

UNL Department of Physics and Astronomy presents:

# Single-Layer and Bilayer Quantum Hall States in an N-Type Wide Tellurium Quantum Well

PRESENTED BY  
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**THURSDAY**  
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Refreshments will be served in the JH 1st Floor Vending Area at 3:30

## ABSTRACT

Tellurium (Te) is a narrow bandgap semiconductor with a unique chiral crystal structure. The topological nature of electrons in the Te conduction band can be studied by realizing n-type doping using atomic layer deposition (ALD) technique on two-dimensional (2D) Te film. In this talk, we fabricated and measured the double-gated n-type Te Hall-bar devices, which can operate as two separate or coupled electron layers controlled by the top gate and back gate. In single-layer case, well-defined quantum Hall effect and Weyl-node related Berry phase are observed and determined. In bilayer case, profound Shubnikov-de Haas (SdH) oscillations are observed in both top and bottom electron layers. Landau level hybridization between two layers, compound and charge-transferable bilayer quantum Hall states at filling factor  $\nu = 4, 6$  and  $8$  are analyzed. Our work opens the door for the study of Weyl physics in coupled bilayer systems of 2D materials.

## Bio

Dr. Peide (Peter) Ye is Richard J. and Mary Jo Schwartz Professor at Elmore Family School of Electrical and Computer Engineering, Purdue University. His research focuses on atomic layer deposition and its integration on various novel channel materials including III-V, Ge, 2D materials and complex oxides. He obtained his Ph.D. from Max-Planck Institute for Solid State Research in Germany and postdoc training at NTT Basic Research Laboratory, National High Magnetic Field Laboratory and Princeton University. He worked for Bell Labs of Lucent Technologies and Agere Systems before joining Purdue faculty in 2005. Prof. Ye received the 2011 IBM Faculty Award, Sigma Xi Award and Arden Bement Jr. Award. He is IEEE Fellow and APS Fellow for his contributions to materials and device development for compound semiconductor MOSFETs. Prof. Ye is also recognized as a Highly Cited Researcher among 6000 world wide in all fields.