

A.1 Scientific highlights

1. C. Skau (Trondheim) and coworkers have proved that all free and minimal $\mathbf{Z}^2$ -actions (as homeomorphisms on the Cantor set) is topologically orbit equivalent to $\mathbf{Z}$ -actions (cf. Connes, Feldman, Weiss in the ergodic measure-theoretic setting). (Team 5; B7)

Reference: T.Giordano, H. Matui, I. Putnam, C. Skau, *The orbit structure of Cantor minimal $\mathbf{Z}^2$ -systems*, preprint (2006).

[Substitute this for what appears in your preliminary FINAL REPORT, keeping reference [112], but supplanting reference [113] with the above.]

2. Nadia Larsen (Oslo) and Iain Raeburn give a new proof of a theorem of Mallat concerning existence of wavelets by using a construction of a direct limit of Hilbert spaces (Team 5; B7)

Reference: N. Larsen, I. Raeburn, *From filters to wavelets via direct limits*, arXiv: math. FA/ 0602450

3. E. Bedos (Oslo) and R. Conti studied convergence and summation processes of Fourier series in reduced twisted C^* -algebras of discrete groups (Team 5; B7)

Reference: E.Bedos, R. Conti, *On twisted Fourier analysis and convergence of Fourier series on discrete groups*, arXiv: math. OA/ 0605145

4. **T. M. CARLSEN** (Trondheim) and S. Silvestrov associate a C^* -algebra to every shift space and show that it can be viewed as a generalization of the universal Cuntz–Krieger algebra. They provide conditions for it to be nuclear, satisfying UCT, being simple, being purely infinite, respectively. (Team 5; B1)

Reference: T.M. Carlsen, S. Silvestrov, *C^* -crossed products and shift spaces*, arXiv: math. OA/ 0512488

5. **T. M. CARLSEN** (Trondheim) constructed a universal C^* -algebra generated by partial isometries for each (partial) dynamical system. The class of C^* -algebras thus obtained is in a natural way a generalization of the Cuntz–Krieger algebras (both finite and infinite matrices), crossed products of two-sided shift spaces, and of C^* -algebras associated to one-sided shift spaces, respectively. (Team 5; B1)

Reference: T. M. Carlsen, *Symbolic-dynamics, partial dynamical systems, Boolean algebras and C^* -algebras generated by partial isometries*, arXiv: math. OA/ 060416

6. S. Neshveyev (Oslo) and coworkers completely determine the ratio set of the orbit equivalence relation on the boundary of a non-amenable hyperbolic group, considered with the harmonic measure defined by a non-degenerate finite range random walk on the group (Team 5; B7)

Reference: M. Izumi, S. Neshveyev, R. Okayasu, *The ratio set of the harmonic measure of a random walk on a hyperbolic group*, arXiv: math. DS/ 0602409

7. S. Neshveyev (Oslo), L. Tuset (Oslo) and M. Izumi prove that for any non-trivial product type action of $SU_q(n)$ ($0 < q < 1$) on an ITPFI factor N , the relative commutant of the fixed point algebra in N is isomorphic to the algebra of bounded measurable functions on the quantum flag manifold. This is equivalent to the computation of the Poisson boundary of the dual discrete quantum group. (Team 5; B7)

Reference: M. Izumi, S. Neshveyev, L. Tuset, *Poisson boundary of the dual of $SU_q(n)$* , Comm. Math. Phys. 262(2006), 505-531

8. L. Tuset (Oslo) and M. Mueger prove that an absorbing monoid is an abstract tensor category is naturally associated to a discrete quantum group. Conversely, one can associate an absorbing monoid to such a quantum group. (Team 5; D3)

Reference: M. Mueger, L. Tuset, *Monoids, embeddings functors and quantum groups*, preprint (2006)

9. **M. Molberg** (Trondheim) established that an AF-equivalence relation can be characterized as the inductive limit of an ascending sequence of finite etale equivalence relations. This gives rise to a new definition of AF-equivalence relations that is more in line with the definition of hyperfinite equivalence relations in the measure-theoretic setting. (Team 5; B1)

Reference: M. Molberg, *AF-equivalence relations*, to appear in Math. Scand.

10. M. Landstad (Trondheim) and coworkers study the Hecke algebra of a Hecke pair (G, H) by using the Schlichting completion (G', H') . The representation theory and C^* -completions can then be addressed in terms of a single projection in $C^*(R')$. (Team 5; B2)

Reference: S. Kaliszewski, M. Landstad, J. Quigg, *Hecke C^* -algebras, Schlichting completions and Morita equivalence*, arXiv: math. OA/ 0311222

B.4.2 Major network meetings, network workshops

1. *C^* -algebras, Oberwolfach, Germany, August 28–September 3, 2005*

Participants:

Ola Bratteli

Erling Størmer

Sergey Neshveyev

Nadia Larsen

TOKE M. CARLSEN

2. *Operator algebras and Applications*, University of Southern Denmark, Odense, April 19–23, 2006.

Participants.

Ola Bratteli

Erling Størmer

Erik Alfsen

Nadia Larsen

Sergey Neshveyev

Christian Skau

Adam Sierakowski

Troels Jensen

3. *Operator algebras and Applications*, National Univ. of Ireland, Cork, June 1–4, 2005.

Participants:

Nadia Larsen

Magnus Landstad

TOKE M. CARLSEN

B.4.3 Networking

Nadia Larsen (Oslo) visited Ryszard Nest (Copenhagen) December 7–10, 2005

Sergey Nesveyev (Oslo) visited Ryszard Nest (Copenhagen) May 10–12, 2006.

List of individual members of the Oslo node (and Trondheim subnode)

(The postdocs and predocs supported by the EU-grant are marked with *, and their stay had terminated by May 1, 2006. Young researchers are in boldface.)

- Erik Alfsen, `alfsen@math.uio.no`. Geometry of state spaces of operator algebras.
- Erik Bedos, `bedos@math.uio.no`. Discrete magnetic Laplacians, amenability aspects for quantum groups, projective unitary representations and twisted Fourier analysis of discrete groups.
- Ola Bratteli, `bratteli@math.uio.no`. Wavelets and operator theory, noncommutative dynamical systems.
- **Toke Meier Carlsen***, `token@math.uio.no`. C^* -algebras associated to shift spaces (QSNG - postdoc in Trondheim 01.07.2004–30.09.2005. Postdoc in Oslo 01.10–31.12.2006)
- **Heidi Dahl**, `heidi.dahl@math.ntnu.no`. Doctoral student in Trondheim.
- Trond Digernes, `Trond.Digernes@math.ntnu.no`. p -adic quantum systems.
- **Sindre Duedahl**, `sindred@math.uio.no`. SUP doctoral student in Oslo.
- **Olav Gravir Imenes**, `olavgim@math.uio.no`. Doctoral student in Oslo.
- **Troels Jensen***, `troelssj@imada.sdu.dk`. (QSNG predoc in Trondheim 11.3–24.4,2006).
- Magnus Landstad, `magnusla@math.ntnu.no`. Hecke algebra and groupoid actions on C^* -algebras.
- Nadia S. Larsen, `nadial@math.uio.no`. Hecke algebras and C^* -completions, crossed products of C^* -algebras by semigroups of endomorphisms.
- **Mats Molberg**, `matism@math.ntnu.no`. Doctoral student in Trondheim.
- Sergey Neshveyev, `sergeyn@math.uio.no`. Noncommutative ergodic theory, boundary theory of quantum discrete groups, noncommutative differential calculus, rigidity properties of group actions.
- Kamran Reihani, `kamranr@math.uio.no`. Connections between C^* -algebras and dynamical systems (SUP - postdoc in Oslo 01.01.2005–31.12.2006)
- **Kjetil Røysland**, `roysland@math.uio.no`. Doctoral student in Oslo.
- **Adam Sierakowski***, `adam@imada.sdu.dk`. (QSNG predoc in Trondheim 11.3–24.4,2006).
- Christian Skau, `csk@math.ntnu.no`. Induced equivalence relations of discrete group actions on Cantor sets, K -theoretic data defined by dynamics.
- Erling Størmer, `erlings@math.uio.no`. Contractions on von Neumann algebras, noncommutative information theory and entropy.

- **Anne Louise Svendsen***, `svendsen@math.ku.dk`. Entropy of endomorphisms arising from subfactors (QSNF - postdoc in Oslo 01.09.2002–30.11.2003)
- Lars Tuset, `Lars.Tuset@iu.hio.no`. Cyclic cohomology for Hopf algebras, tensor categories, Martin boundary for compact quantum groups.

Postdocs and predocs supported under the grant

(who do not feature in the Midterm review report).

Full name: **Adam Sierakowski**

Category of researcher: pre-doc

Age of time of appointment and date of birth: 25 years, March 30, 1980.

Sex: Male

Nationality: Danish

Eligibility criterion used to fund this particular person (e.g Danish citizenships): Danish citizenship

Dates of appointment and total number of person-months: March 11-April 24, 2006 (1, 5 person-months)

Scientific speciality: purely infinite C^* -algebras

Place of work: NTNU, Trondheim, Norway

Email address of young researcher: `adam@imada.sdu.dk`

Full name: **Troels Jensen**

Category of researcher: pre-doc

Age of time of appointment and date of birth: 25 years, february 22, 1981.

Sex: Male

Nationality: Danish

Eligibility criterion used to fund this particular person (e.g Danish citizenships): Danish citizenship

Dates of appointment and total number of person-months: March 11-April 24, 2006 (1, 5 person-months)

Scientific speciality: C^* -algebras, non-commutative probability

Place of work: NTNU, Trondheim, Norway

Email address of young researcher: `troelssj@imada.sdu.dk`