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Fakultät für
Mathematik, Informatik
und Naturwissenschaften

# Kolloquium über Reine Mathematik

## Einladung zu einem Vortrag

# Dienstag, 11. Juli 2017

## 17 Uhr s.t., Geom H4

# Prof. Dr. Paul-André Melliès

## (Université Paris Diderot)

## *Ribbon dialogue categories: a functorial bridge between proofs and knots*

Abstract:

An old dream of formal logic is to follow the path of mathematical physics and to geometrize itself. Can we see logical proofs as topological objects reflecting the way in which we reason and argument in space and time? In this introductory talk, I will explain how to connect the logical notion of proof to the topological notion of knot, using the 3-dimensional language of monoidal 2-categories. A ribbon dialogue category is defined as a monoidal category equipped with a braiding, a twist, and a non-involutive duality. Think for instance of the category of representations (finite and infinite dimensional) of a ribbon Hopf algebra in the sense of Drinfeld. A well-known recipe formulated by Lambek tells us how to construct the free ribbon dialogue category as a category with formulas as objects and proofs as morphisms. Our main result is a coherence theorem which states that the canonical functor from the category of proofs to the category of ribbon tangles is faithful. This coherence theorem is not only useful in practice: it also means that two logical proofs are equal precisely when their underlying ribbon tangles coincide up to topological deformation. I will explain in my talk why this result provides a topological foundation to the dialogical interpretation of proofs as interactive strategies playing on dialogue games.

**Vor dem Vortrag (ab 16.30 Uhr) stehen im Raum 327 Kaffee und Tee bereit.**

A reference (in French) on this work

https://www.irif.fr/~mellies/hdr-mellies.pdf

as well as this page and extra references on tensorial logic and dialogue categories:

https://www.irif.fr/~mellies/tensorial-logic.html

https://www.irif.fr/~mellies/tensorial-logic/1-game-semantics-in-string-diagrams.pdf

https://www.irif.fr/~mellies/tensorial-logic/6-braided-notions-of-dialogue-categories.pdf

https://www.irif.fr/~mellies/tensorial-logic/9-dialogue-categories-and-frobenius-monoids.pdf