SEMINAR ANNOUNCEMENT

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Determining the Electron Scattering from Interfacial Coulomb Scatterers in Two-Dimensional Transistors

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Abstract:

Two-dimensional (2D) transistors are promising for potential applications in next-generation semiconductor chips [1]. Owing to the atomically thin thickness of 2D materials, the carrier scattering from interfacial Coulomb scatterers greatly suppresses the carrier mobility and hampers transistor performance. However, a feasible method to quantitatively determine relevant Coulomb scattering parameters from interfacial long-range scatterers is largely lacking. Here, we demonstrate a method to determine the Coulomb scattering strength and the density of Coulomb scattering centers in InSe transistors by comprehensively analyzing the low-frequency noise and transport characteristics. Moreover, the relative contributions from long-range and short-range scattering in the InSe transistors can be distinguished. This method is employed to make InSe transistors consisting of various interfaces a model system, revealing the profound effects of different scattering sources on transport characteristics and low-frequency noise. Quantitatively accessing the scattering parameters of 2D transistors provides valuable insight into engineering the interfaces of a wide spectrum of ultrathin-body transistors for high-performance electronics [2].

References [1] Y. Liu *et al.*, Promises and Prospects of Two-Dimensional Transistors, Nature **591**, 43 (2021). [2] Yi-Te Lee *et al.*, Determining the Electron Scattering from Interfacial Coulomb Scatterers in Two-Dimensional Transistors, ACS Appl. Mater. Interfaces **16**, 1066 (2024).

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