Prix de doctorat

Doctoral Prize

Matthew Kennedy
(Carleton)

Matthew Kennedy s'est intéressé à la recherche en travaillant avec Heydar Radjavi au baccalauréat. Il a rédigé deux articles, un avec Radjavi dans *Journal of Functional Analysis* et un autre dans *Proceedings of the American Mathematical Society*. À la suite de ces travaux, il a mis sur pied un projet par correspondance avec les mathématiciens russes Victor Shulman et Yuri Turovskii, ce qui a donné lieu à la publication d'un long article dans *Integral Equations & Operator Theory*.

En tant que doctorant avec Kenneth Davidson, il a étudié les algèbres de semigroupes libres, qui sont (weak operator closed) algebras of operators on Hilbert space generated by n isometries with orthogonal ranges. Il a résolu une conjecture de Davidson et Pitts en démontrant a tight spatial structure theory for those algebras which were algebraically isomorphic to the canonical model of shifts on full Fock space. Cet article est paru dans *Journal für die reine und angewandte Mathematik* (Crelle). Une conjecture plus raffinée est demeurée ouverte, et la solution, bien que liée à l'original, a nécessité presque une autre année de travail. L'article du *Journal of the London Mathematical Society* a montré que every n-tuple of isometries with orthogonal ranges has a Wold-Lebesgue decomposition that extends and refines the fine structure theory for a single isometry and exposes new phenomena in the multivariable setting. Ces articles required the melding of operator algebra techniques with function theoretic methods used to study invariant subspaces of single operators.

Aussi à titre de doctorant, Kennedy et Andu Nica ont écrit un article dans *Communications in Mathematical Physics* à propos des C*-algèbres et des algèbres de von Neumann, introduites par Bozejko et Speicher, obtained as q-deformations of the two classical quantum mechanical operator systems. Ils ont montré que ces algèbres étaient toujours exactes et ils ont réalisé des projets sur une conjecture de Dykema et Nica.

Dans l'année suivant la fin de ses études, il a écrit plusieurs autres articles sur la théorie des opérateurs multivariables in the commutative and non-commutative settings.

Il a démontré qu'il était un chercheur accompli ayant un avenir très prometteur.

Matthew Kennedy a reçu son doctorat en mathématiques de l'Université de Waterloo en 2011. Il a refusé une bourse postdoctorale du CRSNG pour accepter un poste menant à la permanence à l'Université Carleton.

Matthew Kennedy learned about research as an undergraduate working with Heydar Radjavi. He wrote two papers, one with Radjavi in J. Functional Analysis and another in Proc. Amer. Math. Soc. As a result of this work, he developed a project by correspondence with Russian mathematicians Victor Shulman and Yuri Turovskii, resulting in a long paper in Integral Equations & Operator Theory.

As a doctoral student with Kenneth Davidson, he studied free semigroup algebras, which are (weak operator closed) algebras of operators on Hilbert space generated by n isometries with orthogonal ranges. He solved a conjecture of Davidson and Pitts demonstrating a tight spatial structure theory for those algebras which were algebraically isomorphic to the canonical model of shifts on full Fock space. This paper appeared in J. reine angewandte Math. (Crelle). A more refined conjecture remained open, and the solution, while related to the original, took almost another year. The J. London Math. Soc. paper showed that every n-tuple of isometries with orthogonal ranges has a Wold-Lebesgue decomposition that extends and refines the fine structure theory for a single isometry and exposes new phenomena in the multivariable setting. These papers required the melding of operator algebra techniques with function theoretic methods used to study invariant subspaces of single operators.

Also as a doctoral student, Kennedy and Andu Nica wrote a paper in Comm.Math. Phys. about C*-algebras and von Neumann algebras, introduced by

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La SMC a créé le Prix de doctorat pour récompenser le travail exceptionnel d'un étudiant au doctorat en mathématiques ayant obtenu un diplôme d'une université canadienne entre le 1er janvier et le 31 décembre de l'année précédente. Ce prix a été décerné pour la première fois en 1997.

The CMS Doctoral Prize recognizes outstanding performance by a doctoral student who graduated from a Canadian university in the preceding year (January 1st to December 31st). The first award was presented in 1997.

Jeffery-Williams Prize *(continued)*

a Leadership Support Initiative Award from NSERC. In 2010 he was awarded the Excellence in Research Prize from Queen's University. His results have been published in the most distinguished mathematical journals including Inventiones Mathematicae, the Duke Mathematical Journal, Advances in Mathematics, Documenta Mathematica, and the American Journal of Mathematics.

Dr. Speicher's area of research, free probability (which was introduced by Voiculescu), lies on the interface between operator algebras and probability theory. This theory had its origins in quantum theory, one of the most successful scientific theories of the twentieth century. At the birth of the quantum age, Werner Heisenberg pronounced that quantum theory must be based on the non-commutative algebra of matrices. The achievement of free probability is its ability to deal with non commuting random variables.

Dr. Speicher is also known for many other important contributions. Among them are the Fock space representation of the deformed Heisenberg commutation relations, the discovery of R-diagonal operators, a stochastic calculus for free Brownian motion, the discovery and classification of easy quantum groups, and the discovery of higher order freeness.

In particular, his 1991 CMP paper (with Bozejko) solved a 20 year old problem on the existence of a Fock space representation of the deformed Heisenberg commutation relations and is among the most heavily cited papers in the subject. His recent CMP paper (with Koestler) on a free de Finetti theorem shows that special quantum groups are the adequate symmetries for free probability and presents a major breakthrough.

After studying physics and mathematics in Saarbrucken, Freiburg, and Heidelberg, Dr. Speicher received his PhD in 1989 and his Habilitation in 1994 at the University of Heidelberg. He joined the faculty at Queen's University in 2000 and he currently holds a joint appointment at the Saarland University, Germany.

Doctoral Prize *(continued)*

Bozejko and Speicher, obtained as q-deformations of the two classical quantum mechanical operator systems. They showed that these algebras are always exact, and made progress on a conjecture of Dykema and Nica. In the year since completing his degree, he has written several more papers on multivariable operator theory in the commutative and non-commutative settings. He has proven to be an accomplished researcher with great prospects for the future.

Matthew Kennedy obtained his PhD in mathematics from the University of Waterloo in 2011. He declined an NSERC PDF in order to take a tenure track job at Carleton University.

Adrien Pouliot Award *(continued)*

camps, mentorship programs, and classroom visits by mathematicians and educators. Over the past few years a number of students who have benefited from these programs have graduated with grade 12 math, a course that is required for entry into university programs in subjects such as science and engineering. Melania and the community she works with see this as a significant initial step and hope many more will follow.

Melania Alvarez obtained her BS degree in actuarial science from the National University of Mexico, she holds an MS in Operations Research from Stanford University and an MS in Economics from the University of Wisconsin-Madison. She has worked in the private sector as a risk analyst and as a research associate in the Quantitative Assessment Program at the University of Wisconsin-Madison. Currently she is preparing a dissertation for a PhD in mathematics education at Simon Fraser University.