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Title of the Presentation: Tunable discrete scale invariance in transition-metal pentatelluride flakes

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Short Biography:

Yanzhao Liu, a PhD candidate of International Center for Quantum Materials, School of Physics, Peking University, received his bachelor's degree in physics from Peking University. He joined Prof. Jian Wang's group of the Low dimensional quantum transport Laboratory in 2016. His research interests are focused on the quantum transport properties of topological materials under extreme conditions.

Abstract:

Log-periodic quantum oscillations discovered in transition-metal pentatellurides give a clear demonstration of discrete scale invariance (DSI) in solid-state materials. The peculiar phenomenon is convincingly interpreted as the presence of two-body quasi-bound states in a Coulomb potential. However, the modifications of the Coulomb interactions in many-body systems showing a Dirac-like spectrum are not fully understood. Here, we report the observation of tunable log-periodic oscillations and DSI in $ZrTe_5$ and $HfTe_5$ flakes. By reducing the flakes thickness, the characteristic scale factor is tuned to a smaller value due to the reduction of the vacuum polarization effect. The decreasing of the scale factor demonstrates the many-body effect on the DSI, which has rarely been discussed hitherto. Furthermore, the cut-offs of oscillations are quantitatively explained by considering the Thomas-Fermi screening effect. Our work clarifies the many-body effect on DSI and paves a way to tune the DSI in quantum materials.

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[1] Y. Liu et al., *npj Quantum Materials* 5, 88 (2020). https://www.nature.com/articles/s41535-020-00290-6