



Mathematisches Forschungsinstitut Oberwolfach

Oberwolfach Seminar

K-Theory for Group C^* -Algebras and Semigroup C^* -Algebras

Date/ID:

12 October - 18 October 2014 (1442a)

Organizers:

Joachim Cuntz, Münster
Siegfried Echterhoff, Münster
Xin Li, London
Guoliang Yu, College Station

Programme:

C^* -algebras generated by unitary representations of discrete or, more generally, locally compact groups, are among the most classical and intensely studied examples of C^* -algebras. One reason is that they are closely related to the representation theory of the corresponding group. Another reason is that such C^* -algebras, for instance associated with the fundamental group of a manifold, arise naturally in classification and index problems in geometry. The determination of the K-theoretic invariants of such C^* -algebras is a particularly challenging problem. At the same time it is of great interest since these invariants are connected to index invariants and topological obstructions in geometry. Paul Baum and Alain Connes proposed a formula for the K-theory of the reduced C^* -algebra of a group that would permit, in principle, its computation. This Baum-Connes conjecture has attracted a lot of attention. It has been verified for very large classes of groups and has led to the development of a host of new techniques. More recently also the C^* -algebras generated by the regular representation of a semigroup have been studied in more detail. Intriguing examples of such semigroups come from algebraic number theory. The K-theory of the algebra in this case is related to natural number theoretic concepts.

We plan the following contents:

- Introduction to C^* -algebras.
- Group C^* -algebras, crossed products.
- Group algebras and crossed products by amenable groups. Examples.
- K-theory for C^* -algebras and methods for computation.
- Examples (AF-algebras, Toeplitz algebra, Pimsner-Voiculescu sequence, reduced and full C^* -algebra for the free group on n generators).
- The Baum-Connes conjecture. Examples and applications.
- Semigroup- C^* -algebras. Computation of their K-theory in examples.

Preparatory reading:

Bruce Blackadar, *K-theory for operator algebras*, Second, Mathematical Sciences Research Institute Publications, vol. 5, Cambridge University Press, Cambridge, 1998. Chapters I, IV, V

Nigel Higson and Erik Guentner, *Group C^* -algebras and K-theory*, Noncommutative geometry, 2004, pp. 137–251.

Deadline for applications:

1 August 2014

The Oberwolfach Seminars are organized by leading experts in the field, and address postdocs and Ph.D. students from all over the world. The aim is to introduce the participants to a particular interesting development. The seminars take place at the Mathematisches Forschungsinstitut Oberwolfach. The Institute covers accommodation and food. By the support of the Carl Friedrich von Siemens Foundation, travel expenses can be reimbursed up to 150 EUR in average per person. Participants can ask for travel support during their stay in Oberwolfach at the guest office against copy of travel receipts. The number of participants of a seminar is restricted to 25.

Applications including:

- full name and address, including e-mail address
- short CV, present position, university
- name of supervisor of Ph.D. thesis
- a short summary of previous work and interest
- title, ID and date of the intended seminar

should be sent preferably by e-mail (pdf files) to:

Prof. Dr. Dietmar Kröner

Vice Director MFO

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