental screening, dominate many of the quantum properties of reduced-dimensional systems and nanostructures. These effects often lead to manifestation of counter-intuitive concepts and phenomena that may not be so prominent or have not been seen in bulk materials. In this talk, I present some fascinating physical phenomena discovered in recent studies of atomically thin two-dimensional (2D) materials. A number of highly interesting and unexpected behaviors have been found – e.g., strongly bound excitons (electron-hole pairs) with unusual energy level structures and novel optical selection rules; massless excitons; tunable magnetism and plasmonic properties; electron supercollimation by disorders; and novel topological phases – adding to the promise of these 2D materials for valuable applications.