

# Gauged Sigma-Models in Two Dimensions

## Workshop Talk Schedule

Events for:  
**Monday, November 3rd - Friday, November 7th**

<b>Monday, November 3rd</b>
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8:30am **Breakfast**

9:30am **Registration**

10:45am **Welcome**

11:00am **Nikita Nekrasov - SCGP 102**

**Title:** "Bethe wavefunctions from gauged linear sigma models via Bethe/gauge correspondence".

**Abstract:** Bethe wavefunctions for the Heisenberg spin chain and elliptic Calogero-Moser many-body system will be computed using gauged linear sigma models.

12:00pm **Lunch**

2:00pm **Jaume Gomis - SCGP 102**

**Title:** "Microscopic GLSM Description of M2-brane Surface Operators and Sphere Partition Functions"

3:00pm **Meng-Chwan Tan - SCGP 102**

**Title:** A quasi-topological gauged sigma model, the geometric Langlands program, and knots

4:00pm **Tea**

4:45pm **Oscar Garcia-Prada - SCGP 102**

**Title:** Gravitating vortices

**Tuesday, November 4th**

8:30am **Breakfast**

9:30am **Ignasi Mundet i Riera - SCGP 102**

**Title:** Nonlinear vortices on nearly nodal curves

**Abstract:** We consider nonlinear vortices (aka gauged pseudoholomorphic maps) with target a compact symplectic manifold endowed with a Hamiltonian action of the circle. In joint work with Gang Tian we proved a compactness theorem for nonlinear vortices of bounded energy in which the conformal structure of the domain Riemann surface is allowed to vary along the moduli space of stable nodal (marked) curves. The main issue of the theorem is a description of the possible objects and phenomena that may arise when a node appears in the limit of the Riemann surfaces: these include meromorphic connections and gradient segments of the moment map. In this talk we will explain how to understand these phenomena when the nonlinear vortices arise from algebraic objects via the Hitchin-Kobayashi correspondence. This will be applied to exhibit concrete sequences of nonlinear vortices of algebraic origin whose limit includes gradient flow lines or meromorphic connections (this last section will be based on joint work with Guangbo Xu).

10:30am **Coffee**

11:00am **Martin Speight - SCGP 102**

**Title:** The  $L^2$  geometry of the space of  $P^1$  vortex-antivortex pairs.

11:30am **AST-105 - SCGP 103**

12:00pm **Lunch**

1:00pm **SCGP Weekly Talk: Ignasi Mundet i Riera (University of Barcelona), "Vortex equations and invariants: A survey" - SCGP 102**

**Title:** "Vortex equations and invariants: a survey"

2:00pm **Marcel Bökstedt - SCGP 102**

**Title:** Divisor links

3:00pm **Christian Wegner - SCGP 102**

**Title:**  $L^2$ -Betti numbers and particle counting in a gauged nonlinear sigma-model

4:00pm **Tea**

4:45pm **Guangbo Xu - SCGP 102**

**Title:** Gauged Witten equation and correlation function

**Abstract:** This is a joint work with Gang Tian. I will talk about the analytical properties of the classical equation of motion in gauged linear  $\sigma$ -model, which we call the gauged Witten equation. This is a generalization of the Witten equation in Landau-Ginzburg A-model (Fan-Jarvis-Ruan, Witten) and the symplectic vortex equation (Mundet, Cieliebak-Gaio-Salamon). We will also discuss a mathematical definition of the correlation function, using the moduli space of gauged Witten equation, when the curve is fixed.

**Wednesday, November 5th**

8:30am **Breakfast**

9:30am **Anton Kapustin - SCGP 102**

**Title:** TBA

10:30am **Coffee**

11:00am **Eric Sharpe - SCGP 102**

**Title:** Recent developments in 2d (0,2) theories

12:00pm **Lunch**

2:00pm **Hold for Nikita's Student Seminars - SCGP-313**

2:00pm **Abhijit Gadde - SCGP 102**

**Title:** Exact solutions of 2d supersymmetric gauge theories

**Abstract:** We study dynamics of two-dimensional non-abelian gauge theories with  $N=(0,2)$  supersymmetry that include  $N=(0,2)$  supersymmetric QCD and its generalizations. For a range of parameters where supersymmetry is not dynamically broken at low energies, we give a complete description of the low-energy physics in terms of 2d  $N=(0,2)$  SCFTs using anomaly matching and modular invariance.

3:00pm **Amihay Hanany - SCGP 102**

**Title:** TBA

4:00pm **Tea**

5:30pm **Art and the Quantum Moment Pre-Exhibition Talk by Arthur I Miller - Lobby, 103**

**Title:** “Colliding Worlds: How Cutting-Edge Science is Redefining Contemporary Art”

**Abstract:** There is a quiet revolution going on in the world of art, a new avant garde pushing the boundaries farther than ever before. These are artists who work together with scientists to make extraordinary creations that may well change the world as we know it. From designer butterflies to plastic surgery as performance theatre, from rabbits that glow in the dark to seeing sound and sculpting data – in my talk I will introduce this brave new world. What are some of the many sorts of art that spring from the interplay between art and science? How did this interaction begin and where is it going in the 21st century? How are concepts such as art and aesthetics being redefined? Are there similarities between the creative processes of artists and scientists and if so, what? These are some of the questions I will explore while looking into the exciting new art movement which I call artsci.

**Thursday, November 6th**

8:30am **Breakfast**

9:30am **Dave Morrison - SCGP 102**

**Title:** Mirror symmetry and gauged linear sigma models

10:30am **Coffee**

11:00am **Chris Woodward - SCGP 102**

**Title:** Flipping out over vortices?

11:30am **AST-105 - SCGP 103**

12:00pm **Lunch**

2:00pm **Kentaro Hori - SCGP 102**

**Title:** Grade restriction rule for Rodland model and Pfaffian/Grassmann correspondence, via hemisphere partition function

**Abstract:** The talk is about D-branes in "Rodland model", a gauged linear sigma model with two geometric phases --- Pfaffian phase and Grassmannian phase, as well as in another model ("Hosono-Takagi model") with the similar feature. The "grade restriction rule" for each window between the two phases is presented. This yields the rule of D-brane transport through the windows and in particular the monodromy around the singular points. The hemisphere partition function is used to find the rule. Based on a joint work with Richard Eager, Johanna Knapp and Mauricio Romo.

3:00pm **Francesco Benini - SCGP 102**

**Title:** Cluster algebras from 2d gauge theories

**Abstract:** In the first part of the talk we study some dualities of two-dimensional supersymmetric  $N=(2,2)$  gauge theories, reminiscent of 4d Seiberg duality, focusing on chiral and twisted chiral rings and the so-called sphere partition function. In the second part we observe that, when applied to quiver gauge theories, those dualities realize the cluster algebras of Fomin and Zelevinsky in their full completeness, with consequences in physics and mathematics.

4:00pm **Tea**

6:00pm **Workshop Banquet**

<b>Friday, November 7th</b>
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8:30am **Breakfast**

9:30am **Tudor Dimofte**

**Title:** 3d N=4 Gauge Theory and Symplectic Duality

**Abstract:** I will discuss half-BPS boundary conditions for 3d N=4 theories, and their IR realizations on the Higgs and Coulomb branches. After putting the 3d theory in an Omega background, boundary conditions map to objects in a certain D-module like category, which is a generalization of the Bernstein-Gelfand-Gelfand "Category O." Moving from the Higgs to the Coulomb branch, either by passing through the UV gauge theory or by acting with 3d mirror symmetry, induces a duality between two different "Categories O," and gives a new perspective on what is known mathematically as symplectic duality.

10:30am **Coffee**

11:00am **Lotte Hollands**

**Title:** "Superconformal index and surface defects"

12:00pm **Lunch**

2:00pm **Piotr Sulkowski**

**Title:** BPS states, knots and vortices

3:00pm **Du Pei - SCGP 102**

**Title:** Equivariant integration over Hitchin moduli space

4:00pm **Tea**