Category Theory
Théorie des catégories
(Org: **Salja Deni**, **Robert Morisette** and/et **Dorette Pronk** (Dalhousie University))

AMÉLIE COMTOIS, University of Ottawa

DARIEN DEWOLF, St Francis Xavier

AARON FAIRBANKS, Dalhousie

MARTIN FRANKLAND, University of Regina
An invitation to n-angulated categories

Triangulated categories arise in topology and in algebra, to capture the structure of cofiber sequences. Examples include the stable homotopy category of spaces and the derived category of a ring. Geiss, Keller, and Oppermann introduced n-angulated categories to capture the structure found in certain cluster tilting subcategories in quiver representation theory. This talk will provide an introduction to n-angulated categories, highlighting some similarities and differences with triangulated categories (the case n=3). I will briefly advertise joint work with Sebastian Martensen and Marius Thaule on Toda brackets in n-angulated categories.

ALI HAMAD, Ottawa

NATHAN HAYDON, University of Waterloo
Compositional First-Order Logic

We discuss a recent string-diagrammatic calculus that is complete for first-order logic. The calculus achieves its results by combining cartesian and linear bicategories. We present the development of the calculus, motivate the inference rules, and suggest future directions.

JACK JIA, Waterloo

CAMERON KRULEWSKI, Dalhousie University
Dagger Categories and Higher Spin Statistics

Dagger categories, which generalize the category of Hilbert spaces equipped with the dagger operation, may be used in functorial field theory to model the physical property of unitarity: one requires unitary functorial field theories to be functors of dagger categories. In the case of invertible, fully-extended functorial field theories, we construct an action of the orthogonal group

extending the reflection and spin flip actions on manifolds as well as the complex conjugation and fermion parity operations on super Hilbert spaces. We show that for this subclass of theories, unitarity imposes an equivariance condition for the O-action, which we interpret as a higher version of the spin-statistics theorem in quantum field theory.

This talk is based on joint work with L. Müller and L. Stehouwer.

Cameron Krulewski, Lukas Müller, and Luuk Stehouwer. "A Higher Spin-Statistics Theorem for Invertible Quantum Field Theories." Commun. Math. Phys. 406, 230 (2025).

ROSE KUDZMAN-BLAIS, Kyoto University

Linear and Cyclic $*$-Autonomous Proarrow Equipments

There is often more than one type of arrow between objects. Frequently, there are maps which strictly preserve structure and more relaxed morphisms which behave like objects themselves, e.g. functions versus relations. A paradigm to study both simultaneously is given by double categories, introduced by Ehresmann, and pseudo double categories, defined by Grandis and Paré. In particular, these double categories often arise from proarrow equipments, as developed by Wood.

On the other hand, with the advent of linear logic by Girard, and the introduction of cyclic $*$-autonomous and linear bicategories by Cockett, Koslowski and Seely, it has become clear that certain bicategories have two linked compositions: tensor and par. Indeed, besides standard relational composition, the bicategory Rel is equipped with a relational sum composition. Further examples were then developed by Blute, K-B and Niefield. Crucially, the tensor structures of most examples are canonically proarrow equipments, inducing well-studied double categories. It is then natural to ask how these stricter maps interact with par.

In this talk, we will discuss joint work with Robert Morissette and Dorette Pronk exploring how a proarrow equipment can be compatible with the par of linear bicategories and the linear negation of cyclic $*$-autonomous bicategories. This compatibility induces new double categories with par as loose composition. We will demonstrate how most examples fit within this paradigm, moreover how piercean bicategories are captured by this new framework, as introduced by Bonchi, Di Giorgio, Trotta to study the cartesian structure of the linear bicategory Rel.

MICHAEL LAMBERT, UMass Boston

RORY LUCYSHYN-WRIGHT, Brandon

ROBERT MORISSETTE, Dalhousie

HAYATO NASU, Dalhousie

ROBERT PARÉ, Dalhousie

EVAN PATTERSON, Topos Institute

JULIEN ROSS, Dalhousie

LAURA SCULL, Fort Lewis College
(Lack of) Model Structure for Homotopy of Graphs

Since the introduction of discrete homotopy theories for graphs, researchers have been interested in constructing model structures for these homotopy theories. The results along this line have largely been negative and include results of [GS] for $\times$-homotopy and [CKK] for A-homotopy. I will discuss these results and their generalizations, and what we can learn from these results about the nature of discrete homotopy theories and their resistance to model structures.

This talk is based on joint work with M. Youssef, with support from the rest of the Adjoint School 2025 Homotopy of Graphs Team: R. Hardeman, M. Ramos Huila, J. Nickel, N. Samadzelkava.

[GS] Goyal, S., Santhanam, R. "(Lack of) Model Structures on the Category of Graphs". Appl Categor Struct 29, 671–683 (2021)

[CKK] Daniel Carranza, Krzysztof Kapulkin, and Jinho Kim. "Nonexistence of Colimits in Naive Discrete Homotopy Theory". Applied Categorical Structures (2023).

DANIEL TEIXEIRA, Dalhousie

JEAN-BAPTISTE VIENNEY, University of Ottawa

SCOTT WESLEY, Dalhousie