Enumerative Geometry and String Theory
Géométrie énumérative et théorie des cordes
(Org: **Keshav Dasgupta** and/et **Johannes Walcher** (McGill))

PER BERGLUND, University of New Hampshire
Global Embeddings for Branes at Toric Singularities and Moduli Stabilization

We discuss recent work on the realization of gauge theories from D3-branes at toric singularities in compact Calabi-Yau manifolds. In particular, we show how a new type of Euclidean D3-brane instanton supported on a non-Spin four-cycle in type IIB orientifolds can give rise to a non-perturbative contribution to the superpotential. This allows the Kähler moduli to be stabilized consistent with the assumption that the four-cycle vanishes for the toric singularity, while the overall volume of the Calabi-Yau manifold is exponentially large.

VINCENT BOUCHARD, University of Alberta
Topological recursion and double Hurwitz numbers

Double Hurwitz numbers count covers of the Riemann sphere by genus g Riemann surfaces with arbitrary ramification over 0 and ∞, and simple ramification elsewhere. We show that generating functions for certain classes of double Hurwitz numbers satisfy the Eynard-Orantin topological recursion, which completely determines them recursively through complex analysis on particularly simple spectral curves. We also argue that double Hurwitz numbers can be obtained in the "infinite framing" limit of Gromov-Witten invariants on certain orbifolds, in parallel to a similar limit relating simple Hurwitz numbers and Gromov-Witten invariants of $\mathbb{C}^3$. This is joint work with Dani Hernandez Serrano and Motohico Mulase.

GUILLAUME LAPORTE, Mcgill University
Monodromy of an Inhomogeneous Picard-Fuchs Equation

The global behaviour of the normal function associated with van Geemen's family of lines on the mirror quintic is presented, as well as how the limiting value of the normal function at large complex structure is an irrational number expressible in terms of the di-logarithm.

ARNAUD LEPAGE-JUTIER, McGill
Smoothed Transitions in Higher Spin AdS Gravity

We consider CFTs conjectured to be dual to higher spin theories of gravity in AdS_3 and AdS_4. Two dimensional CFTs with W_N symmetry are considered in the $\lambda = 0$ ($k \to \infty$) limit where they are described by continuous orbifolds. The torus partition function is computed, making reasonable assumptions, and equals that of a free field theory. We find no phase transition at temperatures of order one; the usual Hawking-Page phase transition is removed by the highly degenerate light states associated with conical defect states in the bulk. Three dimensional Chern-Simons Matter CFTs with vector-like matter are considered on T^3, where the dynamics is described by an effective theory for the eigenvalues of the holonomies. Likewise, we find no evidence for a Hawking-Page phase transition at large level k.

SHUNJI MATSUURA, McGill University
Classification of gapless topological phases

TBA

RUXANDRA MORARU, University of Waterloo
Stable bundles on complex nilmanifolds

Let G be a connected, simply connected nilpotent Lie group, and let $\Gamma \subset G$ be a discrete, co-compact subgroup. The quotient manifold $\Gamma\backslash G$ is called a *nilmanifold*. If $N = \Gamma\backslash G$ is equipped with a complex structure I induced by a left-invariant complex structure on G, then (N, I) is called a *complex nilmanifold*. Other than complex tori, examples of complex nilmanifolds are given by Kodaira surfaces and Iwasawa manifolds. Moreover, although all complex nilmanifolds have holomorphically trivial canonical bundles, only complex tori admit Kaehler metrics. Nonetheless, many non-Kaehler complex nilmanifolds admit balanced metrics. In this talk, I will describe some of the interesting geometric properties that moduli spaces of stable bundles on non-Kaehler complex nilmanifolds possess.

JIHYE SEO, Physics Department, McGill University and CRM MathPhysics lab
Exactly stable non-BPS spinors in heterotic string theory on tori

Considering SO(32) heterotic string theory compactified on tori, stability of non-supersymmetric states is studied. A non-supersymmetric state with robust stability is constructed, and its exact stability is proven in a large region of moduli space against all the possible decay mechanisms allowed by charge conservation. Using various T-duality, we translate various selection rules about conserved charges into simpler problems resembling partition and parity of integers.

ALISHA WISSANJI, University of Alberta, Department of Mathematical and Statistical Sciences
IIA Perspective On Cascading Gauge Theory

We study the N=1 supersymmetric cascading gauge theory found in type IIB string theory on p regular and M fractional D3-branes at the tip of the conifold, using the T-dual type IIA description. We reproduce the supersymmetric vacuum structure of this theory, and show that the IIA analog of the non-supersymmetric state found by Kachru, Pearson and Verlinde in the IIB description is metastable in string theory, but the barrier for tunneling to the supersymmetric vacuum goes to infinity in the field theory limit. We also comment on the N=2 supersymmetric gauge theory corresponding to regular and fractional D3-branes on a near-singular K3, and clarify the origin of the cascade in this theory.