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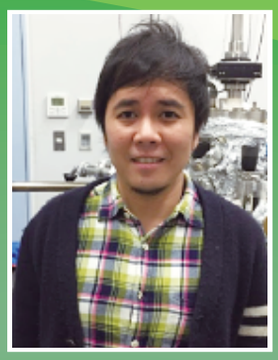
Quasi-Particle Interference Studies of Low-Dimensional Quantum Materials



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Date & Time: 23 Apr. 2019 (Tue.) 15:00-
Place: IMS Research Building Room 201

Low-dimensional quantum materials have become promising materials for next generation devices. Because of the huge diversity among them, to characterize their properties is an urgent issue. In this presentation, the electronic properties inside low-dimensional quantum materials such as *silicene* [1, 2], *layered bismuth* [3], and *transition metal dichalcogenides* (TMDs) [4, 5] are investigated by *quasiparticle interference* (QPI) based on scanning tunneling microscopy (STM). For example, the real-space observations of multilayer silicene and WTe_2 are shown in **Fig. 1** and **Fig. 2**, respectively. After the fast Fourier transformation (FFT), these real-space images can provide the information of wavenumbers (κ) of scattered quasiparticles at specific energy (E). By collecting large numbers of images at different energy, the E–κ plots reveal the intrinsic electronic structures of both materials. The results provide answers to several crucial questions related to these low-dimensional quantum materials and stimulate further exploration of the characteristics of new materials.

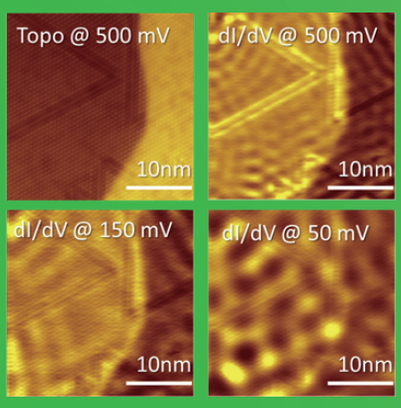

Fig. 1 QPI on Multilayer Silicne

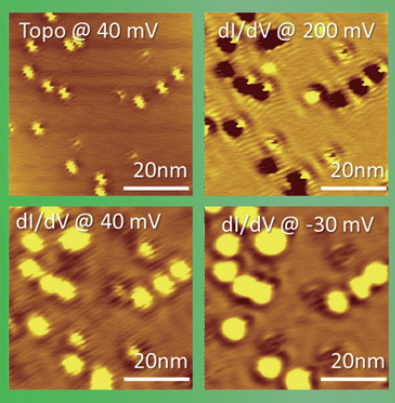

Fig. 2 QPI on WTe_2

[1] Appl. Phys. Express 5 (2012) 045802. [2] Phys. Rev. Lett. 110 (2013) 229701. [3] Appl. Phys. Lett. 107 (2015) 031602.
[4] ACS Nano 11 (2017) 11459. [5] J. Phys.: Condens. Matter 30, (2018) 105703

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