

## Curriculum Vitae

# Mikael Rørdam

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Born January 7, 1959, Denmark.

**Research interests:** Operator algebras, dynamical systems, geometric group theory,  $K$ -theory.

### Education:

1984	University of Copenhagen, advisor: Erik Christensen	Cand. Scient.
1987	University of Pennsylvania, advisor: Richard V. Kadison	Ph.D.

### Employment:

1987	University of Pennsylvania	Visiting Scholar
1988 (Spring)	University of Toronto	Postdoc
1988–1991	Odense University	Adjunkt (Assistant Professor)
1991–1997	Odense University	Lektor (Associate Professor)
1998–2002	University of Copenhagen	Lektor (Associate Professor)
2002–2007	University of Southern Denmark (Odense)	Professor
2008 –	University of Copenhagen	Professor

### Visiting positions and longer stays abroad:

1989	Aix-Marseille Université, Luminy (1 month)
2000	Key Senior Scientist, MSRI, Berkeley (4 months)
2001	Visiting Professor, University of California, Santa Barbara (6 months)
2010 & 2014	UCLA (3 months + 2 months)
2018	IPAM (UCLA) (2 months)

### Honors, grants and awards:

2006	Invited talk at the International Congress of Mathematicians, Madrid.
2004 –	Elected member of the Royal Danish Academy of Sciences and Letters.
1996	Articles (96e:46080a, 96e:46080b) selected for “Featured Review” in <i>Math. Review</i> .
1988–2011	co-PI on grants from The Danish Natural Sciences Research Council (SNF/FNU).
2003–2004	co-PI of <i>MaPhySto</i> , the Danish National Research Foundation Network in Mathematical Physics and Stochastics.
2007–2008	co-PI (and node coordinator at the University of Southern Denmark) of EU Marie Curie Training Network <i>Noncommutative Geometry</i> . (PI: David Evans.)
2010–2019	co-PI of <i>Symmetry and Deformation</i> , the Danish National Research Foundation.
2013–2016	PI on FNU grant “Operator algebras, dynamical systems and quantum information theory”. Amount: DKK 1.620.000
2016–2019	PI on FNU grant “Groups, actions and $C^*$ -algebras”. Amount: DKK 2.200.000

### Students and postdocs:

- Ph.D. students: Hannes Thiel (2013), Adam Sierakowski (2009), Randi Rohde (2009), Jacob Hjelmberg (2000), Jakob Mortensen (1996), Eduardo Scarparo (2017), Matias Lolk (2017), Martin Christiansen (2017), Rasmus Bryder (joint with M. Musat) (2017). Current: Clemens Borys (joint with M. Musat). *Thiel, Sierakowski and Scarparo hold academic positions in Germany, Australia and Brazil, respectively; and Hjelmberg is Professor in Biostatistics at the University of Southern Denmark.*
- Postdocs: Johan Oinert (2010–2012), Leonel Robert (2010–2011), Eduard Ortega (2007–2010), Ilan Hirshberg (2004–2006). Current: Gabor Szabo. *All currently hold tenured positions in Sweden, USA, Norway and Israel, respectively.*
- 22 M.Sc. students (specialer), including one current.

## Academic leadership:

2009–2010 & 2016–	Vice-chair for research at the Department of Mathematics, University of Copenhagen.
2004–	Member of the National Committee for Mathematics in Denmark, Chair since 2010.
2016–	Member of the jury of the Ostrowski Prize
2002–2008	Member of the Danish Natural Sciences Research Council (SNF/FNU), Vice-chair 2007–2008.
2010–2017	Member of The Danish Committees on Scientific Dishonesty (UVVU).
2008–2011	Chairman of the mathematics group under the bibliometric initiative “Bibliometrisk forskningsindikator” under “Forsknings and Innovationsstyrelsen”.
2010–2016	Member of the board of the Mittag-Leffler Institute.
2007–2013	Editor of <i>Mathematica Scandinavica</i> .
2008–	Member of the Research Committee (forskningsudvalg) at the Department of Mathematics, University of Copenhagen. Chairman since 2016.
2012–2016	Section leader for Topology, Algebra and Functional Analysis (TFA) at the Department of Mathematics, University of Copenhagen.
2009–2016	Ph.D coordinator at the Department of Mathematics, University of Copenhagen.
2006–	Organizer or member of scientific committees of 14 conferences, workshops and Masterclasses.

**Invited addresses at Conferences and Workshops:** *Given 61 invited lectures at international conferences and workshops since 2000, including, besides the ICM talk in 2006, the following:*

2008	“Workshop on Noncommutative Geometry” (in honor of the 60th birthday of Joachim Cuntz), Münster.
2009	“25th Nordic and 1st British-Nordic conference of Mathematics” in Oslo. Plenary speaker.
2011	“Group actions on measure spaces”, Texas A&M.
2011	“Conference on $C^*$ -Algebras and Related Topics”, RIMS, Kyoto.
2012	“North British Functional Analysis Meeting”. Oxford. Lecture series.
2013	“Workshop on $C^*$ -algebras and Noncommutative dynamics”, Sde Boker, Israel.
2014	“42nd Canadian Annual Symposium on Operator Algebras and Their Applications”, Fields Institute, Toronto. Plenary talk.
2014	ICM Satellite Conference on Operator Algebras and Applications. Cheongpung, Korea Plenary talk.
2014	Masterclass “Classification, Structure, Amenability and Regularity”, Glasgow. Lecture series (5 x 1 hr).
2015	“Great Plains Operator Theory Symposium 2015”, Purdue University. Plenary talk
2015	“43rd Canadian Operator Symposium on Operator Theory and Operator Algebras”, Waterloo. Plenary talk.
2015	“Conférence de Géométrie non commutative” (in honor of the 60th birthday of Georges Skandalis), CIRM, Marseille
2016	Festkolloquium anlässlich der Emeritierung von Prof. Dr. Dr. h.c. Joachim Cuntz
2016	Operator Algebras and Mathematical Physics, Sendai. Plenary talk
2017	Colloquium. University of Geneva.
2018	IWOTA, Shanghai. Plenary talk.

Peer reviewed research articles, published in journals:

- 1 Advances in the theory of unitary rank and regular approximation, *Ann. Math.* **128** (1988), 153–172.
- 2 (with Ian Putnam) The maximum unitary rank of some  $C^*$ -algebras, *Math. Scand.* **63** (1988), 297–304.
- 3 (with George Elliott and Ryszard Nest) The cyclic homology of algebras with adjoined unit, *Proc. A.M.S.* **113**, No. 2, (1991), 389–395.
- 4 On the structure of simple  $C^*$ -algebras tensored with a UHF-algebra, *J. Funct. Anal.* **100** (1991), 1–17.
- 5 Ideals in the multiplier algebra of a stable  $C^*$ -algebra, *J. Operator Theory* **25**, No. 2, (1991), 283–298.
- 6 (with Nigel Higson) The Weyl-von Neumann theorem for multipliers of some AF-algebras, *Can. J. Math.* **43**, No. 2, (1991), 322–330.
- 7 (with Bruce Blackadar and Marius Dadarlat) The real rank of inductive limit  $C^*$ -algebras, *Math. Scand.* **69** (1991), 211–216.
- 8 On the structure of simple  $C^*$ -algebras tensored with a UHF-algebra, II, *J. Funct. Anal.* **107** (1992), 255–269.
- 9 (with Bruce Blackadar) Extending states on preordered semigroups and the existence of quasitraces on  $C^*$ -algebras, *J. Algebra* **152** (1992), 240–248.
- 10 (with Bruce Blackadar and Alex Kumjian) Approximately central matrix units and the structure of non-commutative tori, *K-theory* **6** (1992), 267–284.
- 11 (with Uffe Haagerup)  $C^*$ -algebras of unitary rank two, *J. Operator Theory* **30** (1993), 161–171.
- 12 (with Wolfgang Lück) Algebraic  $K$ -theory of von Neumann algebras, *K-Theory* **7** (1993), 517–536.
- 13 (with George Elliott) The automorphism group of the irrational rotation  $C^*$ -algebras, *Comm. Math. Phys.* **155** (1993), 3–26.
- 14 (with Ola Bratteli, Aki Kishimoto and Erling Størmer) The crossed product of a UHF-algebra by a shift, *Ergod. Theory & Dynam. Sys.* **13** (1993), 615–626.
- 15 Classification of inductive limits of Cuntz algebras, *J. Reine Angew. Math.* **440** (1993), 175–200.
- 16 A short proof of Elliott’s theorem:  $\mathcal{O}_2 \otimes \mathcal{O}_2 \cong \mathcal{O}_2$ , *C. R. Math. Rep. Acad. Sci. Canada* Vol. XVI, No. 1, (1994), 31–36.
- 17 (with Uffe Haagerup) Perturbation of the rotation  $C^*$ -algebras and of the Heisenberg commutation relation, *Duke Math. J.* **77**, No. 3, (1995), 627–656.
- 18 (with Huaxin Lin) Extensions of inductive limits of circle algebras, *J. London Math. Soc.*, No. 2, **51** (1995), 603–613.
- 19 Classification of Cuntz–Krieger algebras, *K-theory* **9** (1995), 31–58.
- 20 Classification of certain infinite simple  $C^*$ -algebras, *J. Funct. Anal.* **131** (1995), 415–458.
- 21 (with George Elliott) Classification of certain infinite simple  $C^*$ -algebras, II, *Comm. Math. Helvetici* **70** (1995), 615–638.

- 22 (with Peter Friis) Almost commuting self-adjoint matrices — A short proof of Huaxin Lin's theorem, *J. Reine Angew. Math.* **479** (1996), 121–131.
- 23 Classification of certain infinite simple  $C^*$ -algebras, III, *Operator Algebras and their Applications, Fields Institute Communication* vol. **13** (1997), 257–282.
- 24 Classification of extensions of certain infinite simple  $C^*$ -algebras by their six term exact sequence in  $K$ -theory, *Math. Ann.* **308** (1997), 93–117.
- 25 (with Uffe Hagerup and Ken Dykema) The stable rank of some reduced free product  $C^*$ -algebras, *Duke Math. J.* **90**, No. 1, (1997), 95–121.
- 26 Stability of  $C^*$ -algebras is not a stable property, *Doc. Math. J. DMV* **2** (1997), 375–386.
- 27 (with Ken Dykema) Purely infinite simple  $C^*$ -algebras arising from free products, *Can. J. Math.* **50**, No. 2, (1998), 323–341.
- 28 (with Ken Dykema) Projections in free product  $C^*$ -algebras, *Geom. Funct. Anal.* **8** (1998), 1–16.
- 29 (with Jacob Hjelmberg) On stability of  $C^*$ -algebras, *J. Funct. Anal.* **155**, No. 1, (1998), 153–170.
- 30 (with Jesper Villadsen) On the ordered  $K_0$ -groups of universal free product  $C^*$ -algebras, *K-theory* **15** (1998), 307–322.
- 31 (with Ken Dykema) Projections in free product  $C^*$ -algebras, II, *Math. Z.* **234** (2000), 103–113.
- 32 (with Eberhard Kirchberg) Non-simple purely infinite  $C^*$ -algebras, *American J. Math.* **122** (2000), 637–666.
- 33 (with Cornel Pasnicu) Tensor products of  $C^*$ -algebras with the ideal property, *J. Funct. Anal.* **177**, No. 1, (2000), 130–137.
- 34 (with Peter Friis) Approximation with normal operators with finite spectrum, and an elementary proof of a Brown–Douglas–Fillmore theorem, *Pacific J. Math.* **199** (2001), 347–366.
- 35 Extensions of stable  $C^*$ -algebras. *Doc. Math. J. DMV* **6** (2001), 241–246.
- 36 (with Eberhard Kirchberg) Infinite non-simple  $C^*$ -algebras: absorbing the Cuntz algebra  $\mathcal{O}_\infty$ . *Advances in Math.* **167**, No. 2 (2002), 195–264.
- 37 A simple  $C^*$ -algebra with a finite and an infinite projection. *Acta Math.* **191** (2003), 109–142.
- 38 Stable  $C^*$ -algebras. *Advanced Studies in Pure Mathematics* **38** “Operator Algebras and Applications”. Edited by Hideki Kosaki. (2004), 177–199.
- 39 (with Alex Chigogidze and Alex Karasev) Real rank and squaring mappings for unital  $C^*$ -algebras. *Proc. Amer. Math. Soc.* **132** (2004), 783–788.
- 40 A purely infinite AH-algebra and application to AF-embeddability. *Israel J. Math.* **141** (2004), 61–82.
- 41 (with Francesc Perera) AF-embeddings into  $C^*$ -algebras of real rank zero. *J. Funct. Anal.*, **217** No. 1, (2004), 142–170.
- 42 The stable and the real rank of  $\mathcal{Z}$ -absorbing  $C^*$ -algebras. *International J. Math.*, **15** No. 10, (2004), 1065–1084.
- 43 (with Eberhard Kirchberg) Purely infinite  $C^*$ -algebras: ideal-preserving zero homotopies. *Geom. Funct. Anal.*, **15** No. 2, (2005), 377–415.
- 44 (with David Pask, Iain Raeburn, and Aidan Sims) Rank-two graphs whose  $C^*$ -algebras are direct limits of circle algebras. *J. Funct. Anal.* **239**, (2005), 137–178.
- 45 (with Cornel Pasnicu) Purely infinite  $C^*$ -algebras of real rank zero. *J. Reine Angew. Math.* **613** (2007), 51–73.

- 46 (with Ilan Hirshberg and Wilhelm Winter)  $C_0(X)$ -algebras, stability and strongly self-absorbing  $C^*$ -algebras. *Math. Annalen*, **339** (2007), 695–732.
- 47 (with Etienne Blanchard and Randi Rohde). Properly infinite  $C(X)$ -algebras and  $K_1$ -injectivity. *J. Noncommutative Geometry*, **2** no. 3, (2008), 263–282.
- 48 (with Marius Dadarlat). Strongly Self-Absorbing  $C^*$ -algebras which contain a nontrivial projection. *Münster J. Math.* **2** (2009), 35–44.
- 49 (with Wilhelm Winter). The Jiang-Su algebra revisited. *J. Reine Angew. Math.* **642** (2010), 129–155.
- 50 (with Roberto Conti and Wojciech Szymanski). Endomorphisms of  $\mathcal{O}_n$  which preserve the canonical UHF-subalgebra. *J. Funct. Anal.* **259** (2010), 602–617.
- 51 (with Francesc Perera and Eduard Ortega). The Corona Factorization property and refinement monoids. *Transactions Amer. Math. Soc.* **363** (2011), 4505–4525.
- 52 (with Eduard Ortega and Hannes Thiel). The Cuntz semigroup and comparison of open projections. *J. Funct. Anal.* **160** (2011), 3474–3493.
- 53 (with Francesc Perera and Eduard Ortega). The Corona Factorization property, Stability, and the Cuntz semigroup of a  $C^*$ -algebra. *Int. Math. Res. Not. IMRN*. **2012** (2012), 34–66.
- 54 (with Adam Sierakowski). Purely infinite  $C^*$ -algebras arising from crossed products. *Ergod. Theory & Dynam. Sys.* **32** (2012), 273–293.
- 55 (with Leonel Robert). Divisibility Properties for  $C^*$ -algebras. *Proceedings London Math. Soc.* **106** no. 6 (2013), 1330–1370.
- 56 (with Julian Kellerhals and Nicolas Monod). Non-supramenable groups acting on locally compact spaces. *Doc. Math. J. (DMV)* **18** (2013), 1597–1626.
- 57 (with Eberhard Kirchberg). Central sequence  $C^*$ -algebras and tensorial absorption of the Jiang-Su algebra. *J. Reine Angew. Math.* **695** (2014), 175–214.
- 58 (with Hiroki Matui). Universal properties of group actions on locally compact spaces. *J. Funct. Anal.* **268** (2015), 3601–3648.
- 59 (with Narutaka Ozawa and Yasuhiko Sato). Elementary amenable groups are quasidiagonal. *Geom. Funct. Anal.* **25** (2015), 307–316.
- 60 (with Eberhard Kirchberg). When central sequence  $C^*$ -algebras have characters. *International J. Math.*, **26** (2015), 32 pp.
- 61 (with Ilijas Farah, Bradd Hart and Aaron Tikuisis). Relative commutants of strongly self-absorbing  $C^*$ -algebras. *Selecta Mathematica*, **23** (2017), 363–387.
- 62 (with Rostislav Grigorchuk and Magdalena Musat). Just-infinite  $C^*$ -algebras. *Commentarii Math. Helvetica*, **93** (2018), 157–201.
- 63 (with Ilijas Farah). Axiomatizability of the stable rank of  $C^*$ -algebras. *Münster J. Math.*, **10** (2017), 269–275.
- 64 Just-infinite  $C^*$ -algebras and their invariants, *Int. Math. Res. Not. IMRN*., to appear.
- 65 Fixed-points in the cone of traces on  $C^*$ -algebras. Preprint (2018).

### Peer reviewed research articles, published in refereed conference proceedings:

- 1 The stable rank of  $C_{\text{red}}^*(F_n)$  is one — a survey, *Operator Algebras and Quantum Field Theory* (ed. S. Doplicher, R. Longo, J.E. Roberts, and L. Zsido), International Press (1997), 51–58.
- 2 On sums of finite projections, *Operator Algebras and Operator Theory* (ed. L. Ge, H. Lin, and S. Zhang), Contemporary Math. **228** (1998), 327–340.

- 3 Stable  $C^*$ -algebras. *Advanced Studies in Pure Mathematics* **38** "Operator Algebras and Applications". Edited by Hideki Kosaki. (2004), 177–199.
- 4 The real rank of certain simple  $C^*$ -algebras. *Advances in Operator Algebras and Mathematical Physics*. Conference Proceedings. Sinaia, June 26–July 4, 2003. Theta Series in Advanced Mathematics (2005), 197–206.
- 5 Structure and classification of  $C^*$ -algebras. In Proceedings of the International Congress of Mathematicians (Madrid 2006), Volume II, EMS Publishing House, Zurich 2006, 1581–1598.

### Monographs:

- 1 (with Flemming Larsen and Niels Jakob Laustsen) *An introduction to  $K$ -theory for  $C^*$ -algebras*. Book. 256 pp. London Mathematical Society, Student Text 49, Cambridge University Press, Cambridge, 2000.
- 2 *Classification of nuclear simple  $C^*$ -algebras*. Classification of Nuclear  $C^*$ -Algebras. Entropy in Operator Algebras. (J. Cuntz and V. Jones, eds.), vol 126, Encyclopaedia of Mathematical Sciences. Subseries: Operator Algebras and Non-Commutative Geometry, no. VII, Springer Verlag, Berlin, Heidelberg, 2001, pp. 1–145.