

# *Colloquium*

## **Department of Physics**

New Windows into the  
Strong Interaction and Beyond

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### **Abstract**

High-energy collisions of protons and electrons provide a crucial probe for the nature of physics at very short distance scales. Current colliders like the Large Hadron Collider (LHC) are searching for new types of matter and new forces. In addition they provide detailed information about the known strong, weak, and electromagnetic forces, and allow for the measurement of fundamental parameters of the standard model of particle and nuclear physics. The strong interaction, described by Quantum Chromodynamics (QCD), plays a crucial role in high-energy collisions, both for the long distance processes that take place prior to and after the collision, and for the short distance processes that take place at the collision. For example, QCD predicts that high-energy collisions produce streams of collimated particles called jets, which provide a key probe for the nature of the collision. In this talk I will describe the physics of high-energy collisions and jet phenomena, new techniques for analyzing them, and new methods for predicting them based on Effective Field Theory. Examples will include enhancing our understanding of jet data from past experiments to dramatically improve the measurement of one of the fundamental parameters of nature, the strong interaction coupling constant, and improving predictions for the LHC to strengthen the hunt for new particles and forces.

**Monday, October 17, 2016 at 3:00 pm**

**SERC, Room 116**

**Refreshments will be served at 2:45 pm**