



Department of Mathematics and Statistics
St. John's, NL Canada A1C 5S7
Tel: (709) 864-8784 Fax: (709) 864-3010

*Research Talk for
Tenure Track
Position*

Speaker: Dr. Hari Kunduri

Affiliation: Memorial University of Newfoundland

Date: Wednesday, March 5, 2014

Time: 1:00 p.m.

Room: HH-3017

Title: **The Black Hole Classification Problem**

Abstract:

The field equations of general relativity are a set of hyperbolic partial differential equations determining the geometry of a Lorentzian manifold (spacetime). Stationary black holes are a special class of time-independent solutions characterized by an event horizon H , a hypersurface through which causal curves may enter but not leave. Black holes are typically specified by their horizon topology and a small number of geometric invariants (e.g. mass). An important problem in mathematical physics is to classify these solutions and establish uniqueness theorems.

I will summarize progress achieved by considering a certain class of 'extreme' solutions, for which one can analyze Einstein's equations directly on H . I will also discuss applications of this work to Riemannian geometry, such as the construction of discrete families of inhomogeneous Einstein metrics on compact manifolds. Finally, I will describe recent work using variational methods to characterize the phase space of black hole solutions in general relativity and its extensions.