

## Harmonic Analysis and Banach Algebra Group

### 1. The subject

In the past few years, quantization has become an increasingly important topic in abstract harmonic analysis: groups are replaced by quantum groups, Banach spaces are replaced by operator spaces, etc. This has led to fruitful interaction between harmonic analysis, Banach algebras, operator algebras, and operator spaces, and has led to natural generalizations in the framework of Kac algebras and, more generally, locally compact quantum groups. Many important properties of locally compact groups can now be expressed in terms of quantum groups, such as amenability, uniform structure, geometric properties, representation theory, non-commutative function spaces and their duals. Remarkable achievements have been made by Zhiguo Hu, Matthias Neufang, Zhong-Jin Ruan, and Volker Runde.

There has also been significant recent progress in functional analytic and geometric properties of group and measure algebras, Fourier and Fourier–Stieltjes algebras, and positive definite functions on locally compact groups, as well as problems related to amenability, derivations, homomorphisms, topological centres, multiplier algebras, spectral synthesis and representations of locally compact groups, by a large group of researchers in Canada and around the world, such as Bachir Bekka (Rennes), Yemon Choi (Saskatchewan), H. Garth Dales (Leeds), Antoine Derighetti (Lausanne), Edward G. Effros (UCLA), Brian Forrest (Waterloo), Fereidoun Ghahramani (Manitoba), Colin Graham (British Columbia), Edmond E. Granirer (British Columbia), Kathryn Hare (Waterloo), Zhiguo Hu (Windsor), Monica Ilie (Lakehead), Eberhard Kaniuth (Paderborn), Anthony To-Ming Lau (Alberta), Micheal Leinert (Heidelberg), Viktor Losert (Vienna), Jean Ludwig (Metz), Tianxuan Miao (Lakehead), Mehdi Sangani Monfared (Windsor), Matthias Neufang (Fields and Carleton), Thomas Ransford (Laval), Charles Read (Leeds), Zhong-Jin Ruan (Illinois at Urbana-Champaign), Volker Runde (Alberta), Ebrahim Samei (Saskatchewan), Nico Spronk (Waterloo), Ross Stokke (Winnipeg), Dona Strauss (Leeds), Keith Taylor (Dalhousie), Ali Ülger (Koç, Istanbul), George Willis (Newcastle, Australia), and Yong Zhang (Manitoba).

### 2. Funding and support from NSERC and Research Institutes

The harmonic analysis and Banach algebra group in Canada has a strong reputation both nationally and internationally. We have benefited significantly from various NSERC Programs: Discovery Grants, a Discovery Accelerator Supplement, a Leadership Support Initiative Grant, Undergraduate Student Research Awards, Doctoral Fellowships as well as Postdoctoral Fellowships. BIRS, Fields and PIMS have also played significant roles in supporting our research, particularly in Collaborative Research Groups, Research in Teams, a Thematic Program and several Workshops ranging between two and five days.

A number of PIMS Postdoctoral Fellowships have been awarded in our group since 2000, including (at the University of Alberta): Matthias Neufang, Yong Zhang, Yin Feng Lin, Hung Le Pham, and Rajendran Prakash; all of them are presently holding academic positions around the world. Faruk Uygul, mainly sponsored through an NSERC Discovery Accelerator Supplement, presently holds a University position, and Deping Ye, a recent recipient of a Fields-Ontario Postdoctoral Fellowship shared between Carleton University and the University of Ottawa, will start an academic position in the summer of 2011. An NSERC Postdoctoral Fellowship and a Fields Postdoctoral Fellowship have been awarded at the University of Waterloo: Ebrahim Samei and Hun Hee Lee, both now employed in academic positions.

PIMS also supported the conferences *Banach Algebras and Their Applications* in 2003 at the University of Alberta, as well as the *Canadian Abstract Harmonic Analysis Symposium* in 2009 at the University of Alberta and in 2010 at the University of Saskatchewan. Fields will provide funding for the meeting *Banach Algebras 2011* in Waterloo. Moreover, a proposal for a six-month Thematic Program on *Banach Algebras and Abstract Harmonic Analysis* is currently being considered by Fields for 2014.

### 3. International support

Our group has been very successful in the last five years in obtaining support for organizing international Conferences, Workshops as well as Research-in-Pairs Stays in China (Chern Institute of Mathematics), France (Luminy), Germany (Oberwolfach), Hong Kong, Poland, Taiwan, Turkey, and the UK.

### 4. Effect of new granting system to our group

The future of this quite abstract field of mathematics relies on forming the next generation through HQP training at all levels, from undergraduate students to postdoctoral researchers. The most significant effect of the new granting system to our group is on colleagues in departments without a Ph.D. program; this includes five of our eighteen active researchers in the group. It also affected one of our retired colleagues who is still very active in research but has no access to HQP.

Prepared by: Tony Lau (Alberta), Matthias Neufang (Fields and Carleton), Volker Runde (Alberta) and Nico Spronk (Waterloo).