

Curriculum vitæ

Franco Fagnola

Date of birth: 1960

Place of birth: Varallo (Vercelli)

Address: Politecnico di Milano, Dipartimento di Matematica,

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Education

- Laurea in Matematica. Università di Pisa.
- Diploma di Licenza in Matematica. Scuola Normale Superiore di Pisa.
- Diploma di Perfezionamento in Matematica (eq. Ph.D.). Scuola Normale Superiore di Pisa.

Academic Positions

- 2004–: Professore ordinario di Probabilità e Statistica Matematica (MAT/06), Dipartimento di Matematica, Politecnico di Milano,
- 1994–2004: Professore ordinario di Probabilità e Statistica Matematica, Facoltà di Scienze Matematiche Fisiche e Naturali dell'Università di Genova,
- 1993–1994: Professore associato di Calcolo delle Probabilità e Statistica, Facoltà di Scienze Matematiche Fisiche e Naturali dell'Università di Pisa,
- 1986–1992: Ricercatore universitario, Facoltà di Ingegneria, Dipartimento di Matematica, Università di Trento.

Research projects (2005 – 2018)

- 2006–2008: National coordinator of the PRIN programme “Quantum Markov Semigroups and Quantum Stochastic Differential Equations”
- 2007–2009: Italian coordinator of the Programma Esecutivo di Collaborazione Scientifica e Tecnologica (Ministero degli Affari Esteri) Italia-Messico “Dinamiche Stocastiche”.
- 2008-2009: Responsabile Scientifico del programma INdAM-GNAMPA “Semigruppri Markoviani Quantistici”.
- 2009-2010: Coordinator of the Milano Politecnico Research Unit of the PRIN Programme “Probabilità Quantistica e Applicazioni alla Teoria dell’Informazione”.
- 2009–2011 : Italian coordinator of the Programma Esecutivo di Collaborazione Scientifica e Tecnologica (Ministero degli Affari Esteri) Italia-Messico “Dinamiche Stocastiche con applicazioni in fisica e finanza”.
- 2010: European Science Foundation Exploratory workshop and programme “Dissipative systems: entropy methods, classical and quantum probability” (with A. Arnold and A. Jungel (Wien), D. Bakry (Toulouse))
- 2011–2013: Italian coordinator of the Esecutivo di Collaborazione Scientifica e Tecnologica (Ministero degli Affari Esteri) Italia-Messico “Dinamiche Stocastiche con applicazioni in fisica e finanza”.
- 2017-2018: Atracción de Capital Humano Avanzado del Extranjero, MEC 2017. Conicyt, Ministerio de Educación, Gobierno de Chile.

Congress organisation (2005 – 2019)

- Perspectives in Probability Theories and its Connections in Science and Society. Levico Terme (Trento) 3-7 dicembre 2006. (con L. Accardi (Roma II)).
- International Workshop on Quantum Probability and its Applications Campobasso, 13 - 16 maggio , 2007 (con L. Accardi (Roma II) e M. Skeide (Campobasso))

- ESF exploratory workshop “Dissipative Systems: Entropy Methods, Classical and Quantum Probability”. Vienna University of Technology, Austria, November 01 - 03, 2010. www.jungel.at.vu/esf/esf.html (with A. Arnold (Wien) and A. Jünger (Wien)).
- 32th Conference on Quantum Probability and Infinite Dimensional Analysis. Levico Terme (Trento) May 29–June 4 2011. (with L. Accardi (Roma II))
- XII Latin American Congress of Probability and Mathematical Statistics CLAPEM 2012, Vina del Mar, CHILE, March 26-30 2012. Invited session organized: Open Quantum Systems and Quantum Probability.
- Lyon-Milano days on open quantum systems. Politecnico di Milano, January 27–29, 2014.
- Quantum Markov Semigroups in Analysis, Physics and Probability, Oaxaca (Mexico), August 23rd - 28th 2015 at Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Casa Matematica Oaxaca (CMO).
- Stochastic Analysis and Mathematical Physics SAMP 2015, Pucon (Chile), August 31st - September 4th , 2015.
- First Italian Meeting on Probability and Mathematical Statistics, Torino, June 19th-22nd, 2017. Session organizer: Quantum Probability.
- Quantum Transport Equations and Applications September 2nd-7th, 2018 Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Casa Matematica Oaxaca (CMO).
www.birs.ca/events/2018/5-day-workshops/18w5059
- UMI-SIMAI-PTM Wroclaw 2018
- The 39th International Conference on Quantum Probability and Infinite Dimensional Analysis. CIRM, Levico Terme (Trento), Oct 15 - Oct 19 2018. cirm.fbk.eu/events/
- Second Italian Meeting on Probability and Mathematical Statistics, Vietri sul Mare, June 17th-20th, 2019.

Invited talks (2005 – 2019)

1. Colloque Léandre, Dijon, 15-18 gennaio 2006. Invited talk (plenary): Minimal quantum dynamical semigroups
2. Quantum Probability and Its Applications. Greifswald (Germany) 26-31 marzo 2006. Invited talk (plenary): Generic Quantum Markov Semigroups.
3. 27th Conference on Quantum Probability and Infinite Dimensional Analysis. Nottingham 2006 Invited talk (plenary): Regularity of solutions of quantum stochastic differential equations.
4. Congress of Mathematics “CAPRICORNIO”, COMCA’06, La Serena (Chile), August 2 to 5, 2006. Minicorso: Lectures on Quantum Probability.
5. Free Probability, Operator Spaces and von Neumann Algebras. Sibiu (Romania), June 9-16, 2007. Invited talk (plenary): Cycle decomposition of quantum markov semigroups.
6. 28th International Conference on Quantum Probability and Related Topics, CIMAT - Guanajuato (México), September 2-8, 2007. Invited talk (plenary): Long-time behaviour of quantum markov semigroups.
7. Stochastic Analysis and Mathematical Physics SAMP VI. Santiago (Cile), 3-9 gennaio 2008. Invited talk: Quantum Fokker-Planck models.
8. Stochastic Partial Differential Equations and Applications. Levico Terme, 6-12 gennaio 2008. Invited talk: Quantum Fokker-Planck models.
9. 11th workshop on non-commutative harmonic analysis with applications to probability. Bedlewo (Polonia), August 18-23, 2008. Invited talk (plenary): Generators of symmetric quantum Markov semigroups and detailed balance condition.
10. 29th International Conference on Quantum Probability and Related Topics, Hammamet (Tunisia), October 13-18, 2008. Invited talk (plenary): Generators of symmetric quantum Markov semigroups and detailed balance condition.

11. Product Systems and Independence in Quantum Dynamics Oberwolfach Mini-Workshop, February 15-21, 2009. www.mfo.de. Oberwolfach (Germany). Talk (plenary): Quantum Markov Semigroups and Flows Arising from Form Generators on $B(h)$.
12. International Congress on Stochastic Analysis and Applications, Hammamet (Tunisia), October 12-17, 2009. Talk: Quantum Detailed Balance Conditions
13. XI CLAPEM - Congreso Latinoamericano de Probabilidad y Estadística Matemática. Naiguata (Venezuela), November 1-6, 2009. Plenary talk: A quick introduction to quantum probability.
14. 30th International Conference on Quantum Probability and Related Topics, Santiago (Chile), November 23–28, 2009. Talk (plenary): Open problems on quantum Markov semigroups.
15. 31th International Conference on Quantum Probability and Related Topics, Bangalore (India), August 14–17, 2010. Satellite meeting of the International Congress of Mathematicians, Hyderabad (India) August 19-27, 2010. www.isibang.ac.in/~statmath/icmqpsat. Opening talk: Entropy Production of Quantum Markov Semigroups.
16. Classical and Quantum Mechanical Models of Many-Particle Systems. Oberwolfach December 5-11, 2010. Talk (plenary): Quantum Fokker-Planck models: an Open System Approach
17. 6th Jikji Workshop on Infinite Dimensional Analysis and Quantum Probability. NIMS (National Institute Math. Sc.), Daejeon (Korea), January 8 – 12, 2011. crs.chungbuk.ac.kr/~hhlee/Jikji2011.html Talk (plenary): Stochastic Schroedinger equations and quantum Markov semigroups in measurements processes of position and momentum.
18. Journées franco-italiennes du GDRE “Géométrie non commutative” Besançon, January 19–21, 2011. Talk (plenary): Structure of generators of quantum Markov semigroups: symmetry and detailed balance.
19. International Conference on Stochastic Analysis and Applications. Hammamet (Tunisia), October 10-15, 2011. Talk (plenary): Entropy production of quantum Markov semigroups.

20. 7th Jikji Workshop on Infinite Dimensional Analysis and Quantum Probability. Chungbuk National University, Cheongju (Korea), July 23–27, 2012. crs.chungbuk.ac.kr/~hhlee/Jikji2011.html Talk (plenary): Structure of generators of quantum Markov semigroups: symmetry and detailed balance
21. Korea-Italy symposium on Infinite Dimensional Analysis and Quantum Probability, Hanyang University, Seoul (Korea), July 30–31, 2012. Talk (plenary): Entropy production for quantum Markov semigroups.
22. 33rd International Conference on Quantum Probability and Related Topics, CIRM, Luminy (France), October 1–5, 2012. Talk (plenary): Entropy production for quantum Markov semigroups
23. 4th International Workshop on Quantum Probability and its Applications (in honour of Prof. W. von Waldenfels), University of Molise, Campobasso (Italy), October 11–14, 2012. Talk (plenary): Support projections of states of quantum open systems and a non-commutative Lévy-Austin-Ornstein theorem
24. Lyon-Milano days on open quantum systems. University of Lyon, (France), March 11–13, 2013. Talk (plenary): Entropy production for quantum Markov semigroups
25. Advances in Open Quantum Systems, Autrans (France), July 8 – 19, 2013. Talk (plenary): The decoherence-free subalgebra of a quantum Markov semigroup
26. 34th International Conference on Quantum Probability and Related Topics, Steklov Mathematical Institute of the Russian Academy of Sciences, Moscow, September 16–20, 2013. Talk (plenary): Quantum Markov semigroups: detailed balance and weighted detailed balance
27. International Symposium on Analysis and Applications Metepec (México), January 3–5, 2014. Talk (plenary): The range of the generator of a quantum Markov semigroup
28. Operator & Spectral theory, Operator algebras, Non-commutative geometry & Probability in honour of Prof. Kalyan B Sinha. Kerala School of Mathematics, Kunnammangalam (Kerala, India), February 7–14, 2014. Talk (plenary): Evolution in time of the support projection of a state

29. 35th International Conference on Quantum Probability and Related Topics, Chungbuk National University, Korea, August 22nd-26th, 2014. Talk (plenary): Structure of norm continuous Quantum Markov semigroups.
30. Algebraic and Analytic Aspects of Quantum Levy Processes - AlgAnAspQLP2015, Alfried Krupp Wissenschaftskolleg Greifswald (Germany) March 9th - 13th 2015. Invited talk (plenary): Structure of norm continuous quantum Markov semigroups and their invariant states
31. Quantum Markov Semigroups: Decoherence and empirical estimates, Genova (Italy), June 29th - July 1st, 2015 Talk (plenary): Structure of norm continuous quantum Markov semigroups and their invariant states
32. Quantum Markov Semigroups in Analysis, Physics and Probability, Oaxaca (Mexico), August 23rd - 28th 2015. Talk (plenary): Structure of norm continuous quantum Markov semigroups and their invariant states
33. Stochastic Analysis and Mathematical Physics SAMP 2015, Pucon (Chile), August 31st - September 4th , 2015. Talk (plenary): Entropy production of quantum Markov semigroups.
34. International Conference on Stochastic Analysis and Applications, Hammamet (Tunisia), October 19th - 23rd, 2015. Invited talk (plenary): Entropy production of Quantum Markov Semigroups
35. 48-th Symposium on Mathematical Physics, Torun (Poland) June 10th-12th 2016, Invited talk (plenary): Structure of norm continuous quantum Markov semigroups and their invariant states
36. 17th workshop on non-commutative probability Bedlewo, Poland, July 25th - 29th 2016 Talk (plenary): Structure of norm continuous quantum Markov semigroups and their invariant states
37. 37-th International Conference on Quantum Probability and Related Topics, Kuantan (Malaysia), August 22st-26th 2016. Invited talk (plenary): On the structure of quantum Markov semigroups of weak coupling limit type.
38. International school and workshop on Orthogonal Polynomials, Interacting Fock Spaces, Quantum Markov Semigroups and Related Fields.

- Hammamet (Tunisia), October 17th – 22nd, 2016. Invited course on Quantum Markov Semigroups.
39. Quantum Probability: Past, Present and Future, Indian Statistical Institute Bangalore, August 10th-12th, 2017. Invited talk (plenary): Decoherence-free subalgebra and set of fixed points of a quantum Markov semigroup
 40. Italy-Korea 2nd Joint Workshop on: Quantum Probability, White Noise Analysis and applications, KIAS Seoul, September 28th-29th 2017. Invited talk: Exponential L2-convergence of quantum Markov semigroups on $B(h)$.
 41. 38-th International Conference on Infinite Dimensional Analysis, Quantum Probability and Related Topics, Tokyo University of Science, October 1st-7th, 2017 Invited Talk (plenary): On the structure of quantum Markov semigroups.
 42. Recent advances in operator semigroups. University of Delhi, December 18th-21st 2017. Invited Talk (plenary): Exponential L2-convergence of quantum Markov semigroups on $B(h)$.
 43. Operator Algebras, Quantum Probability & Innovative Applications, United Arab Emirates University, Al Ain, February 6th-8th 2018. Invited talk (plenary): Exponential L2-convergence of quantum Markov semigroups on $B(h)$.
 44. PRACQSYS 2018: Principles and Applications of Control in Quantum Systems, Institut Henri Poincaré, Paris, July 2nd – 6th, 2018. Invited talk (plenary): On the structure of quantum Markov semigroups
 45. Quantum Transport Equations and Applications. BIRS-Casa Matemática Oaxaca, September 2nd-7th 2018. Talk (plenary): Structure of quantum Markov semigroups.
 46. 51th Symposium on Mathematical Physics, Toruń, June 16–18, 2019 Talk (plenary): Mathematical Models of Markovian Dephasing.
 47. QP40, International Conference on Quantum Probability and Related Topics, Ohio State University, Columbus, August 12th-16th, 2019. Talk (plenary): Potential theory for some Quantum Markov Chains.

48. Quantissima in the Serenissima III, August 19th–23rd, 2019 Venezia Talk (plenary): Quantum Markov Semigroups & Detailed Balance.
49. Operator Algebras in Quantum Field Theory and Quantum Probability. Università di Roma Tor Vergata, December 4–7, 2019. Talk (plenary): Quantum Markov Semigroups & Detailed Balance.
50. KBS Fest, on the occasion of 75th birthday of Professor Kalyan B. Sinha, Indian Statistical Institute, Bangalore Centre, December 12–14, 2019 Talk (plenary): Quantum Markov Semigroups & Detailed Balance.

PhD Theses supervision

- 1997 Roberto Monte, Università di Palermo. Title: Sull'estensione quantistica dei processi di Markov.
- 2000 Raffaella Carbone, Università di Milano. Title: Exponential ergodicity of some quantum Markov semigroups.
- 2005 Veronica Umanità, Università di Genova. Title: Classification and Decomposition of Quantum Markov Semigroups.
- 2007 Chiara Bottero, Politecnico di Milano. Title: Qualitative Behaviour of Quantum Markov Semigroups.
- (in progress) Damiano Poletti, Politecnico di Milano

Co-supervisions: L. Pantaleón Martínez 2008 and J. Bolaños 2013 (with R. Quezada), S. Hachicha 2008 (with L. Accardi), I. Nasroui 2016 (with S. Hachicha), K. Bessadok 2019 (with S. Hachicha).

Short PhD courses

- 1999 Processi Stocastici (10 lessons), Dottorato in Statistica Matematica, Università di Pavia,
- 2000 Processi Stocastici (10 lessons), Dottorato in Statistica Matematica, Università di Pavia,
- 2000 Processi Stocastici (10 lessons), Dottorato in Matematica, Università di Genova,

- 2001 Processi Stocastici (10 lessons), Dottorato in Statistica Matematica, Università di Pavia,
- 2002 Probabilités Quantiques (7 lessons), Faculté des Ciencias dell'Université de Tunis El Manar
- 2002 Quantum Markov Semigroups (4 lessons), Institut Fourier Grenoble,
- 2002 Calcolo delle Probabilità (15 lessons), Dottorato in Matematica, Università di Genova,
- 2003 Probabilidades y sistemas dinámicos: la visión cuántica, (4 lessons), Pontificia Universidad Católica de Chile.
- 2006 An Introduction to Quantum Markov Semigroups (3 lessons). Universidad de La Serena (Chile).
- 2007 An Introduction to Quantum Probability (3 lessons). Politecnico di Milano.
- 2010 Stochastic Calculus and Stochastic Differential Equations (5 lessons). Politecnico di Milano.
- 2012 Stochastic Calculus and Stochastic Differential Equations driven by Lévy processes (5 lessons). Politecnico di Milano.
- 2016 Quantum Markov Semigroups (6 lessons). International school and workshop on Orthogonal Polynomials, Interacting Fock Spaces, Quantum Markov Semigroups and Related Fields. Hammamet (Tunisia)

Scientific activity

Since 1987, the main field of investigation is Quantum Probability, the mathematical theory underlying computations of probabilities in Quantum Mechanics where randomness arises in a natural due to the Heisenberg uncertainty principle.

The main research topics concern open quantum systems. These are typically small quantum systems interacting with an environment with infinite degrees of freedom. Under the Markov approximation, one can eliminate the unnecessary degrees of freedom and obtain a quantum Markov (dynamical, in the physical literature) semigroup or a quantum stochastic differential equation. Quantum Markov semigroups (QMS) have now become the key structure for describing open system dynamics all of physics. Their importance

for describing irreversible processes involving dissipation and decoherence is steadily growing with the recent impetus from quantum technologies.

The main results obtained by the PI and collaborators in the last two decades are: a sufficient condition for conservativity of quantum Markov semigroups allowing one to construct a QMS by the minimal semigroup method, conditions for the existence, uniqueness and faithfulness of normal invariant states for QMSs with (possibly unbounded) generator of GKS-Lindblad type and the classification of transient and recurrent states, the characterisation of generators of semigroups that are symmetric or satisfy a quantum detailed balance condition with respect to some invariant state. These results are the building blocks of a rather general (but also simply applicable) theory for the qualitative study of several evolutions arising in the physical literature. Recently, we have been able to describe completely the structure of QMSs with an atomic decoherence-free subalgebra (or fixed point algebra) as well as the structure of their invariant states. Most important results on quantum stochastic differential equations are: the existence, uniqueness and unitarity theorem for stochastic differential equations with unbounded coefficients.

He authored more than one hundred of scientific publications.

WOS: H-index 19, papers 70, citations 736

Scopus: H-index 18, papers 53, citations 682

MathSciNet: H-index 14, papers 100, citations 582

Google Scholar: H-index 26, papers 100, citations 2034

Collaborations with scientific journals

1994 – 1997 Associated Editor of “Quantum Probability and Communications”.

Since 1998 Editor of “Infinite Dimensional Analysis, Quantum Probability and Related Topics”.

Since 2008 Editor of “Milan Journal of Mathematics”.

Referee

- Annales Henri Poincaré,
- Annales de l’Institut Henri Poincaré - Probabilité et Statistique,
- Bulletin of the London Mathematical Society,
- Communications in Mathematical Physics,
- Communications in Stochastic Analysis,

- Duke Mathematical Journal,
- IEEE Transactions on Automatic Control,
- Infinite Dimensional Analysis, Quantum Probability and Relat. Top.,
- Journal of Computer and System Sciences,
- Journal of Functional Analysis,
- Journal of Mathematical Physics,
- Journal of Mathematical Analysis and Applications,
- Journal of Operator Theory,
- Journal of Physics A,
- Journal of Statistical Physics,
- Linear Algebra and its Applications,
- Mathematical Physics Analysis and Geometry,
- Open Systems and Information Dynamics,
- Probability Theory and Related Fields,
- Physica A, Physica D, Physica E
- Reviews in Mathematical Physics,
- Quantum Probability and Related Topics,
- Stochastic Processes and Applications,
- Stochastics.

1994–2008 reviewer for “Mathematical Reviews”.
 Since 1998 reviewer for “Zentralblatt für Mathematik”.

References

- [1] F. Fagnola: Appendice B del libro: G. Letta, *Martingales et intégration stochastique*. Scuola Normale Superiore, Quaderni. Bologna, Monograf (1985), p.173–179
- [2] F. Fagnola, G. Letta: *Sur la représentation intégrale des martingales du processus de Poisson*. In: Azéma, J., Yor, M. (editori), *Séminaire de Probabilités XX 1984/85*. (Lecture Notes in Mathematics vol. **1204**, p.28–29) Berlin Heidelberg New York: Springer 1986.
- [3] F. Fagnola, G. Letta: *Sur la représentation intégrale des martingales d'un processus de comptage*. *Rend. Acc. Naz. delle Scienze detta dei XL*, Vol. **X** (1986), p.45–51.
- [4] F. Fagnola: *Sur la représentation intégrale des martingales d'un processus ponctuel marqué*. *Rend. Acc. Naz. delle Scienze detta dei XL*, Vol. **X** (1986), p.191–199.
- [5] F. Fagnola: *Une caractérisation de la filtration naturelle d'un processus ponctuel marqué*. *Rend. Acc. Naz. delle Scienze detta dei XL*, Vol. **XI** (1987), p.285–291 .
- [6] F. Fagnola: *Une caractérisation des lois exponentielles et géométriques*. *Rend. Sem. Mat. Un. Padova*. Vol.**LXXXII** (1989), p.157–162.
- [7] L. Accardi, F. Fagnola: *Stochastic Integration*. In: Accardi, L., Von Waldenfels, W. (editori), *Quantum Probability and Applications III*. Proceedings, Oberwolfach 1987 (Lecture Notes in Mathematics, **1303**, p. 6–19) Berlin Heidelberg New York: Springer 1988.
- [8] F. Fagnola: *Explosions in quantum stochastic differential equations*. *Boll. Un. Mat. Ital. Serie VII Vol. 3-B N. 1* (1989), p.137–154.
- [9] F. Fagnola: *Quantum stochastic calculus and a Boson Lévy theorem*. In: Accardi, L., Von Waldenfels, W. (editori) *Quantum Probability and Applications V*. Proceedings, Heidelberg 1988 (Lecture Notes in Mathematics, **1442**, p. 131–144) Berlin Heidelberg New York: Springer 1990.
- [10] F. Fagnola: A martingale characterization of quantum Poisson processes. *Probab. Th. Rel. Fields*, **84**, 323–333 (1990).

- [11] F. Fagnola: On quantum stochastic differential equations with unbounded coefficients. *Probab. Th. Rel. Fields*, **86** (4), 501–516 (1990). ISSN: 0178-8051
- [12] L. Accardi, F. Fagnola, J. Quaegebeur: A representation free quantum stochastic calculus. *J. Funct. Anal.*, **104** No.1, 149–197 (1992). doi:10.1016/0022-1236(92)90094-Y
- [13] F. Fagnola: Quantum stochastic differential equations and Feynman-Kac perturbation of quantum evolution. *Quantum Probability and Related Topics*, **VI**, 267–284 (1991).
- [14] F. Fagnola: Pure birth and pure death processes as quantum flows in Fock space. *Sankhyā*, **53**, Serie **A** (1991).
- [15] F. Fagnola: On quantum stochastic integration with respect to "free" noises. *Quantum Probability and Related Topics*, **VI**, 285–304 (1991).
- [16] A.M. Chebotarev, F. Fagnola, A. Frigerio: Towards a stochastic Stone's theorem. Trento, Preprint UTM no.315 June 1990. In: G. Da Prato and L. Tubaro (eds.) *Stochastic Partial Differential Equations and Applications*, Pitman Research Notes in Mathematics. Longman Scientific & Technical p. 86–97 (1992).
- [17] F. Fagnola: A Lévy theorem for free noises. *Probab. Th. Rel. Fields*. **90**, 491–504, (1991).
- [18] F. Fagnola, K.B. Sinha: Quantum flows with unbounded structure maps and finite degrees of freedom. *J. London Math. Soc.* (3) **48**, 537–551, (1993). doi:10.1112/jlms/s2-48.3.537
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- [20] F. Fagnola, M. Mancino: Free noise dilation of semigroups of countable state Markov processes. *Quantum Probability and Related Topics* **VII**, 149–164 (1992).
- [21] F. Fagnola: Unitarity of solutions of quantum stochastic differential equations and conservativity of the associated semigroups. *Quantum Probability and Related Topics* **VII**, 139–148 (1992).

- [22] F. Fagnola: Characterisation of isometric and unitary weakly differentiable cocycles in Fock space. *Quantum Probability and Related Topics VIII*, 143–164, (1993).
- [23] A.M. Chebotarev, F. Fagnola: Two approaches to quantum stochastic differential equations with unbounded coefficients. Moscow Institute for Electronic Engineering, Preprint. 1992. In corso di pubblicazione su: *Matematicheskije Zametki*.
- [24] F. Fagnola: Chebotarev’s sufficient conditions for conservativity of quantum dynamical semigroups. *Quantum Probability and Related Topics VIII*, 123–142, (1993).
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- [27] A.M. Chebotarev, F. Fagnola: Sufficient conditions for conservativity of quantum dynamical semigroups. *J. Funct. Anal.* **118**, 131–153 (1993).
- [28] F. Fagnola: *Quantum Markov Flows in the Boson Fock Spaces*. Pontificia Universidad Católica de Chile, Quaderno 3/92, Santiago de Chile, Ottobre 1992.
- [29] F. Fagnola, R. Rebolledo, C. Saavedra: Quantum flows associated to master equations in quantum optics. *J. Math. Phys.* (1) **35**, 1–12, (1994). ISSN: 0022-2488 doi: 10.1063/1.530788
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- [31] A.M. Chebotarev, F. Fagnola: On quantum extensions of the Azéma martingale semigroup. *Sém. Prob.* **XXIX**, 1–16, Springer LNM 1613, (1995).
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- [34] B.V.R. Bhat, F. Fagnola: On minimality of Evans-Hudson flows. *Boll. Un. Mat. Ital.* (7) **XI-A** (1997), 671–684.
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- [37] F. Fagnola, R. Rebolledo: Classical limit theorems related to quantum phase. *Open Systems and Information dynamics* **5**, n.3, p.289–301 (1998).
- [38] F. Fagnola: Extending flows of classical Markov processes to quantum flows in Fock space. In: L. Accardi, C.C. Heyde (eds.) *Probability Towards 2000* Lecture Notes in Statistics 128. Springer 1998. p. 179–193.
- [39] F. Fagnola, R. Monte: A quantum extension of the semigroup of Bessel processes. *Mat. Zametki* **60** n.5, p.519–537 (1996).
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- [42] F. Fagnola, R. Rebolledo, C. Saavedra: Reduction of Noise by Squeezed Vacuum. Proceedings of the Second International Workshop *Stochastic Analysis and Mathematical Physics ANESTOC '96* World Scientific 1998. p. 61–71.
- [43] F. Fagnola: A simple singular quantum Markov semigroup. Proceedings of the Third International Workshop *Stochastic Analysis and Mathematical Physics ANESTOC '98* Birkäuser 2000 p. 73–88.

- [44] F. Fagnola: Quantum stochastic differential equations. Quantum probability communications, Vol. XI (Grenoble, 1998), 123–170, QP-PQ, XI, World Sci. Publishing, River Edge, NJ, 2003.
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