The Expanding Flatlands—2D Materials Beyond Graphene

(Plenary talk)

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Since the discovery of graphene, 2D materials have emerged as a new class of material that may impact future science and technology. While a few dozens of 2D materials have so far attracted most attention, the vast majority of the thousands of layered crystals remain largely unexplored. The large number of layered crystals, which cover all major branches of condensed matter physics, provide vast opportunities for exploring new physics in flatlands. In this talk I will discuss, through the lens our own work, recent efforts in expanding the 2D material family that now includes ferromagnets, quantum anomalous hall insulator, and high-temperature superconductors. Because the materials are now in the extreme 2D limit, it becomes possible to control their material properties with external means. I will discuss how the concept of gate modulation can be extended to 2D materials beyond semiconductors.