

# *Kent State University*

## *Physics Colloquium*

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### **IRRADIATED TOPOLOGICAL MATTER: QUANTUM DESIGN LEADS TO SOLAR ENERGY HARVESTING**

#### **Abstract**

Understanding and manipulating matter at the nano-scale is the key to harnessing the quantum technologies of the future. Recently the so-called Dirac materials, such as graphene and topological insulators, came to the frontier to provide a test bed for new quantum phenomena with potential technological applications in robust quantum computation, ultrafast memory storage, and even solar energy harvesting. In particular, time-dependent perturbations are emerging as a versatile tool for engineering the properties of these materials 'on demand.' In this talk, I describe our recent work in understanding irradiated topological insulator surface states leading to the discovery of a new state of matter, the Floquet-Bloch state. The realization of this state is made possible by the combination of geometrical aspects of the band structure and an external drive to take the system out of equilibrium. Finally, we emphasize how the bulk photovoltaic effect, which is also a geometrical effect, can enhance current injection with promise for solar energy applications.

**TUESDAY, NOVEMBER 24, 2015**

**3:15 PM**

**SMITH HALL 111**

**REFRESHMENTS: 3:00- PM – SMITH HALL 111**