

New Horizons in Gravity



Monday 28 September 2009 - Friday 2 October 2009

Niels Bohr International Academy

Scientific Programme

Abstracts of the lecture series:

Series A: **Higher-dimensional gravity**
(Harvey Reall)

I shall discuss aspects of general relativity in more than four spacetime dimensions, concentrating on black holes. Some, or all, of the following topics will be discussed: black strings, Myers-Perry black holes, black rings, anti-de Sitter black holes, theorems concerning higher-dimensional black holes, stability of black strings and higher-dimensional black holes, supersymmetric solutions in five dimensions, microscopic description of 5d black holes.

Series B: **Applied AdS/CFT: hydrodynamics and condensed matter systems** (Simon Ross)

I will review the AdS/CFT correspondence, and describe how it has been applied to study field theories relevant to particle physics and condensed matter at finite temperature. I will show that there is a simple and surprisingly direct relation between the hydrodynamic regime on the field theory side of the correspondence and the dual gravity description. These ideas are most well-developed for relativistic theories, but I will also describe the application to field theories with non-relativistic conformal symmetry.

Series C: **Brane mechanics, fluid dynamics and black holes** (Niels Obers)

I will discuss some recent advances in the construction of an effective worldvolume theory for black holes, called the blackfold approach. This effective description is valid in the regime where the black hole horizon admits two widely separated scales. This construction uses elements of brane mechanics and fluid dynamics that will be reviewed in the first lecture. In the second lecture these ideas will be applied to i) construct new types of higher-dimensional black holes and ii) discuss the stability of black holes