

# 1 Saskatchewan Topology Meeting

Speaker: Jacek Szmigielski

Title: The magic of Lax pairs; a gentle introduction

Abstract: Lax pairs show up in a variety of problems in mechanics, non-linear wave theory and geometry to mention just a few contexts. I will discuss three natural scenarios giving rise to Lax pairs:

- 1) isospectral deformations of boundary value problems;
- 2) co-adjoint actions of Lie groups;
- 3) Riemann-Hilbert factorizations of loop groups.

Speaker: Ozgur Bayindir

Title: Topological Equivalences of  $E_\infty$  DGAs

Abstract: In this talk, I present an idea for studying  $E_\infty$  differential graded algebras ( $E_\infty$  DGAs) using stable homotopy theory. Namely, I discuss new equivalences between  $E_\infty$  DGAs that are defined using commutative ring spectra.

We say  $E_\infty$  DGAs are  $E_\infty$  topologically equivalent when the corresponding commutative ring spectra are equivalent. Quasi-isomorphic  $E_\infty$  DGAs are  $E_\infty$  topologically equivalent. However, the examples I am going to present show that the opposite is not true; there are  $E_\infty$  DGAs that are  $E_\infty$  topologically equivalent but not quasi-isomorphic. This says that between  $E_\infty$  DGAs, we have more equivalences than just the quasi-isomorphisms. I also discuss interaction of  $E_\infty$  topological equivalences with the Dyer-Lashof operations and cases where  $E_\infty$  topological equivalences and quasi-isomorphisms agree.

Speaker: Soumen Sarkar

Title: Equivariant generalized cohomology theory of divisive toric orbifolds

Abstract: Toric orbifolds are topological generalization of simplicial projective toric varieties. We introduce some sufficient conditions on the combinatorial data associated to a toric orbifold to ensure an invariant CW-structure of the toric orbifold. In this talk I will discuss 3 different equivariant cohomology theories of divisive toric orbifolds. This is a joint work with V. Uma.

Speaker: Steve Rayan

Title: One Quiver, Served Three Ways

Abstract: In this talk, I will discuss the Jordan quiver (unframed and framed), which gives rise to a number of interesting and different quiver varieties, depending on the category one uses and the type of quotient. I will discuss what happens when we use:

- (1) the ordinary (GIT or symplectic) quotient and the category of vector spaces;
- (2) the ordinary quotient and the category of vector bundles (on some fixed curve);
- (3) the hyperkähler quotient and the category of vector spaces.

I will discuss some open problems in the geometry and topology of these quotients, especially in the latter case. A number of the ideas here are joint work with each of J. Fisher, H. Weiss, and M. Kamgarpour (both completed and in progress).

Speaker: Paul Arnaud Songhafou Tsopmene

Title: Manifold calculus

Abstract: Manifold calculus, due to Goodwillie and Weiss, goes back to around 1999. It is concerned with the study of functors from the poset of open subsets of a manifold to the category of topological spaces. Manifold calculus has been used by many authors to understand the topology of a variety of embedding spaces. This talk will go over three things. First I will explain the concept of manifold calculus by highlighting some analogies with the ordinary calculus. Next I will talk about a project with Donald Stanley that consists of generalizing manifold calculus to functors into any model category. Lastly, if time permits, I will present a combinatorial model for manifold calculus and further exciting directions to go with that