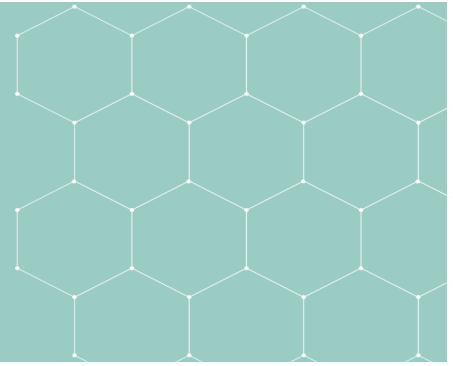




# PHYSICS

## COLORADO STATE UNIVERSITY



### CSU PHYSICS COLLOQUIUM

#### **Machine Learning for Physics Reconstruction of Liquid Argon Time Projection Chambers** **Dr. Kazuhiro Terao, Stanford Linear Accelerator Center (SLAC)**

April 1, 2019 at 4 p.m.  
120 Engineering (Hammond Auditorium)

#### **Abstract**

Liquid Argon Time Projection Chambers (LArTPCs) are capable of recording images of charged particle tracks with breathtaking resolution. Such detailed information will allow LArTPCs to perform accurate particle identification and calorimetry, making it the detector of choice for many current and future neutrino experiments. However, analyzing such images can be challenging, requiring the development of many algorithms to identify and assemble features of the events in order to reconstruct neutrino interactions. In the recent years, we have been investigating a new approach using deep neural networks (DNNs), a modern solution to a pattern recognition for image-like data in the field of Computer Vision. A modern DNN can be applied for various types of problems such as data reconstruction tasks including interaction vertex finding, pixel clustering, and particle/topology type identification. We have developed a small inter-experiment collaboration to share generic software tools and algorithms development effort that can be applied to non-LArTPC imaging detectors. In this talk I will discuss the challenges of LArTPC data reconstruction, recent work and future plans for developing a full LArTPC data reconstruction chain using DNNs.

