Name of 5-day Workshop
Date of 5-day Workshop

MEALS

*Breakfast (Buffet): 7:00–9:30 am, Sally Borden Building, Monday–Friday
*Lunch (Buffet): 11:30 am–1:30 pm, Sally Borden Building, Monday–Friday
*Dinner (Buffet): 5:30–7:30 pm, Sally Borden Building, Sunday–Thursday
Coffee Breaks: As per daily schedule, in the foyer of the TransCanada Pipeline Pavilion (TCPL)
***Please remember to scan your meal card at the host/hostess station in the dining room for each meal.**

MEETING ROOMS

All lectures will be held in the lecture theater in the TransCanada Pipelines Pavilion (TCPL). An LCD projector, a laptop, a document camera, and blackboards are available for presentations.

SCHEDULE

Sunday

16:00	Check-in begins (Front Desk - Professional Development Centre - open 24 hours)
17:30–19:30	Buffet Dinner, Sally Borden Building
20:00	Informal gathering in 2nd floor lounge, Corbett Hall (if desired) Beverages and a small assortment of snacks are available on a cash honor system.

Monday

7:00–8:45	Breakfast
8:45–9:00	Introduction and Welcome by BIRS Station Manager, TCPL
9:00–10:00	Lecture: John Francis
10:00–10:30	Coffee Break
10:30–11:30	Lecture: David Jordan
11:30–13:00	Lunch
13:00–14:00	Guided Tour of The Banff Centre; meet in the 2nd floor lounge, Corbett Hall
14:00	Group Photo; meet in foyer of TCPL
17:30–19:00	Dinner
19:00–20:00	Lecture: André Henriques

Tuesday

7:00–9:00	Breakfast
9:00–10:00	Lecture: Mikhail Kapranov
10:00–10:30	Coffee Break
10:30–11:30	Lecture: Tobias Dyckerhoff
11:30–13:00	Lunch
17:30–19:00	Dinner
19:00–20:00	Lecture: David Nadler

Wednesday

7:00–9:00	Breakfast
9:00–10:00	Lecture: Michael Ching
10:00–10:30	Coffee Break
10:30–11:30	Lecture: Pascal Lambrechts
11:30–13:00	Lunch
17:30–19:00	Dinner
19:00–20:00	Lecture: Victor Turchin

Thursday

7:00–9:00	Breakfast
9:00–10:00	Lecture: Sam Raskin
10:00–10:30	Coffee Break
10:30–11:30	Lecture: Ivan Mirkovic
11:30–13:00	Lunch
17:30–19:00	Dinner
19:00–20:00	Lecture: Reimundo Heluani

Friday

7:00–9:00	Breakfast
9:00	Informal Discussions
11:30–13:30	Lunch
Checkout by 12 noon.	

** 5-day workshop participants are welcome to use BIRS facilities (BIRS Coffee Lounge, TCPL and Reading Room) until 3 pm on Friday, although participants are still required to checkout of the guest rooms by 12 noon. **

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ABSTRACTS
(in alphabetic order by speaker surname)

Speaker: **Michael Ching** (Amherst)
Title: *Goodwillie calculus and functors on pointed framed manifolds*
Abstract: The aim of this talk is to describe a connection between the ideas of factorization homology and Goodwillie's calculus of homotopy functors from the category of based spaces to the category of spectra. (This is all joint work with Greg Arone.) In this version of calculus the layers of the "Taylor tower" of such a functor F are encoded by a sequence of spectra known as the "derivatives" of F.

Our main result shows that the entire Taylor tower of F (and hence, when the tower converges, F itself) can be recovered from an action of the little n-discs operad on the derivatives if and only if the functor F is determined by its values on "pointed framed n-manifolds", that is, on those based spaces given by adding a basepoint to a framed n-manifold in a suitable way. As an example, I'll explain how this theorem applies to the Taylor tower of Waldhausen's algebraic K-theory functor with $n = 3$.

Speaker: **Tobias Dyckerhoff** (Bonn)
Title: *Topological Fukaya categories and relative Calabi-Yau structures*
Abstract: According to a proposal of Kontsevich, the wrapped Fukaya category $F(M)$ of a noncompact symplectic manifold M can, under suitable conditions, be computed as the homology $H(L, E)$ of a possibly singular Lagrangian spine L in M with coefficients in a constructible cosheaf E of differential graded categories. We address the question of how to make use of this sheaf-theoretic nature to

(1) compute invariants of $F(M)$ and

(2) introduce structure on $F(M)$.

In the special case when M is a noncompact Riemann surface, we compute periodic cyclic homology and construct certain relative variants of Calabi-Yau structures.

Speaker: **John Francis** (Northwestern)
Title: *Factorization homology and the cobordism hypothesis*
Abstract: I'll describe a proof of the cobordism hypothesis using factorization homology. This is joint work with David Ayala.

Speaker: **Reimundo Heluani** (IMPA)
Title: *Higher chiral homology and rationality*
Abstract: Let X be an elliptic curve, V a vertex algebra, and A the corresponding chiral algebra on X. We present a computation relating the higher chiral homology of X with coefficients in A with the Hochschild homology of the Zhu algebra of V. This answers a question of Beilinson and Drinfeld in the genus 1 case. This is work in progress joint with Jethro van Ekeren (IMPA).

Speaker: **André Henriques** (Utrecht)
Title: *Extended Chern-Simons theory*
Abstract: We propose answers to the questions "What does Chern-Simons theory assign to a point?" and "What kind of mathematical object does Chern-Simons theory assign to a point?"

Speaker: **David Jordan** (Edinburgh)
Title: *Integrating quantum groups over surfaces*

Abstract: In this talk, I will explain a technique for computing factorization homology of braided tensor categories on (punctured, or closed) surfaces, which draws ideas from the representation theory of tensor categories. The construction leads to a quantization of the Atiyah-Bott-Goldmann Poisson structure on the character variety of the surface. We obtain manifestly topological constructions of several well-known constructions in representation theory, such as reflection equation algebras, quantum differential operator algebras, double affine Hecke algebras and Cherednik algebras, and their extensions to higher genus. This is joint work with David Ben-Zvi and Adrien Brochier.

Speaker: **Mikhail Kapranov** (IPMU)
Title: *Lie algebras and E_n-algebras associated to secondary polytopes*
Abstract: The secondary polytope associated to a finite set of points A in $\mathbb{R}^n$ has a remarkable factorization property: each face of it is itself a product of other secondary polytopes. The talk will explain how this property allows one to associate to the collection of secondary polytopes an L_∞ algebra and to extend it to a E_n-algebra. It is based on joint work with M. Kontsevich and Y. Soibelman and on further work in progress with Y. Soibelman.

Speaker: **Pascal Lambrechts** (UC Louvain)
Title: *Cosimplicial models for manifold calculus and simplicial models for factorization homology*
Abstract: Manifold calculus is a tool developped by Goodwillie and Weiss which enables to approximate a contravariant functor, F, from the category of m-manifolds to the category of spaces (or alike), by its "Taylor approximation", $T_\infty F$. I will explain how to construct a fairly explicit and computable cosimplicial model of $T_\infty F(M)$ out of a simplicial model of the compact manifold M (i.e. out of a simplicial set whose realization is M, with extra tangential information if needed). This cosimplicial model in degree p is then equivalent to the evaluation of F on a disjoint union of as many m-disks as p-simplices in the simplicial model of M.

As an example, we apply this construction to the functor $F(M) = Emb(M, W)$ of smooth embeddings in a given manifold W; in that case our cosimplicial model in degree p is then just the configuration spaces of all the p-simplices of M in W product with a power of a Stiefel manifold. When $\dim(W) > \dim(M) + 2$, a theorem of Goodwillie-Klein implies that our explicit cosimplicial space is a model of $Emb(M, W)$. (This generalizes Sinha's cosimplicial model for the space of long knots which was for the special case when M is the real line.)

This allows one to make explicit computations. As an example, using this cosimplicial model we show that the rationnal Betti numbers of the space $Emb(M, \mathbb{R}^n)$ have an exponential growth when the Euler characteristic of M is < -1.There is also a dual version which gives a simplicial model for factorization homology. (This is joint work with Greg Arone, Pedro Boavida de Brito, Daniel Pryor, Arnaud Songhafouo.)

Speaker: **Ivan Mirkovic** (UMass Amherst)
Title: *Loop Grassmannians, classifying spaces and local spaces*
Abstract: Loop Grassmannians are a manifestation of factorization in geometric representation theory. The talk is about two ways to reconstruct the geometry of loop Grassmannians and their generalizations in a way manifestly related to factorization.. The first attempts to reinterprete (closures of) orbits in loop Grassmannians as spaces of maps following Beilinson and Drinfeld. In the second approach locality (factorization) is used as a construction rather than just a property.

Speaker: **David Nadler** (Berkeley)
Title: *TBA*
Abstract: TBA

Speaker: **Sam Raskin** (MIT)
Title: *Equivalences of factorization categories in geometric Langlands*
Abstract: An old observation of Beilinson and Drinfeld is that the constituents of local geometric Langlands

factorize. The factorization framework is useful in many applications (e.g., in the global program), but is not always so amenable to the combinatorics inherent in Langlands duality. We will explain how ideas emerging from many people working on geometric Eisenstein series provide a framework for circumventing these difficulties, and will explain how to use these methods to establish some new equivalences of factorization categories.

We will strive to provide necessary background from geometric representation theory during the talk.

Speaker: **Victor Turchin** (KSU)
Title: *Relative deformation theory of the little discs operads and spaces of long embeddings*
Abstract: I will explain the connection between the GoodwillieWeiss embedding calculus and the deformation theory of the operads of of little discs. (This is joint work with Arone, Fresse, and Willwacher.)