UCLA Mani L. Bhaumik Institute for Theoretical Physics

# Bhaumik Luncheon Seminar

## Monday, June 10th @ 12PM Physics & Astronomy Building 4-330

The Mani L. Bhaumik Institute of Theoretical Physics presents the **Spring 2019** Bhaumik Luncheon Seminar. The goal of this Seminar series is to learn about exciting new ideas from scientists in the department and around the world through short talks and discussions. The Seminar is held once per academic quarter. Come participate and enjoy a light lunch.

## Andrea Bertozzi, UCLA Mathematics and Mechanical and Aerospace Engineering

### "A theory for undercompressive shocks in tears of wine"

We revisit the tears of wine problem for thin films in water-ethanol mixtures and presents new model for the climbing dynamics. The new formulation includes a Marangoni stress balanced by both the normal and tangential components of gravity as well as surface tension. distinctly different behavior. In the lubrication limit we obtain an equation that is already well-known for rising films in the presence of thermal gradients. Such models can exhibit non-classical shocks that are undercompressive. We present basic theory that allows one to identify the signature of an undercompressive (UC) wave. We observe both compressive and undercompressive waves in new experiments and we argue that the classical "wine tears" result from a reverse undercompressive shock originating at the meniscus.

## Nathan Whitehorn, UCLA

### "The TeV Neutrino Background: What is It?"

In late 2013, the IceCube Neutrino Observatory reported the existence of a bright, isotropic cosmic background of neutrinos with energies exceeding 2000 TeV. These neutrinos were numerous -- approaching upper bounds on an astrophysical flux -- and of unclear origin. Four years later, in 2017, a neutrino apparently from a distant blazar provided the first evidence for the origin of at least some of these neutrinos, but raised more questions than it answered. Why is the brightest neutrino source 5 billion light-years away? Why is it otherwise so unremarkable? The class of objects of which it is a part can make < 10% of the TeV background -- what is the origin of the other 90+%? I will discuss the state of our understanding of this part of the non-electromagnetic universe and the instrumental path forward, in particular forthcoming upgrades to IceCube.