

**CMP Seminar**  
**Michigan State University**

**Benjamin Fregoso**  
**University of California - Berkeley**

***Irradiated topological matter: quantum design leads to solar energy harvesting***

Understanding and manipulating matter at the nanoscale is the key to harnessing the quantum technologies of the future. Recently, Dirac materials such as graphene and topological insulators became the focus of research with the goal of providing 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”. Our recent work in understanding irradiated topological insulator surface states lead 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 time-dependent perturbation which takes the system out of equilibrium. Finally, we demonstrate how irradiation in other novel topological two-dimensional materials enhances current injection and shows promise for future solar energy applications.

**Thursday, February 18, 2016**  
**12:00 p.m.**  
**BPS 1400**  
**Prof. Carlo Piermarocchi - Host**