Fusion Categories in Dijon, May 21–23, 2013

Abstracts

Alain Bruguires:
Exact sequences of fusion categories
In this talk, I will give an outline of a joint work with Sonia Natale on exact sequences of tensor categories, focusing on the special case of fusion categories. I will explain how exact sequences of tensor categories generalize exact sequences of (finite) groups, and also exact sequences of Hopf algebras. I will give examples, such as (exact sequences associated with) modularizations and equivariantizations. Equivariantization exact sequences can be characterized as 'central exact sequences' and are closely related to modularizations.

Siu-Hung Ng:
Cauchy's Theorem and Wang's finiteness conjecture
Cauchy's theorem for finite groups asserts that the exponent and the order of a finite group have the same prime factors. The theorem has been generalized to semisimple Hopf algebras as well as quasi-Hopf algebras, in which the dimensions of these algebras replace the role of the orders of finite groups. In this talk, we will discuss a generalization of Cauchy's theorem for spherical fusion categories, and its application to a proof of Wang's finiteness conjecture: there are only finitely many modular categories of any given rank. This is joint work with P. Bruillard, E. Rowell and Z. Wang.

David Penneys:
Subfactors at index $3 + \sqrt{5}$
A planar algebra is a mathematical object which encodes quantum symmetries. Particularly nice planar algebras, called "factor" or "fantastic" planar algebras, give unitary 2 categories, and generalize the representation categories coming from (quantum) groups. We will discuss some examples and non-examples of such planar algebras at index $3 + \sqrt{5}$ which are important in the classification of subfactors.

Julia Plavnik:
On the structure of fusion categories with few irreducible degrees
In this talk we shall consider the general problem of understanding the structure of a fusion category $\mathcal{C}$ after the knowledge of the set $\mathrm{c.\,d.}(\mathcal{C})$ of Frobenius-Perron dimensions of its simple objects.

We shall show various structural results regarding nilpotency and solvability, in the sense introduced by Etingof, Gelaki, Nikshych and Ostrik, of certain classes of integral fusion categories and semisimple Hopf algebras under restrictions on the set $\mathrm{c.\,d.}(\mathcal{C})$ of its irreducible degrees.

Eric Rowell:
Classifying Modular Categories
I will discuss some approaches to classifying modular categories from two perspectives: enumeration by rank and stratification by properties.

Kenichi Shimizu:
Indicators of the adjoint object
I will introduce an invariant of fusion categories defined based on the Frobenius-Schur indicator of the adjoint representation of a semisimple Hopf algebra, and explain how it extends to the non-semisimple case, i.e., finite tensor categories.

Noah Snyder:
Radford's theorem and the belt trick
Topological field theories give a connection between topology and algebra. This connection can be exploited in both directions: using algebra to construct topological invariants, or using topology to prove algebraic theorems. In this talk, I will explain an interesting example of the latter phenomena. Radford's theorem, as generalized by Etingof-Nikshych-Ostrik, says that in a finite tensor category the quadruple dual functor is easy to understand. It's somewhat mysterious that the double dual is hard to understand but the quadruple dual is easy. Using topological field theory, we show that Radford's theorem is exactly the consequence of the Dirac belt trick in topology. That is, the double dual corresponds to the generator of $\pi_1(\mathrm{SO}(3))$ and so the quadruple dual is trivial in an appropriate sense exactly because $\pi_1(\mathrm{SO}(3)) \cong \mathbb{Z}/2$. This is part of a large project, joint with Chris Douglas and Chris Schommer-Pries, to understand local field theories with values in the 3-category of tensor categories via the cobordism hypothesis.

Leonid Vainerman:
On $\mathbb{Z}/2\mathbb{Z}$-extensions of pointed fusion categories (joint work with J.-M. Vallin)
We classify $\mathbb{Z}/2\mathbb{Z}$-graded fusion categories whose 0-component is a pointed fusion category. A number of concrete examples is considered.

Jean-Michel Vallin:
On quantum groupoids and subfactors associated with $\mathbb{Z}/2\mathbb{Z}$-graded extensions of pointed fusion categories.
This talk is about a work in progress, we apply reconstruction theorems to $\mathbb{Z}/2\mathbb{Z}$-graded extensions of pointed fusion categories in order to obtain families of finite C^*-quantum groupoids and type II_1 subfactors.

Alexis Virelizier:
On group-graded fusion categories
My talk will concern fusion categories which are graded by a (dicrete) group. In particular, we will investigate their graded centers. Such categories are useful to construct homotopy quantum field theories (HQFTs) in dimension 3. If time permits, I will briefly discuss the case of a topological group.