NCAMP 2026

Titles and Abstracts

October 8-10, 2026 | University of North Carolina Wilmington

Talk titles and abstracts in conference schedule order. All times are Eastern.

Thursday October 8

Bojko Bakalov

North Carolina State University | 9:00-9:50 a.m.

Variational quantum algorithms and dynamical Lie algebras

One of the main obstacles to the trainability of variational quantum algorithms and quantum machine learning models are barren plateaus, where the cost function (and its gradients) exponentially concentrates in parameter space as the size of the problem increases. We derive a formula for the variance of the cost function in terms of the dynamical Lie algebra (DLA) of the parametrized quantum circuit, i.e., the Lie algebra generated by the Hamiltonians in the circuit. We present a classification of DLAs generated by 1- and 2-local Pauli operators acting on a spin chain or more generally placed on the edges of an arbitrary interaction graph. Finally, we explicitly determine the DLA associated with the Quantum Approximate Optimization Algorithm with a Grover mixer. We prove that the dimension of the DLA grows polynomially with the number of qubits, and as a consequence, barren plateaus are avoided.

Julia Plavnik

Indiana University Bloomington | 10:10-11:00 a.m.

The Condensed Fiber Product and Zesting

G-crossed braided categories are important since they model anyon models with defects. In this talk, we will introduce two constructions of G-crossed categories, the fiber product and zesting, and present their connection. If time allows, we will show a monoidal structure in the 2-category of G-crossed and braided extensions of braided categories with a fixed transparent symmetric pointed subcategory.

Liz Jurisich

College of Charleston | 11:10 a.m.-12:00 p.m.

A Borcherds subalgebra of Primary Vectors Inside the Monster Lie Algebra

The Monster Lie algebra $\mathfrak{m}$, introduced by Borcherds in his proof of the Monstrous Moonshine conjectures, is built from the Moonshine module $V^\natural$ and carries an action of the Monster group $\mathbb{M}$. In this talk I will describe a proper Borcherds subalgebra $\mathfrak{p} \subset \mathfrak{m}$ generated by primary vectors of $V^\natural$. Like $\mathfrak{m}$, it decomposes as $\mathfrak{v}^- \oplus \mathfrak{gl}_2 \oplus \mathfrak{v}^+$ with $\mathfrak{v}^\pm$ free Lie algebras, for which I will give explicit generators. I will also discuss the $\mathbb{M}$-module structure of its graded pieces and a denominator formula that yields recursive formulas for root space dimensions and characters.

David Green
North Carolina State University | 1:30-2:00 p.m.

Three constructions on string net models

The famous Levin-Wen model serves as a tractable example of a system exhibiting (2 +1)D topological order. Topological orders support a variety of physical constructions - we will review three of them from the perspective of *unitary* tensor categories: condensation, the attaching of a bulk, and gauging. The common thread is the utility of a skein theoretic approach incorporating unitarity, as well as particular models for the Drinfeld center.

This work is based on a series of three articles, collectively joint with several coauthors.

Darlayne Addabbo
SUNY Polytechnic Institute | 2:10-3:00 p.m.

Modularity of vertex operator algebra correlators and heavy Heisenberg algebras

Zhu famously proved that correlation functions of elements in rational C_2-cofinite vertex operator algebras transform nicely under the action of $SL_2(\mathbb{Z})$. Recently, Keller and I showed that correlation functions with zero modes inserted also satisfy nice modular transformation properties. Of special interest are the so-called “zero mode correlators”, which are correlation functions with zero modes but no vertex operators inserted. One motivation for the study of zero mode correlators is that Miyamoto proved that the generating function for zero mode correlators of a weight 1 vector is a Jacobi form of weight 0. In this talk, I will discuss our results on correlators with zero modes inserted, as well as our recent higher weight analog of Miyamoto’s result. (Based on joint work with Christoph A. Keller.)

Florencia Orosz Hunziker
University of Colorado Boulder | 3:30-4:20 p.m.

Vertex algebras, tensor categories and modular forms.

In this talk, we will discuss how vertex algebra representations give interesting examples of tensor categories and how modular forms arise when studying their characters. I will describe recent progress in describing tensor structures and number theoretic properties of characters in the irrational setting, namely, for non-semisimple categories with infinitely many irreducible modules.

Andrew Manion
North Carolina State University | 4:30-5:20 p.m.

The sutured Frohman-Nicas TQFT and quantum topology

The Alexander polynomial is the quantum invariant associated to the Lie superalgebra $gl(1|1)$; it has a categorification in Heegaard Floer homology. The Frohman-Nicas TQFT is a classical TQFT setting for the Alexander polynomial. I will discuss recent joint work with Elijah Rutter giving a sutured refinement of the Frohman-Nicas TQFT and relating it to the decategorification of bordered sutured Floer homology. In this setting, the "half-projectivity" property of the Frohman-Nicas TQFT, a common feature of non-semisimple theories, is replaced by honest functoriality up to sign. I will then discuss some proposals and conjectures relating the sutured Frohman-Nicas TQFT to constructions in 3d quantum topology, where the appearance of sutures is related to the extension of the TQFT down to a point.

Friday October 9

Hans Wenzl
University of California San Diego | 9:00-9:50 a.m.

Reconstruction of tensor categories of type G_2

We prove that any ribbon tensor category whose fusion ring is the one of the compact Lie group of type G_2 has to be equivalent to the representation category of the Drinfeld-Jimbo quantum group of type G_2 with $q=1$ or q not a root of unity. We also prove an analogous result for the corresponding finite fusion tensor categories. This is joint work with Lilit Martirosyan.

Lisa Carbone
Rutgers University | 10:00-10:50 a.m.

Groups for Borcherds algebras

We discuss the challenges involved in constructing Lie group analogs for Borcherds algebras and we present some recent developments in this direction.

Andrew Schopieray
SUNY Plattsburgh | 11:00-11:50 a.m.

Recent advances in tensor categories, number theory, and mathematical physics

September 2026 was a hectic month at the intersection of tensor categories, number theory, and mathematical physics. Three major papers, one in each of the previously mentioned subjects, were released in the same week, all tying the construction of the first infinite families of (temporarily) exotic fusion categories to arithmetic surrounding the multiple gamma functions. In this talk, I will speak about the tensor categories contribution to this trifecta authored by Terry Gannon, Harshit Yadav, and myself. To warm us up to the idea that number theory is really the way to go, we'll discuss how elementary number theory classifies the fusion categories of ranks less than 5.

Melody Molander
The Ohio State University | 1:30-2:00 p.m.

NIM-representations of Tambara-Yamagami generalizations

Tambara-Yamagami (TY) categories form one of the simplest families of non-pointed fusion categories. Despite their elementary description, these categories play a central role in mathematical physics. Studying generalizations of TY fusion rings can then provide a controlled framework to explore the new phenomena that arise when one moves beyond the classical TY setting. In this talk, I will focus on the generalization of the TY fusion ring, proposed by Jordan-Larson. One of the most useful tools to study fusion rings is the classification of their non-negative integer matrix (NIM-) representations. NIM-reps can be used as an effective method to detect candidate algebra objects in the fusion category underlying the fusion ring. In this talk, we will compute and classify the irreducible NIM-reps of the proposed extensions as well as detect candidate algebra objects associated to these NIM-reps. This work is joint with Agustina Czenky, Emily McGovern, Monique Müller, and Ana Ros Camacho.

Roberto Hernandez Palomares
University of Waterloo | 2:10-3:00 p.m.

Quantum graphs and spin models

Spin models for singly-generated Yang-Baxter planar algebras are known to be determined by certain highly-regular classical graphs such as the pentagon or the Higman-Sims graph, which are extremely rare. Examples of spin models include the Jones and Kauffman polynomials. We will discuss the notion of higher-regularity for quantum graphs, and using tools from quantum information we give new examples of non-classical graphs yielding spin models. Time allowing, we will discuss some applications to quantum groups.

Siu-Hung "Richard" Ng
Louisiana State University | 3:30-4:20 p.m.

Generalized Symmetries From Fusion Actions

Finite automorphism groups of nice vertex operator algebras have been well-studied in orbifold theory. Galois correspondence and Schur Weyl duality were established in these finite group actions on VOAs. In this talk, we introduce an action of a fusion category on a condensable algebra in a modular tensor category via the generalized Frobenius-Schur indicators. For these fusion actions, Galois correspondence and Schur Weyl duality are proved, and they are generalizations of the corresponding results in orbifold theory of VOAs. This talk is based on a joint work with Chongying Dong, Li Ren and Feng Xu.

Colleen Delaney
Purdue University | 4:30-5:20 p.m.

AnyonWiki.org

The AnyonWiki is an open-source database of fusion rings and fusion categories for researchers working in math, physics, and quantum information science. I will give an overview of some exciting recent developments with the project and a demonstration of new functionality for engaging with the algebraic data on AnyonWiki.org.