

# PiTP Student Talks

July 21, 2008

The talks are going to be held on July 22<sup>nd</sup> from 7 PM to 8:45 PM and July 24<sup>th</sup> from 7 PM to 8:30 PM. I have tried to avoid dinner, soccer and booze time.

*Tuesday July 22<sup>nd</sup> 2008, 7 PM - 8:45 PM*

- **Title: C-Functions in Lovelock gravity**  
**Speaker: Mohamed M. Anber**

Abstract: In this talk, I present C-functions for static and spherically symmetric spacetimes in Lovelock gravity theories. After a brief introduction to Lovelock gravity and the concept of C-function, I show that, unlike the case of Einstein gravity where there is a single C-function, this function is non-unique in the case of Lovelock gravity.

- **Title: Hawking Radiation from Non-Extremal Fuzzballs**  
**Speaker: Borun D. Chowdhury**

Abstract: We have a 1-parameter family of nonextremal geometries. These are states of the 3-charge non-extremal system, but nongeneric, since they have large rotation. For these, we know the internal structure of the gravity solution, and can explicitly see the hawking radiation emerge carrying all information and flowing off to infinity.

- **Title: Large Volume and MCMC**  
**Speaker: Matt Dolan**

Abstract:

- **Title: de Sitter Vacua and Inflation in Supergravity and String Theory**  
**Speaker: Christian Gross**

Abstract: We perform a general analysis on the possibility of obtaining metastable dS vacua and inflation with spontaneously broken N=1 supersymmetry in the moduli sector of string models. We consider both heterotic and orientifold string compactifications on a Calabi-Yau in the large volume limit. We show that, while the no-scale property shared by these models imposes a severe restriction, there may exist fully viable models both for inflation and stabilisation.

- **Title: Growing extra dimensions from 4 dimension field theory**  
**Speaker: Yu-tin Huang**

Abstract: By considering the zero radius limit of a classical string in  $AdS_5 \times S_5$ , the geometry becomes 4-dimensional with a non-dynamic fifth dimension. For the pure  $AdS_5$  case one can understand this as describing a four dimensional scalar  $\phi^4$  theory in the large N limit. We prove this by showing that one can start from the four dimensional theory and reproduce a dynamical fifth dimension in the large N strong coupling limit. The fifth dimension will be the Schwinger parameter. We will also comment on the full  $AdS_5 \times S_5$  case.

- **Title: String creation and effective field theory**  
**Speaker: L-Y.Hung**

Abstract:

- **Title: Symmetric points in the landscape as cosmological attractors**  
**Speaker: Alexander Morisse**

Abstract: In the landscape, if there is to be any prospect of scientific prediction, it is crucial that there be states which are distinguished in some way. The obvious candidates are states which exhibit symmetries. Here we focus on states which exhibit (approximate) supersymmetry and discrete (R and non-R) symmetries. Such states are rare, but one can speculate that they are cosmological attractors. We investigate the problem in model landscapes which capture some of the features of candidate flux landscapes. We find that such states, while not invariably attractors, often are. Our considerations lead us to raise questions about some popular models of eternal inflation.

*Thursday July 24<sup>nd</sup> 2008, 7 PM - 8:30 PM*

- **Title: A Black Hole Solution and Possible Connection with AdS/CFT**  
**Speaker: Jianwei Mei**

Abstract: I will introduce a black hole solution that we have found in the five dimensional gauged supergravity theory. I will talk about its global structure and its thermodynamic properties. I will try to mention the connection of AdS/CFT a little bit, just to invite some attention and better study on this topic.

- **Title: Electromagnetically interacting massive spin-2 field: Intrinsic cut-off and pathologies**  
**Speaker: Rakibur Rahman**

Abstract: We argue, by employing the Stueckelberg formalism, that the theory of massive spin-2 field coupled to electromagnetism in flat space must have an intrinsic, model-independent, finite UV cutoff. We show how the very existence of a cutoff has connection to other pathologies of the system, such as superluminal propagation. We comment on the generalization of the results to arbitrary spin, and to gravitational interaction.

- **Title: Bicycling Black Rings**  
**Speaker: Maria J Rodriguez**

Abstract: We present detailed physics analyses of two different 4+1-dimensional asymptotically flat vacuum black hole solutions with spin in two independent planes: the doubly spinning black ring and the bicycling black ring system (bi-rings). The latter is a new solution describing two concentric orthogonal rotating black rings which we construct using the inverse scattering technique.

- **Title: Reheating of the universe after inflation with  $f(\phi)R$  gravity**  
**Speaker: Yuki Watanabe**

Abstract: We show that reheating of the universe occurs spontaneously in a broad class of inflation models with  $f(\phi)R$  gravity ( $\phi$  is inflaton). The model does not require explicit couplings between  $\phi$  and bosonic or fermionic matter fields. The couplings arise spontaneously when  $\phi$  settles in the vacuum expectation value ( $v_{ev}$ ) and oscillates. This mechanism allows inflaton quanta to decay into any fields

which are not conformally invariant.

- **Title: The N Body Problem In GR From Perturbative Field Theory**  
**Speaker: Yi-Zen Chu**

Abstract: I will describe how one can use techniques borrowed from quantum field theory to systematically compute the general relativistic effective lagrangian for arbitrary N point particles moving under the influence of their mutual gravitational interactions in a background Minkowski spacetime.

- **Title: Heat Kernel and Local Couplings in SUSY Gauge**  
**Speaker: Mathieu Ehrhardt**

Abstract: I'll review the Schwinger-DeWitt heat kernel method and discuss its application to SUSY gauge theories. I'll briefly discuss the link to Zamolodchikov's c-theorem, which states that the renormalization group flow is an irreversible process.