



Liverpool Theoretical Physics PhD Annual Student Presentations I

Talk Titles and Abstracts

1. 13:00-13:20 David Errington

derr@liv.ac.uk

Title: 'Nernst Branes'

Abstract: I will discuss the construction of a family of non-extremal black brane solutions in N=2 U(1) gauged supergravity using the techniques of dimensional reduction and the real formulation of special geometry. Since these solutions satisfy the so-called 'Nernst Law' of thermodynamics, we refer to them as Nernst branes and provide a brief discussion of their possible connection to condensed matter systems via hyperscaling violating Lifshitz (hvLif) holography.

2. 13:20-13:40 Johar Ashfaque

jauhar@liv.ac.uk

Title: 'The Hunt for the QCD Axion'

Abstract: Quantum chromodynamics (QCD) is a remarkable theory and is almost universally believed to be the theory of strong interactions. However, it suffers from one serious problem: the Strong-CP problem. There are 3 viable solutions to tackle the Strong-CP problem of which Axions (new light particles) are discussed in the setting of String Theory.

3. 13:40-14:00 Atif Choudri

Atif1988@liv.ac.uk

Title: 'Aspects of four and two dimensional field theories'

Abstract: Supersymmetric (0,2) field theory is studied and its subsequent compactification on a two torus in the presence of magnetic and auxiliary field terms. Various models in terms of branes are considered and an attempt is made to realise this in terms of geometric transitions.

4. 14:00-14:15 Rebecca Simms

sgrsimms@liverpool.ac.uk

Title: 'Banks-Zaks Fixed Points and Critical Exponents in Momentum Subtraction Schemes'

Abstract: We analyse the critical exponents relating to the quark mass anomalous dimension and β -function at the Banks-Zaks fixed point in Quantum Chromodynamics (QCD) for the quark in the momentum subtraction (MOM) schemes of Celmaster and Gonsalves. For a specific range of values of the number of quark flavours, estimates of the exponents appear to be scheme independent.

5. 14:15-14:30 Glyn Harries

G.Harries@liverpool.ac.uk

Title: 'Quasi-Realistic Left Right Symmetric Heterotic String Vacua'

Abstract: This talk will begin with an overview of the free fermionic construction of heterotic string theory. The ABK rules and the GSO projections of states will be briefly discussed. The basis vectors used to develop the left right symmetric model are then shown and an example of the how the basis vectors generate the observable matter spectrum is examined. Finally aspects of the program used to create these models is considered.

6. 14:30-14:45 Alex Keshavarzi

alexkesh@liverpool.ac.uk

Title: 'Calculating the Hadronic Vacuum Polarisation Contribution to the Anomalous Magnetic Moment of the Muon'

Abstract: The theoretical estimate of the anomalous magnetic moment of the muon is lower than the experimental measurement by approximately 3 standard deviations. The precision of the Standard Model (SM) prediction is limited by hadronic contributions, of which the Leading Order Vacuum Polarisation (LOVP) contribution has the largest uncertainty. By carefully processing new electron-positron-to-hadron experimental cross section data, we aim to improve the accuracy and precision of the hadronic contribution to the muon $g-2$ to help to clarify the origin of the discrepancy between theory and experiment.