

# Physics Colloquium

Thursday, February 22<sup>nd</sup> at 3:30 pm in ESB 120

**Dr. Justin Pilot**

*University of California, Davis*

## ***Toward Discovery at the LHC: Jet Substructure to Find New Physics***

The Large Hadron Collider at CERN provides experimentalists with the largest dataset at the highest energy to date in the search for new physics. With this data comes exciting opportunities for the next discoveries in particle physics. Although searches to date have only constrained many models of new physics, new techniques are under development that can significantly enhance the power of existing and future datasets. I will discuss a set of tools, known as jet substructure algorithms, to identify hadronic decays of high-momentum massive particles expected from new heavy resonance production. I will detail the development of such tools in the CMS experiment, and describe the results of analyses deploying them, including searches for top quark pair resonances, and 4th-generation vector-like quarks. Finally, I will introduce new machine learning developments underway in the field of jet substructure, as well as planned upgrades of the CMS detector to further improve the ability to reconstruct these signatures of new physics.

Note: Room is Experimental Science Building (ESB) 120.

Refreshments at 3:00 pm in SC 103