Graduate Seminar

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Thursday, January 16, 2014
1:00 p.m., HH-3017

On dynamic noncommutative spacetimes

Abstract:

Noncommutative gravity is a theory of quantum gravity that presupposes a fuzziness in spatial coordinates. Under the formalism of coherent states, mass is diffused per a gaussian distribution rather than located at a single point. This modifies the mass located at the singularity of a black hole, and subsequently the general behaviour of the noncommutative black hole. The focus of this talk will be the characteristic behaviour of a noncommutative dynamic spacetime, with parameters for mass and charge.

We will also present the concept of extremality as it applies to noncommutative black holes. Classical black holes are called extremal when the mass-to-charge ratio is one; we shall see that the noncommutative case is not as clear, but the notion of extremality can still be applied.

Finally, we will follow with a discussion of the energy conditions of a noncommutative spacetime. These conditions are requirements on energy and mass densities and pressures that ensure a properly-behaved spacetime. We will see that noncommutative spacetimes generally violate these conditions. Imposing a particular requirement on pressure and density, we present a new dynamic spacetime solution that satisfies the energy conditions, and encompasses several interpretations via parameter choice.