

2023 Simons Physics Summer Workshop - WEEK 1

**Events for:
Monday, June 26th - Friday, June 30th**

Monday, June 26th

9:00am **Summer Physics Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

10:00am **Physics Summer Workshop: Amihay Hanany - SCGP 102**

Speaker: Amihay Hanany (Year Represented: 2014)

Title: Exotic brane systems and Moduli spaces of theories with 8 supercharges

Abstract: This talk will focus on brane systems which give rise to new types of quivers, both electric and magnetic. Using these brane systems, one can get gauge groups with spinor matter, exceptional type and a new understanding of Higgs branches. One can have a window into the physics of theories involving symmetric products. Those naturally appear in a system of multiple M5 branes near a Klein singularity. New phases of moduli spaces can be found and a match with a classical Higgs branches and with those which arise at infinite coupling. Some of these concepts may be new, so I will go over details, depending on how they arise.

10:30am **Summer Physics Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

12:00pm **Summer Physics Workshop: Lunch - SCGP Cafe**

Title: Lunch

3:30pm **Physics Summer Workshop: Tea - SCGP Cafe**

Title: Tea

Tuesday, June 27th

9:00am **Summer Physics Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

10:00am **Physics Summer Workshop: Jonathan Heckman - SCGP 102**

Speaker: Jonathan Heckman (Year Represented: 2009)

Title: IIB Determined

Abstract: We use the Swampland Cobordism Conjecture recently proposed by McNamara and Vafa to study the spectrum of objects in type IIB string theory. A famous feature of type IIB string theory (as well as several other quantum systems) is that it enjoys a non-abelian duality group. By computing the relevant cobordism groups, we show that the cobordism conjecture successfully reconstructs many known supersymmetric objects, and also predicts the existence of a new non-supersymmetric “reflection 7-brane,” the properties of which we describe. Time permitting, we also discuss how such 7-branes implement generalized symmetry operators in various quantum field theories engineered from string theory. Based on joint work with Debray, Dierigl, Montero and Torres.

10:30am **Summer Physics Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

12:00pm **Summer Physics Workshop: Lunch - SCGP Cafe**

Title: Lunch

4:00pm **Workshop Tea - SCGP Lobby**

Title: Tea

5:00pm **- Auditorium 103**

Title: Summer Concert Series: Jazz Loft Concert

Wednesday, June 28th

9:00am **Summer Physics Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

11:00am **Physics Summer Workshop: Beach Talk - Cumrun Vafa - Smith Point County Park, 1 William Floyd Pkwy, Shirley, NY 11967, USA**

Speaker: Cumrun Vafa (Year Represented: 2008)

Title: Swampland constraints & moduli space boundaries and interior

Abstract: We discuss the interplay between various Swampland constraints in the asymptotic region in field space as well as its interior.

Thursday, June 29th

9:00am **Summer Physics Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

10:00am **Physics Summer Workshop: Sebastian Franco - SCGP 102**

Speaker: Sebastian Franco (Year Represented: 2006)

Title: Brane Webs, GTPs and Quivers

Abstract: We propose a unified perspective on two sets of objects that usually arise in the study of bipartite field theories. Each of the sets consists of a polytope, or equivalently a toric Calabi-Yau, and a quiver theory. We refer to the two sets of objects as original and twin. The democratic treatment that we advocate raises new questions regarding the connections between these objects, some of which we explore. With this motivation in mind, we establish a correspondence between the mutations of the original polytope and the twin quiver. This leads us to propose that non-toric twin quivers are naturally associated to generalized toric polygons (GTPs) and we explore various aspects of this idea. Supporting evidence includes global symmetries, the ability of twin quivers to encode the generalized s-rule, and the connection between the mutations of polytopes and of configurations of webs of 5-branes suspended from 7-branes. We introduce three methods for constructing twin quivers for GTPs. We also investigate the connection between twin quivers obtained using different toric phases. Twin quivers provide a powerful new perspective on GTPs. The ideas presented in this talk may represent a step towards the generalization of brane tilings to GTPs.

10:30am **Summer Physics Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

12:00pm **Summer Physics Workshop: Lunch - SCGP Cafe**

Title: Lunch

3:30pm **Physics Summer Workshop: Tea - SCGP Cafe**

Title: Tea

5:00pm **Workshop Banquet - Simons Center Cafe - SCGP Cafe**

Title: Banquet Dinner

Friday, June 30th

9:00am **Summer Physics Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

10:00am **Physics Summer Workshop: Cenke Xu - SCGP 102**

Speaker: Cenke Xu (Year Represented: 2016)

Title: When Topology and Criticality Meet quantum information

Abstract: Decoherence is the bridge between the quantum and classical worlds. We discuss the effect of decoherence/weak measurement on strongly entangled quantum many-body systems. Decoherence or WM turn a pure state into a mixed state density matrix, and the effect of decoherence can be mathematically mapped to a boundary problem. There are two classes of quantum many-body systems with well-known nontrivial boundary effects: (1) states with nontrivial topology, and (2) quantum critical points. For the states with nontrivial topology, the effect of decoherence is mathematically equivalent to turning on nonlocal interactions between physical topologically protected boundary states, and we design the so-called type-I and type-II "strange correlator" to diagnose the mixed state density matrix. We demonstrate that usually the type-II strange correlator still "remembers" the information of the SPT even after decoherence. We also consider 2+1d Wilson-Fisher fixed point under decoherence. The boundary effect of 2+1d quantum critical points have attracted a lot of theoretical and numerical efforts in the last few years, and we demonstrate that under decoherence we may observe some exotic physics such as the "extraordinary-log" physic that was proposed recently.

10:30am **Summer Physics Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

12:00pm **Summer Physics Workshop: Lunch - SCGP Cafe**

Title: Lunch

3:30pm **Physics Summer Workshop: Tea - SCGP Cafe**

Title: Tea