# UCLA NUCLEAR PHYSICS SEMINAR

## Initial Conserved Charges in Nuclear Geometry

Presented by: Mauricio Martinez Guerrero
North Carolina State University

In the modeling of the initial conditions for high energy nuclear collisions, it is usually assumed that the energy density is composed almost entirely of gluon fields. However, quarks, which constitute a minority of the overall energy density, carry conserved charges such as baryon number and electric charge which are sensitive to entirely different transport properties of the QGP. We present a new model for reconstructing the initial distribution of quarks and antiquarks in a heavy ion collision by sampling the (g-->qqbar) splitting function over the initial energy density. In this way, we provide a new numerical tool which can be used to supplement models for the initial energy density with the associated conserved charges. As a result, we find a strong flavor dependence of the initial geometries of different quarks, as characterized by their initial eccentricities. Importantly, we find that the strange quark geometry differs significantly from the geometry of the bulk energy density in an event, reflecting the geometry of the hot spots rather than the geometry of the bulk. This new tool for the initial conditions, when coupled to a charge-conserving viscous hydrodynamics code, will open the door to studying a wealth of new charge and flavor dependent correlations and transport parameters of the QGP.

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