

# 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. 22<sup>nd</sup> Canadian Operator Algebra Symposium, Univ. of Ottawa, May 1994.
8. Warwick Symposium on the dynamics of  $Z^n$ -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, Irland, 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, Massachussetts, 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, Cargése, 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\*-algebren", Oberwolfach, Germany, Desember 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\*-algebren", 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. 33<sup>rd</sup> 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 23<sup>rd</sup> 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.

### Advisor of Ph.D. students

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

### EU-network in mathematics.

Together with two colleagues at our Math. Dept. I belong to a network where groups at 7 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 — 2011

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 minimal  $\mathbf{Z}^2$ -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.

## 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* 51, N<sup>o</sup>2 (2004), 210-214.
2. (with M. Raussen) Interview with Sir Michael Atiyah and Isidore Singer (recipient of the Abel Prize in Mathematics 2004), *EMS Newsletter* 53 (Sept. 2004), 24-30; *Notices AMS* 52, N<sup>o</sup>2 (2005), 225-233.
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)
10. (with N. Baas) Interview with Atle Selberg, published full in Norwegian in *Normat*, 56 (2008).
11. (with N. Baas) “The lord of the numbers, Atle Selberg, On his life and mathematics”, *Bulletin of the AMS* 45 (2008), 617-649.

(All, except 1 and 11 have been shown on Kunnskapskanalen, NRK TV-1, each edited to a one-hour interview.)