

Curriculum Vitae

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Birthdate: June 23, 1939

Citizenship: Norwegian

Education

- 1959–63: 4 years of study at the Norwegian Institute of Technology, Trondheim, Dept. of Physics.
- 1969: Cand.real. degree in mathematics at the University of Oslo.
Thesis: “Existence of simplicial boundary measures on compact convex sets”.
Thesis advisor: Professor Erik Alfsen.
- 1973: Ph.D. in mathematics, University of Pennsylvania, Philadelphia, USA.
Ph.D. thesis: “Commutative projections and abelian subalgebras”.
Thesis advisor: Professor Shoichiro Sakai.

Positions held

- 1974–77: Assistant professor, Univ. of Oslo
- 1977–80: Assistant professor, Univ. of Trondheim
- 1980–92: Associate professor, Univ. of Trondheim
- 1993–2009: Full professor, Univ. of Trondheim (since Jan. 1996: The Norwegian University of Science and Technology, NTNU)
- 2009– Professor Emeritus

Elected member of The Royal Norwegian Society of Sciences and Letters in 1996.

Research Interests

Operator algebras: C^* - and von Neumann algebras, Topological dynamics, Ordered K -theory/Dimension groups.

Sabbaticals

1982/83	University of California, Los Angeles
1989/90	Pennsylvania State University, State College
Nov/Dec. 1992	Visiting professor at The University of New South Wales, Sydney, Australia
1995/96	University of Washington, Seattle
2000/2001	Mathematical Sciences Research Institute (MSRI), Berkeley, California
2006/2007	University of California, Berkeley

Talks at International Mathematical Conferences and Meetings 1990–

1. NSF/CBMS conference on ergodic theory and combinatorial number theory, Univ. of North Dakota, June 1990
2. “Current topics in operator algebras”, Satellite Conference of ICM-90, Nara, Japan, Aug. 1990.
3. “ C^* -algebren”, Oberwolfach, Germany, Oct. 1991.
4. 20.th. Canadian Functional Analysis Symposium, Univ. of Calgary, May 1992.
5. “Ergodic theory and its connections with harmonic analysis”, Univ. of Alexandria, Egypt, May 1993.
6. “ C^* -algebren”, Oberwolfach, Feb. 1994.
7. 22nd Canadian Operator Algebra Symposium, Univ. of Ottawa, May 1994.
8. Warwick Symposium on the dynamics of \mathbb{Z}^n -actions and their connections with commutative algebra, number theory and statistical mechanics, April 1994.
9. “Dynamical systems and C^* -algebras”, Workshop at the Fields Institute, Waterloo, Ontario, Canada, Oct. 1994.
10. Canadian Operator Symposium, The Fields Institute, Waterloo, Canada, June 1995.
11. Dynamical Systems and Number Theory, Univ. de Marseille-Luminy, France, July 1995.
12. C^* -algebras and their Invariants, Univ. of Cork, Ireland, July 1995.
13. West Coast Operator Algebra Seminar, Univ. of Oregon, Eugene, USA, Sept. 1995.

14. Conference on C*-algebras and Applications, Nihon University, Tokyo, Japan, Feb. 1996.
15. Symbolic Dynamics Workshop, Univ. of Maryland, College Park, USA, March 1996.
16. AMS Summer Research Conference, Mt. Holyoke College, Massachusetts, USA, July 1996.
17. AMS/MAA Joint Annual Meeting, San Diego, USA, Jan. 1997.
18. Canadian Operator Symposium, Kingston, Canada, May 1997.
19. Conference at Lancaster University, England, July 1997.
20. Annual Meeting of the Canadian Mathematics Society, Victoria, Canada, Dec. 1997.
21. Canadian Operator Symposium, Edmonton, Canada, May 1998.
22. Conference on Dynamical Systems: From Crystals to Chaos, Univ. of Marseille-Luminy, France, July 1998.
23. Invited talk at the Ukrainian Academy of Science, Kiev, Ukraine, Oct. 1998.
24. Danish/Norwegian workshop in operator algebras, Oslo, Jan. 1999.
25. EU Conference on Operator Algebras and Non Commutative Geometry, Cargèse, Corsica, July 1999.
26. Joint Penn State Univ. / Maryland Univ. Conference on dynamical systems, Penn State Univ., State College, Pennsylvania, October 1999.
27. Invited talk at The Steklov Institute, St. Petersburg, Russia, June 2000.
28. Annual Meeting of the Canadian Math. Society, Vancouver, Dec. 2000.
29. "Aperiodic order", Oberwolfach, Germany, May 2001.
30. "C*-algebras", Oberwolfach, Germany, December 2001.
31. Abel Bicentennial Conference, Oslo, Norway, June 2002.
32. "Operator algebras and applications", ICM-2002 Satellite Conference, Chengde, China, August 2002.
33. Danish/Norwegian workshop in operator algebras, Copenhagen, December 2002.
34. "C*-algebras", Oberwolfach, Germany, March 2003.
35. "Non-commutative geometry", Mittag-Leffler, Sweden, September 2003.
36. Annual Meeting of the Canadian Math. Society, Vancouver, December 2003.
37. "K-theory and cyclic cohomology", Univ. Luminy, France, February 2004.
38. "Aperiodic order: Dynamical systems, combinatorics and operators", BIRS, Banff, Canada, May 2004.
39. "Representation theory, dynamical systems and asymptotic combinatorics", Euler Institute, St. Petersburg, Russia, June 2004.
40. "Activity on algebraic and topological dynamics", Max Planck Institute, Bonn, Germany, July 2004.
41. "The structure of amenable systems", BIRS, Banff, Canada, October 2004.
42. 33rd Canadian Operator Algebra Symposium, Univ. of Ottawa, June 2005.

43. "Lie theory, lattices and dynamics", University of Newcastle, Australia, November 2005.
44. "Operator algebra conference", Univ. of Southern Denmark, Odense, April 2006.
45. "Ergodic theory and dynamical systems", Szklarska Poreba, Polen, June 2006.
46. "Operator methods in fractal analysis, wavelets and dynamical systems". Banff, Canada, December 2006.
47. "Japan-US/West Coast operator algebra seminar", University of Hawaii, January 2007.
48. "Workshop on dynamical systems and related topics", University of Maryland, USA, March 2007.
49. Danish/Norwegian workshop in operator algebras, Oslo, Dec. 2007.
50. "Workshop on topological dynamics", Colorado State University, USA, June 2008.
51. Danish/Norwegian workshop in operator algebras, Oslo, Dec. 2008.
52. Joint Scandinavian-British meeting, Oslo, June 2009.
53. "Workshop on operator algebras", Univ. of Copenhagen, June 2009.
54. "Workshop on dynamical systems and number theory", Max Planck Institute of mathematics, Bonn, Germany, July 2009.
55. "Workshop on topological dynamics", Colorado State University, USA, August 2009.
56. "Workshop on Bratteli diagrams and tilings groupoids", Univ. de Picardie, Amiens, France, May 2010.
57. "Great Plains Operator theory Symposium (GPOTS)", Denver University, Colorado, U.S.A., June 2010
58. "The 23rd International Conference on Operator Theory", Timisoara, Romania, July 2010.
59. "Brazilian Operator Algebras Symposium", Florianopolis, Brazil, February 2011.
60. "2011 International Conference on Measurable and Topological Dynamics and Related Topics", Huang Shan City, China, June 2011.
61. "Workshop on Positivity", Fields Institute, Toronto, Canada, August 2011.
62. "4th Pingree Park Dynamics Workshop", Colorado State University, August 2011.
63. "Conference on C^* -algebras and Related Topics", RIMS, Kyoto University, Japan, September 2011.
64. "Non-commutative Geometry: Multiple Connections", Ohio State University, USA, May 2012.
65. "Perspectives on Orbital Equivalences and Applications", III Atlantic Geometry Seminar, CIEM, Castro Urdiales, Spain, September 2012.
66. " C^* -algebras and noncommutative dynamics", Ben-Gurion University, Sde Boker, Israel, March 2013.
67. "The structure and classification of nuclear C^* -algebras", ICMS, Edinburgh, Scotland, April 2013.

68. “Subfactor theory in mathematics and physics”, University of Hawaii, Maui, Hawaii, July 2014.
69. “School on orbit equivalence and related fields”, University of Santiago, Chile, December 2014.
70. “Workshop on functional analysis and dynamical systems”, University of Santa Catarina, Florianópolis, Brazil, February 2015.
71. “Workshop on C*-algebras: Structure and classification”, University of Münster, Germany, April 2015.
72. “Classification and dynamical systems I: C*-algebras”, Workshop at Mittag-Leffler Institute, Stockholm, Sweden, February 2016.
73. “Scottish operator algebras research meeting”, University of Aberdeen, Scotland, March 2016.
74. “Applications of operator algebras: order, disorder and symmetry”, International Centre for Mathematical Sciences, Edinburgh, Scotland, June 2017.
75. “Richard Kadison and his mathematical legacy – a memorial conference”, Univ. of Copenhagen, November 2019.
76. “Dynamics in zero-dimensional spaces: new directions”, Lorenz centre, Leiden, Netherlands, May 2024.

Advisor of Ph.D. students

I have been the advisor for five Ph.D. students; two got their Ph.D. degrees in 1998, one in 2006, one in 2008 and one in 2014.

EU-network in mathematics.

Together with some colleagues at our Math. Dept. I belong to a network where groups at several European universities cooperate on the EU-supported project “Quantum Spaces – Non-commutative Geometry”. (This is a continuation of a previous EU-supported project, “Non-commutative Geometry”, with the same network.)

List of Publications 1990–

1. “Minimal dynamical systems, ordered Bratteli diagrams and associated C* - crossed products”, Current Topics in Op. Algs., Proc. of the Satellite Conf. of ICM –90, Nara, Japan (1990), 264-280.
2. “Revisiting Abel’s and Ruffini’s proof of the impossibility of solving algebraically the general equation of n ’th degree when $n \geq 5$ ”, Nordisk Matematisk Tidsskrift 38 (1990), 53–84.
3. (with R. H. Herman, I. F. Putnam) “Ordered Bratteli diagrams, dimension groups, and topological dynamics”, International Journal of Math. 3 (1992), 827–864.

4. (with Lars Gaarding) “Niels Henrik Abel and solvable equations”, *Archive for History of Exact Sciences* 48 (1994), 81–103.
5. (with T. Giordano, I. F. Putnam) “Topological orbit equivalence and C^* -crossed products”, *J. Reine angew. Math.*, 469 (1995), 51–111.
6. “Orbit structure of topological dynamical systems and its invariants”, *Proceedings from Operator Algebras and Quantum Field Theory, Rome 1.7–6.7, 1996*, 533–544.
7. (with T. Giordano, I. F. Putnam) “Full groups of Cantor minimal systems”, *Israel J. Math.* 111 (1999), 285–320.
8. (with F. Durand, B. Host) “Substitution dynamical systems, Bratteli diagrams and dimension groups”, *J. of Erg. Th. and Dyn. Systems* 19 (1999), 953–993.
9. “Ordered K -theory and minimal symbolic dynamical systems”, *Colloquium Mathematicum* 84/85 (2000), 203–227.
10. “Three pearls from elementary mathematics”, *Nordisk Matematisk Tidsskrift* 48 (2000), 56–74.
11. (with T. Giordano, I. F. Putnam) “ K -theory and asymptotic index for certain almost one-to-one factors”, *Math. Scand.* 89 (2001), 297–319.
12. (with T. Giordano, I. F. Putnam) “Affable equivalence relations and orbit structure of Cantor dynamical systems”, *J. of Erg. Th. & Dyn. Syst.* 23 (2004), 441–475.
13. (with T. Giordano, I. F. Putnam) “The orbit structure of Cantor minimal \mathbf{Z}^2 -systems”, *Proceedings of the first Abel Symposium*, Springer-Verlag, 2006.
14. (with T. Giordano, H. Matui, I. F. Putnam) “Orbit equivalence for Cantor minima \mathbf{Z}^2 -systems”, *Journal of the Amer. Math. Soc.* 21 (2008), 863–892.
15. (with T. Giordano, H. Matui, I. F. Putnam) “The absorption theorem for affable equivalence relations”, *Ergod. Th. & Dynam. Sys.* 28 (2008), 1509–1531.
16. (with T. Giordano, I. F. Putnam) “Cocycles for Cantor minimal \mathbf{Z}^d -systems”, *Internat. J. Math.* 20 (2009), 1107–1135.
17. (with T. Giordano, M. Matui, I. F. Putnam) “Orbit equivalence for Cantor minimal \mathbf{Z}^d -systems”, *Inventiones Math.* 179 (2010), 119–158.
18. “Abel and the Theory of Algebraic Equations”, *The Abel Prize 2008-2012*, Springer Verlag (2014), 517–551.
19. (with T. Giordano, I. F. Putnam) “ \mathbf{Z}^d -odometers and cohomology”, *Groups, Geometry and Dynamics* 13 (2019), 909–938.

Other publications 2000–

1. (with M. Raussen) Interview with Jean-Pierre Serre (recipient of the Abel Prize in Mathematics 2003), *EMS Newsletter* 49 (Sept. 2003), 18–20; *Notices AMS* (February 2004).
2. (with M. Raussen) Interview with Sir Michael Atiyah and Isadore Singer (recipient of the Abel Prize in Mathematics 2004), *EMS Newsletter* 53 (Sept. 2004), 24–30; *Notices AMS* (February 2005).

3. (with M. Raussen) Interview with Peter Lax (recipient of the Abel Prize in mathematics 2005), EMS Newsletter (Sept. 2005), Notices AMS (February 2006).
4. (with M. Raussen) Interview with Lennart Carleson (recipient of the Abel Prize in Mathematics 2006), EMS Newsletter (Sept. 2006), Notices AMS (February 2007).
5. (with M. Raussen) Interview with Srinivasa S.R. Varadhan (recipient of the Abel Prize in Mathematics 2007), EMS Newsletter (Sept. 2007), Notices AMS (February 2008).
6. (with M. Raussen) Interview with John G. Thompson and Jacques Tits (recipients of the Abel Prize in Mathematics 2008), EMS Newsletter, September 2008, Notices AMS, April 2009.
7. (with M. Raussen) Interview with Mikhail Gromov (recipient of the Abel Prize in mathematics 2009), EMS Newsletter (Sept. 2009), Notices AMS (March 2010).
8. (with M. Raussen) Interview with John Tate (recipient of the Abel Prize in Mathematics 2010), EMS Newsletter (Sept. 2010), Notices AMS (March 2011).
9. (with M. Raussen) Interview with John Milnor (recipient of the Abel Prize in Mathematics 2011), EMS Newsletter (Sept. 2011), Notices AMS (March 2012).
10. (with M. Raussen) Interview with Endre Szemerédi (recipient of the Abel Prize in Mathematics 2012), EMS Newsletter (sept. 2012), Notices AMS (February 2013).
11. (with M. Raussen) Interview with Pierre Deligne (recipient of the Abel Prize in Mathematics 2013), EMS Newsletter (Sept. 2013), Notices AMS (February 2014).
12. (with M. Raussen) Interview with Yakov Sinai (recipient of the Abel Prize in Mathematics 2014), EMS Newsletter (Sept. 2014), Notices AMS (February 2015).
13. (with M. Raussen) Interview with John Forbes Nash and Louis Nirenberg (recipients of the Abel Prize in Mathematics 2015). Nash interview published in EMS Newsletter (Sept. 2015) and Notices AMS (May 2016); Nirenberg interview published in EMS Newsletter (Dec. 2015) and Notices AMS (Feb. 2016).
14. (with M. Raussen) Interview with Sir Andrew Wiles (recipient of the Abel Prize in Mathematics 2016). EMS Newsletter (Sept. 2016), Notices AMS (March 2017).
15. (with B. Dundas) Interview with Yves Meyer (recipient of the Abel Prize in Mathematics 2017), EMS Newsletter (Sept. 2017), Notices AMS (May 2018).
16. (with B. Dundas) Interview with Robert Langlands (recipient of the Abel Prize in Mathematics 2018), EMS Newsletter (Sept. 2018), Notices AMS (April 2019).
17. (with B. Dundas) Interview with Karen Uhlenbeck (recipient of the Abel Prize in Mathematics 2019), EMS Newsletter (Sept. 2019), Notices AMS (March 2020).
18. (with B. Dundas) Interviews with Hillel Furstenberg and Gregory Margulis (recipients of the Abel Prize in Mathematics 2020), EMS Newsletter (Dec. 2020), Notices AMS (August 2021 and June/July 2021, respectively).
19. (with B. Dundas) Interviews with László Lovász and Avi Wigderson (recipients of the Abel Prize in Mathematics 2021), EMS Magazine (Dec. 2021), Notices AMS (May 2022).
20. (with B. Dundas) Interview with Dennis Sullivan (recipient of the Abel Prize in Mathematics 2022), EMS Magazine (Sept. 2022), Notices AMS (April 2023).

21. (with B. Dundas) Interview with Luis Caffarelli (recipient of the Abel Prize in Mathematics 2023), EMS Magazine (Sept. 2023), Notices AMS (January 2024).
22. (with B. Dundas) Interview with Michel Talagrand (recipient of the Abel Prize in Mathematics 2024), EMS Magazine (Sept. 2024).
23. (with N. Baas) Interview with Atle Selberg, published full in Norwegian in *Normat*, 56 (2008).
24. (with N. Baas) “The lord of the numbers, Atle Selberg, On his life and mathematics”, *Bulletin of the AMS* 45 (2008), 617–649.

(The interviews 2–17, as well as 21, have been shown on Kunnskapskanalen, NRK2 TV, each edited to a one-hour interview. One can find the interviews 1 to 22 at the website: www.abelprize.no. Look for them in the individual laureate’s pages.)