

**East Carolina University®**  
Department of Physics

Colloquium

Friday, March 15<sup>th</sup>, Room N109, Howell Science Complex  
3:15 p.m. (Refreshments at 3:00 p.m.)

**Professor Ron Belmont**  
**University of North Carolina**  
**at Greensboro**

***Creating Droplets of the Early Universe in the  
Laboratory with Nuclear Collisions***

In the first few microseconds after the big bang, the universe was in a state of matter called the quark-gluon plasma (QGP). Research into surprising effects found in collisions of a light nucleus with a heavy nucleus is one of the main pillars of present-day research in high energy nuclear physics, and the discovery of QGP droplet formation in these small-volume collisions has fomented major developments in relativistic hydrodynamics. The Relativistic Heavy Ion Collider at Brookhaven National Laboratory has conducted a geometry scan, comprising collisions of three different systems with three different intrinsic geometries. The PHENIX collaboration found the intrinsic geometry to be manifest in the measured correlations, confirming QGP droplet formation, and published the results in *Nature Physics* in 2019. More recent results corroborate the clear geometrical dependence and also indicate different contributions from intrinsic geometry vs sub-nucleonic fluctuations in different kinematic regions. In this talk we discuss the latest experimental and theoretical results in the context of the geometry engineering program, and briefly discuss additional future measurements.

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