



Centre for Symmetry and Deformation

Department of Mathematical Sciences, University of Copenhagen



The Centre for Symmetry and Deformation (SYM) is a research center and PhD and postdoc training site based at the Department of Mathematical Sciences at the University of Copenhagen. It consists of 9 permanent faculty, 10-15 postdocs, and around 20 PhD students enrolled in a 3-year PhD program. It has an extensive conference and visitors program, with an average of 10 annual workshops/masterclasses and hundreds of independent visitors, as well as regular outreach activities. The center was created in 2010 by a grant from the Danish National Research Foundation, and also receives support from a number of other sources including several ERC Advanced and Starting grants.

The 9 permanent faculty currently consists of professors Jesper Grodal (director), Søren Eilers, Uffe Haagerup, Ib Madsen, Jesper M. Møller, Ryszard Nest, Erik K. Pedersen, Mikael Rørdam, and Nathalie Wahl. All have received significant international accolades, including a cumulative total of 6 invited talks at the International Congress of Mathematicians. Their publication lists feature numerous publications in leading math journals such as *Annals*, *Inventiones*, and *J. Amer. Math. Soc.*

The center conducts research in the cross-field of topology, algebra, and non-commutative geometry, with the encompassing theme of understanding *symmetry*, i.e., groups and group actions, via commutative and non-commutative *deformation* methods, i.e., methods from homotopy theory and non-commutative geometry.

In particular the center conducts research within the following areas, at the highest international level:

- Homotopical group theory and the theory of p -local structures in groups.
- Diffeomorphism spaces of manifolds.
- Homological methods in geometric group theory.
- Algebraic K -theory and classification of manifolds.
- Hochschild and cyclic homology.
- Index theorems and deformation quantization.
- K -theoretic methods in topology and operator algebra.
- Analytic group theory.

As of November 2012, the SYM preprint series (arXiv report no. CPH-SYM-00) contained 135 papers. We list the following five representative recently published papers:

- The classification of p -compact groups and homotopical group theory. J. Grodal. *Proc. Intl. Congress of Mathematicians 2010*, 973–1001.
- Equivalences between fusion systems of finite groups of Lie type. C. Broto, J. Møller and B. Oliver. *J. Amer. Math. Soc.* **25** (2012), 1–20.
- Stabilization for mapping class groups of 3-manifolds. A. Hatcher and N. Wahl. *Duke Math J.* **155** (2010), 205–269.
- Central sequence C^* -algebras and tensorial absorption of the Jiang-Su algebra. E. Kirchberg and M. Rørdam. *J. Reine Angew. Math.* 41pp. accepted 2012.
- Simple Lie groups without the Approximation Property. U. Haagerup, T. de Laat. *Duke Math J.* 29pp. accepted 2012.

Even more recent breakthroughs include the Galatius–Randal-Williams determination of the stable homology of high dimensional manifolds (arXiv:1201.3527, arXiv:1203.6830) and the Benson–Grodal–Henke far-reaching generalization of Quillen’s cohomological p -nilpotence criterion (arXiv:1210.1564), all posted in 2012.

Keywords: homotopy theory, non-commutative geometry, homotopical group theory, diffeomorphisms of manifolds, K -theory of operator algebras.