

The Department of Mechanical Engineering Presents

## Luis A. Jauregui, Ph.D.

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**Title:** Manipulating the Electrical Properties of Van der Waals Quantum Materials by Static and Dynamic Strain

**Abstract:** Topological order and materials have been at the center of attention in condensed matter physics and engineering. Topological materials, a new quantum state of matter, are a family of quantum materials with boundary states whose physical properties are robust against disorder. Therefore, there have been few examples for a topological phase transition realized experimentally, even fewer cases for an in-situ tuning of the topological phase. For the first part of my talk, I will discuss our results and methods to apply uniaxial strain in topological van der Waals quantum materials and how it influences its electrical properties. Our results point towards a topological phase transition of the system tuned by in situ uniaxial strain. For the second part of my talk, I will discuss our approach to creating dynamic strain in van der Waals quantum materials and how to control the electron and excitons dynamics in such systems. Our results could pave the way for creating topological phases of matter by strain engineering in quantum materials and devices as well as a step towards a solid-state quantum simulator platform.



**About the Speaker:** Luis studied his Ph.D. at Purdue University and worked in the electron and phonon transport of graphene and topological nanostructures. For his graduate studies, he obtained the Intel Ph.D. Fellowship and the Purdue Research Foundation Fellowship. After his Ph.D., Luis became a Postdoctoral fellow at Harvard and his work was focused on studying the optical properties of van der Waals heterostructures. Since 2019, Luis is an assistant professor at the Physics Department at UCI and the director of the Irvine Quantum Material Center. Luis A. Jauregui's research work is interdisciplinary and ranges from Materials Science, Engineering and Physics. His work in quantum materials and devices includes high quality graphene growth, topological insulators, superconductivity, light-matter interaction in quantum materials, phonon polaritons, excitonic, etc.

**CHUNG HALL**  
**ROOM 205/206**

**THURSDAY, NOVEMBER, 18, 2021**  
**11:00AM-11:50AM**