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講題: Lifshitz - van der Waals Repulsion on Freestanding 2D Material

- 主 持 人: 周佳靚助理教授
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- 地 點:臺灣大學應用力學研究所 402 會議室

☆☆ 歡迎聽講,敬請張貼 ☆☆

Lifshitz - van der Waals Repulsion on Freestanding 2D Material

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Abstract: The van der Waals (vdW) force is a ubiquitous short-range interaction between atoms and molecules that underlies many fundamental phenomena. Early pairwise additive theories pioneered by Keesom, Debye, and London suggested the force to be monotonically attractive. However, seminal work by Lifshitz et al. predicted that quantum fluctuations can change the sign of vdW interactions from attraction to repulsion. A number of studies had demonstrated the existence of repulsive van der Waals force, whereas the force magnitude is typically small. In this talk, I will demonstrate that the atomic thickness and birefringent nature of two-dimensional (2D)materials, arising from their anisotropic dielectric responses, make them a remarkable platform to engineer the vdW repulsion. I will theoretically and experimentally show that on a sheet of feestanding graphene, vacuum can exert a strong repulsive force to an metallic object on the opposite side of graphene. The findings presented here may enable new technological opportunities in MEMS/NEMS and sensor devices.

Bio: Dr. Chih-Jen Shih is currently Chairman and Associate Professor in the Institute for Chemical and Bioengineering at ETH Zurich. He received Bachelor and Master degrees of Chemical Engineering from National Taiwan University, followed by PhD and Postdoctoral trainings at Massachusetts Institute of Technology (2014) and Stanford University (2015), respectively. His research interest ranges from fundamental understanding of how dielectric screening of atomically thin nanomaterials influences the movement and interactions of charges, excitons, and molecules near interfaces, to application-motivated studies aimed at developing new engineering strategies to control over the interplay of these mechanisms, towards new technological opportunities in optoelectronics, sensors, and actuators. His research has been recognized by the Victor K. LaMer Award from the American Chemical Society, the Ruzicka Prize from the Swiss Chemical Society, and the ERC Starting Grant from the European Union.

