Personal information

Name : Kenny R. W. De Commer

Nationality : Belgian

Date of birth : 20/08/1983

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Languages : Dutch (native), English, French, Italian (basic), Polish (very basic)

Formation and professional experience

2014- *Tenure track research professor* (*ZAP-BOF*), Vrije Universiteit Brussel, Belgium

2011-2013 *Maître de conférences*, Université de Cergy-Pontoise, France

2009-2011 *Post-doc* at Tor Vergata university, Rome, Italy (supervisor : Prof. R. Longo)

2005-2009 *Research Assistant* (FWO), KU Leuven, Belgium.
PhD Defense : 21/05/2009
Title : Galois coactions for algebraic and locally compact quantum groups
Advisor : Alfons Van Daele (KU Leuven, België)

2003-2005 *Master of mathematics*, KU Leuven, Belgium

2001-2003 *Candidate of mathematics*, KU Leuven, Belgium

Research

Research themes

- Quantum groups (on analytic and algebraic level)
- Representation theory (of quantum groups and related structures)
- C*-algebras and von Neumann algebra's
- Subfactor theory
- Category theory, in particular tensor categories
- Non-commutative geometry.

Key publications

- K. De Commer, A. Freslon and M. Yamashita, CCAP for Universal Discrete Quantum Groups, *Communications in Mathematical Physics* **331** (2) (2014), 677–701.
- K. De Commer and M. Yamashita, Tannaka-Kreĭn duality for compact quantum homogeneous spaces. II. Classification of quantum homogeneous spaces for quantum $SU(2)$, *Journal für die reine und angewandte Mathematik*, DOI : 10.1515/crelle-2013-0074.
- K. De Commer, On a correspondence between quantum $SU(2)$, quantum $E(2)$ and extended quantum $SU(1,1)$, *Communications in Mathematical Physics* **304** (1) (2011), 187–228.
- K. De Commer, Galois coactions and cocycle twisting for locally compact quantum groups, *Journal of Operator theory* **66** (1) (2011), 59–106.

Grants

01/01/2015 – 31/12/2018 Research Project of the Fund for Scientific Research Flanders.

Short description of my research

My research is at the interface of the theory of *operator algebras* and the theory of *quantum groups*.

Operator algebras are non-commutative algebras with a norm which form a rich generalization of the theory of locally compact and measureable spaces. One hence speaks sometimes of 'non-commutative topology' or 'non-commutative measure theory'. *Quantum algebras* are algebras with extra structure (such as a coproduct) whose theory in turn forms a rich generalization of group theory. The combination of the above theories has led to the development of the theory of *locally compact quantum groups*, initiated by George Kac in the 1960's and brought to a culmination point by Johan Kustermans and Stefaan Vaes around 2000.

Locally compact quantum groups admit many of the constructions from classical group theory. For example, one can develop *harmonic analysis* or *representation theory* for locally compact quantum groups. In a certain sense, locally compact quantum groups behave more naturally than ordinary groups, as one can develop a general theory of *Pontryagin duality* for them. They can also be used to describe in a correct way the symmetries of certain inclusions of non-abelian algebras (*non-abelian Galois theory*).

My research has been focused mainly on the following themes.

- Construction of locally compact quantum groups by means of the *twisting* technique.
- Study of *ergodic actions* of (locally) compact quantum groups.
- Study of the operator algebraic properties of a given (locally) compact quantum group.

One of the main goals of my current research concerns the construction of operator algebraic quantizations of non-compact semi-simple Lie groups, for which the twisting technique is of fundamental importance.