Titles and Abstracts

Monday, Jan 15

1. Benjamin Assel, CERN

Title: Coulomb branch and fixed points of 3d N=4 gauge theories

Abstract: I will present a new approach to study the fixed points of 3d N=4 gauge theories, based on an analysis of the Coulomb branch of vacua. The Coulomb branch is described as a complex algebraic variety, parametrized by the vevs of monopole operators and SCFT fixed points sit at singular points of the variety. I will use this framework to study the fixed points of U(N) and USp(2N) gauge theories with fundamental matter, revealing some surprising features.

2. Francesco Benini, SISSA

Title: IR Dynamics and Dualities in (2+1)D QFTs

Abstract: I will present new conjectured dualities that relate gauge theories with scalars and fermions in 2+1 dimensions. The dualities give interesting predictions about the infrared dynamics of those theories, including phenomena such as bosonization, emergence of quantum symmetries, decoupling of free fields, multicritical points. If time permits, I will mention 't Hooft anomalies in those theories.

3. Inaki Garcia-Etxebarria, Max-Planck Institute

Title: S-duality in N=1 orientifold SCFTs

Abstract: I will describe the generalization of the N=4 USp(2N)/SO(2N+1) Montonen-Olive duality to the class of N=1 theories arising at low energy from branes probing orientifolded toric singularities.

4. Sebastian Franco, CUNY

Title: TBA

Abstract: TBA

5. Kantaro Ohmori, IAS

Title: Anomaly polynomials and Higgs branches of 6d (1,0) theories and M-theory

Abstract: In this talk I will first give a brief review of 6d (1,0) theories, its anomaly polynomials and its M-theory brane constructions. An important open problem there is lack of anomaly inflow computations for many cases. Then, I will explain some conjectures/results mainly about Higgs branches of some classes of 6d (1,0) SCFTs. One class is constructed as M5 branes probing an ALE singularity possibly with discrete C-flux, and the other is M5 branes probing the intersection of a M9-brane and an A_k singularity, possibly with non-trivial E_8 flat bundle.

6. Cyril Closset, CERN

Title: 2d (0,2) quivers: a view from the B-model

Abstract: I will describe some recent work on 2d N=(0,2) supersymmetric quivers realized on D1-branes at CY4 singularities, and a few other closely related topics.

7. Guglielmo Lockhart, Utrecht

Title: TBA

Abstract: TBA

Tuesday, Jan 16

1. Sergio Benvenuti, SISSA

Title: Lagrangians for Argyres-Douglas theories: superpotentials and 3d dualities.

Abstract: We consider 4d N=1 Lagrangians dual to N=2 Argyres-Douglas models. The N=1 gauge theories display unitarity bound violations. We propose a general procedure to complete such theories, isolating the infrared interacting SCFT. Combined with chiral ring stability, this allows to reduce the dualities to 3d and find two physical interpretations of the Lagrangians: the 'Abelianization duality' and its mirror, the 'sequential confinement RG flow'.

2. Shlomo Razamat, Technion

Title: TBA

Abstract: TBA

3. Seok Kim, Seoul National University

Title: 6d strings and exceptional instantons

Abstract: We propose ADHM-like methods to compute the Coulomb branch instanton partition functions with certain exceptional gauge groups or exceptional matters: $SO(7)$ theories with matters in **8**, and G_2 theories with matters in **7**. We also study the elliptic genera of 6d instanton strings. Our proposals are tested using alternative D-brane-based methods, and also 5d descriptions of 6d SCFTs.

4. Kimyeong Lee, KIAS

Title: 5-brane webs for 5d N=1 G2 gauge theories

Abstract: TBA

5. Sungjay Lee, KIAS

Title: TBA

Abstract: TBA

6. Soo-Jong Rey, SNU

Title: Elliptic Genus, Anomaly Cancellations and Sagnotti Mechanism in Nonperturbative Heterotic Strings in 6d

Abstract: TBA

7. Can Kozcaz, Harvard

Title: TBA

Abstract: TBA

Wedsday, Jan 17

1. Jonathan Heckman, Pennsylvania University

Title: Punctures and Dynamical Systems

Abstract: We show that punctures in the theory of M5-branes probing a $\mathbb{C}^2/Z_k$ singularity are governed by a dynamical system in which evolution in time corresponds to motion to a neighboring node in an affine A-type quiver. Even in the "trivial" $k = 1$ case, there is a remarkable level of complexity: Only specific rational values for the initial momenta of the dynamical system lead to physical punctures and small perturbations in initial conditions lead to vastly different late time behavior, which we fully classify. Based on joint work with F. Hassler.

2. Amihay Hanany, Imperial College

Title: TBA

Abstract: TBA

3. Patrick Jefferson, Harvard

Title: Geometric classification of rank 2 5d SCFTs

Abstract: I discuss recent progress on classifying 5d SCFTs with Coulomb branch deformations. In the first part of the talk, I describe newly proposed field theoretic criteria necessary for a 5d gauge theory to admit a nontrivial UV SCFT fixed point. In the second part of the talk, I describe a proposal for classifying rank 2 5d SCFTs in terms of Khler surfaces, and explain how this classification program sharpens the necessary field theoretic criteria by incorporating 5d instanton physics. This geometric classification program supports the existence of many new theories previously identified using the field theoretic approach, predicts several dualities among these theories, and further supports the idea that all 5d SCFTs can be viewed as deformations of a 6d "parent" theory compactified on a circle.

4. Stefan Hohenegger, Universite de Lyon

Title: Triality in Little String Theories

Abstract: I discuss a class of little string theories (LSTs) with eight supercharges on the world-volume of N M5-branes probing a transverse $\mathbb{Z}_M$ orbifold. These M-brane configurations compactified on a circle are dual to M D5-branes intersecting N NS5-branes on $T^2 \times \mathbb{R}^{7,1}$ as well as to F-theory compactified on a toric Calabi-Yau threefold $X_{N,M}$. I argue that the Kähler cone of $X_{N,M}$ admits three regions associated with weakly coupled quiver gauge theories of gauge groups $[U(N)]^M$, $[U(M)]^N$ and $[U(NM/k)]^k$ where $k = \gcd(N, M)$. These provide low-energy descriptions of different LSTs. The duality between the first two gauge theories is well known and is a consequence of the S-duality between D5- and NS5-branes or the T-duality of the LSTs. The triality involving the third gauge theory is new and I demonstrate it using several examples.

Thursday, Jan 18

1. Chi-Ming Chang, UC Davis

Title: TBA

Abstract: TBA

2. Takuya Okuda, Tokyo University

Title: Supersymmetric vortex defects in two dimensions

Abstract: We study codimension-two BPS defects in 2d N = (2, 2) supersymmetric gauge theories, focusing especially on those characterized by vortex-like singularities in the dynamical or non- dynamical gauge field. We classify possible SUSY-preserving boundary conditions on charged matter fields around the vortex defects, and derive a formula for defect correlators on the squashed sphere. We also prove an equivalence relation between vortex defects and 0d-2d coupled systems. Our defect correlators are consistent with the mirror symmetry duality between Abelian gauged linear sigma models and Landau-Ginzburg models, as well as that between the minimal model and its orbifold. Work with Kazuo Hosomichi and Sungjay Lee.

3. Pavel Putrov, IAS

Title: TBA

Abstract: TBA

4. Yang-Hui He, City University of London

Title: Calabi-Yau Volumes, Reflexive Polytopes and Gauge Theories in Various Dimensions

Abstract: We study various geometrical quantities for Calabi-Yau varieties realized as cones over Gorenstein Fano varieties, obtained as toric varieties from reflexive polytopes in various dimensions. We concentrate on reflexive polytopes up to dimension 4 and calculate the minimized volume of the Sasaki-Einstein base of the corresponding Calabi-Yau cone. By doing so we conjecture new bounds for the Sasaki-Einstein volume with respect to many topological quantities of the corresponding toric varieties.

We give interpretations about these volume bounds in the context of associated field theories via the AdS/CFT correspondence. Based on joint work with R.-K. Seong and S.-T. Yau.

5. Guido Festuccia, Uppsala

Title: TBA

Abstract: TBA

6. Peter Koroteev, UC Davis

Title: Quantum Geometry, Instantons and Elliptic Algebras

Abstract: Moduli spaces of instantons/vortices in gauge theories contain a lot of geometric data, which we know how to extract using methods of modern enumerative geometry. I shall discuss such moduli spaces which appear in a certain family of N=2 supersymmetric gauge theories together with algebraic structures which naturally arise from those moduli spaces. Our construction admits extensions and generalization which have both physical and geometrical meaning.

7. Fei Yan, UT Austin

Title: Line defect Schur indices, Verlinde algebras and $U(1)_r$ fixed points

Abstract: Given a 4d N=2 superconformal field theory, one could consider Schur index in presence of a half line defect L. Recently Cordova-Gaiotto-Shao found that such index admits an expansion in terms of characters of the chiral algebra introduced by Beem et al. In this talk I will report a puzzling new feature of this expansion: the $q \to 1$ limit of the expansion coefficients is linearly related to the vacuum expectation values $\langle L \rangle$ in $U(1)_r$-invariant vacua of the theory compactified on a circle. This relation can be expressed as a commutative diagram involving three algebras: the OPE algebra of line defects, the algebra of functions on $U(1)_r$-invariant vacua, and a Verlinde-like algebra associated to the chiral algebra. This is joint work with Andy Neitzke.

Friday, Jan 19

1. Minxin Huang, USTC

Title: Topological Strings on Singular Elliptic Calabi-Yau 3-folds and Minimal 6d SCFTs

Abstract: We apply the modular approach to computing the topological string partition function on non-compact elliptically fibered Calabi-Yau 3-folds with higher Kodaira singularities in the fiber. The approach consists in making an ansatz in terms of a rational function of weak Jacobi forms. Our results yield, at given base degree, the elliptic genus of the corresponding non-critical 6d string, and thus the associated BPS invariants of the 6d theory. We introduce subrings of the known rings of Weyl invariant Jacobi forms which are adapted to the additional symmetries of the partition function, making its computation feasible to low base wrapping number.

In contradistinction to the case of simpler singularities, generic vanishing conditions on BPS numbers are no longer sufficient to fix the modular ansatz at arbitrary base wrapping degree. We show that to low degree, imposing exact vanishing conditions does suffice, and conjecture this to be the case generally.

2. Joseph Minahan, Uppsala University

Title: Analytically continuing d in localization

Abstract: In this talk I discuss how to localize supersymmetric gauge theories on spheres of dimension d, where d is not necessarily an integer. We then attempt to analytically continue up in dimensions where localization is not directly accessible. We discuss the results and their consistency with other results.

3. Satoshi Nawata, Fudan University

Title: Geometry and physics of double affine Hecke algebra

Abstract: I will talk about physics approach to understand representation theory of double affine Hecke algebra (DAHA). DAHA can be realized as an algebra of line operators in 4d N=2* theory and therefore it appears as quantization of coordinate ring of Hitchin moduli space over once-punctured torus. Using 2d A-model on the Hitchin moduli space, I will explain relationship between representation category of DAHA and Fukaya category of the Hitchin moduli space.

4. Marco Bertolini, IPMU

Title: TBA

Abstract: TBA