Éric Vernier

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Birth: 13/09/1989
Citizenship: French

Academic Positions and Education

2019-present CNRS researcher at the Laboratoire de Probabilité et de Modélisation Statistique (LPSM), Paris

2017-2019 Postdoctoral Research Associate, Oxford University (United Kindgom)

2015-2017 Postdoctoral fellow at SISSA (Trieste, Italy)

2011-2015 Ph.D. in theoretical physics at École Normale Supérieure (ENS Paris)
Title: *Non compact conformal field theories in statistical mechanics*
Advisors: Profs. J.L. Jacobsen (ENS, Paris) and Hubert Saleur (IPhT, CEA Saclay)

2008-2011 Undergraduate Studies in Theoretical Physics at École Normale Supérieure (ENS Paris)

Teaching

2020-present Teaching Assistant for the Probability course at batchelor and masters level, Université de Paris.

2018 Teaching Assistant for the Quantum Field Theory course at Oxford University. Professor: Paul Fendley.

2012-2015 Teaching assistant in Mathematics and Physics for undergraduate students at Université Pierre et Marie Curie (UPMC), Paris, France.

Courses : *Mathematics for physicists*, *Thermodynamics* , *Waves*

2010-2012 Oral examinations in Physics at undergraduate level in Lycée Louis Le Grand (Paris)

Research supervision

2023 Supervision of PhD student Márton Borsi for a one-month visit, funded by a program Erasmus+
Home Institution : Eötvös Loránd University, Budapest (Hungary).
Supervisor at home institution: Balázs Pozsgay.

2023 Supervision of a one-month research internship at the Batchelor Level. Student : Ilakkiya Annalingam (Sorbonne Université).

Referee activity

Reviewer for the Journals : Nature, Physical Review X, Physical Review Letters, Journal of High Energy Physics, Journal of Physics A: Mathematical and Theoretical, Journal of Statistical Mechanics, SciPost Physics, Nuclear Physics B.

Scientific communication

2020-present Organizer of a weekly Probability seminar, "Séminaire de Modélisation et Probabilités", at LPSM Paris.

2012-2014 Co-organization of a monthly seminar for graduate and postdoctoral students in condensed matter and statistical mechanics at ENS Paris.

Collective and administrative engagements

2018-2019 Representative for the postdocs in Theoretical Physics at the Physics Department in Oxford University.

2014 Representative for the PhD students at the laboratory's council of IPhT Saclay.

Funded research

2024-2025 CNRS IEA project, funded amount 10k€ for collaborations with SISSA Trieste

2023 PEPS-JCJC project, funded amount 4k€

2022 PEPS-JCJC project, funded amount 4k€

Languages

- **French**: mother tongue
- **English**: fluent, both written and spoken
- **Italian**: fluent, both written and spoken

Participation to scientific events

Invited presentations in international events

09/2023 *Workshop on exactly solvable models of open quantum systems*, Steklov Mathematical Institute, Russie [online]. *Hidden strong symmetries and quasi-local charges in a local Lindblad system*

07/2023 Workshop *Correlations in Integrable Quantum Many-Body Systems*, Wuppertal, Allemagne. *Integrability beyond quantum groups*

06/2023 Workshop *New Frontiers in Integrability*, Trinity College, Dublin, Irlande. *Integrability beyond quantum groups*

10/2022 Workshop *Systèmes intégrables, modèles et algèbres exactement solubles*, CRM Montréal, Canada. *Onsager algebra and Ising structures in root-of-unity six-vertex models*

05/2022 Workshop *Medium range integrable models*, Oxford Mathematical Institute, Royaume-Uni. *Some observations on free (and less free) models*

09/2021 Conference *The art of mathematical physics*, IPhT Saclay, France. *Hard rod deformed spin chains - the simplest interacting integrable models?*

03/2019 Conference *Integrability and Conformal Field Theory*, Oxford University, Royaume-Uni. *Onsager symmetries in quantum integrable models*.

05/2018 Conférence *Quantum Paths*, Erwin Schrödinger Institute, Vienne, Autriche. *Exact non-equilibrium dynamics of quantum integrable systems*

09/2017 Workshop *Correlations in Integrable Quantum Many-Body Systems*, Hannover, Allemagne. *Exact non-equilibrium dynamics of quantum integrable systems*

Invited presentations in local seminars

04/2023 Budapest Integrability Seminar (online). *Digital simulations of many-body quantum systems: Trotter transitions and integrability.*

02/2023 LPT & IMT joint Mathematical Physics Seminar, Toulouse, France. *Digital simulations of many-body quantum systems: Trotter transitions and integrability.*

01/2023 Séminaire de Physique Mathématique, Institut de Physique Théorique, CEA Saclay, France. *Onsager algebra and Ising structures in root-of-unity six-vertex models.*

05/2022 Séminaire de Probabilités, LPSM Paris. *Statistiques spectrales de matrices aléatoires en présence de symétries discrètes*.

05/2022 SISSA Trieste, Italie. *Probing symmetries of quantum many-body systems through spectral statistics*.

03/2021 City University Mathematics seminar, Londres. *Probing symmetries of quantum many-body systems through spectral statistics*.

02/2021 Budapest Integrability seminar. *(Towards) Yang-Baxter integrability of the Rule 54.*

01/2021 Groupe de Travail de Modélisation Stochastique, LPSM, Paris. *Temps de mélange et cutoffs dans les systèmes quantiques.*

10/2020 Integrability seminar, Louvain-la-Neuve, Belgique. *Boundary integrability, "integrable states"and "integrable quenches"*

10/2019 Laboratoire de Mathématiques Blaise Pascal, Clermont-Ferrand. *On analytical and numerical approaches to the scaling limit of 2d stat. mech. models*

05/2019 Groupe de Travail de Modélisation Stochastique, LPSM, Paris. *Modèles statistiques sur réseau et théories conformes non compactes*

01/2019 Department of Mathematical Sciences, Durham University, Royaume-Uni. *Integrable states in quantum integrable models*.

01/2019 Institut Camille Jordan, Lyon, France. *Onsager symmetries of $U(1)$-invariant clock models*

12/2018 Institut de Physique Théorique, CEA Saclay, France. *The $U(1)$-invariant clock models and symmetries at roots of unity*

12/2018 Institut Denis Poisson, Tours, France. *The $U(1)$-invariant clock models and symmetries at roots of unity*

11/2018 City University London, Royaume-Uni. *Integrable states and their applications*
10/2018 ENS Lyon, France *The $U(1)$–invariant Potts model and symmmetries at root of unity.*
11/2017 Rudolf Peierls Centre for Theoretical Physics, Oxford University, Royaume-Uni. *xact non-equilibrium dynamics of quantum integrable systems*
02/2017 ENS Lyon, France *Non-equilibrium dynamics of quantum many-body systems : the Loschmidt echo*
01/2017 LPT Toulouse, France. *Non-equilibrium dynamics of quantum many-body systems : the Loschmidt echo*
01/2017 LPTMS Orsay, France. *Non-equilibrium dynamics of quantum many-body systems : the Loschmidt echo*
12/2016 Institut de Physique Théorique, CEA Saclay, France. *Non-equilibrium dynamics and relaxation in quantum integrable systems and field theories*
11/2016 LPTHE Paris, France. *Non-equilibrium dynamics and relaxation in quantum integrable systems and field theories*
11/2016 Budapest University of Technology and Economics, Hongrie. *Non-equilibrium dynamics and relaxation in quantum integrable systems and field theories*
03/2016 Université de Ljubljana, Slovénie *Quasilocal charges in integrable spin-1 chains*
06/2015 Séminaire PCT, Ecole Supérieure de Physique et de Chimie Industrielles, Paris. *Field theory approach to polymers*
01/2015 IFT, Madrid, Espagne. *Spin chains for non compact CFTs*.
01/2015 SISSA Trieste, Italie. *Spin chains for non compact CFTs*.
12/2014 Institut für Theoretische Physik, Leibniz Universität Hannover, Allemagne. *Spin chains for non compact CFTs*.
12/2014 Bergische Universität Wuppertal, Theoretical Physics Group, Allemagne. *Spin chains for non compact CFTs*.
12/2014 Nordita Stockholm, Suède. *Spin chains for non compact CFTs*.
11/2014 Budapest University of Technology and Economics, Hongrie. *Spin chains for non compact CFTs*.
11/2014 Rudolf Peierls Center for Theoretical Physics, Université d'Oxford, Royaume Uni. *Spin chains for non compact CFTs*.
11/2014 Institute of Physics, Université d'Amsterdam, Pays-Bas. *Non compact conformal field theory of the Izergin-Korepin model, and the collapse of two-dimensional polymers*.

Participation to other conferences or schools

11/2022 Conférence *The multiple facets of the six vertex model*, ENS Lyon, France. *Onsager algebra and Ising structures in root-of-unity six-vertex models.*
09/2018 Conférence *RAQIS 2018*, LAPTH, Annecy-le-vieux, France. *The rich symmetries of the $U(1)$–invariant Potts model*
10/2017 Workshop *Correlation functions of quantum integrable systems and beyond*, ENS Lyon, France. *Exact non-equilibrium dynamics of quantum integrable systems*
07/2016 Conférence *Entanglement and Non-Equilibrium Physics of Pure and Disordered Systems*, ICTP, Trieste, Italie.
02/2016 Ecole *Statistical Field Theories*, G. Galilei Institute of Theoretical Physics, Florence, Italie.
10/2015 Conférence informelle *Statistical field theory and related topics*, SISSA, Trieste, Italie.
03/2014 Workshop *Recent Progress and Perspectives in Scaling, Multifractality, Interactions, and Topological Effects Near Anderson Transitions*, MPIKS, Dresden, Allemagne. Présentation poster.
02/2014 Ecole *Statistical Field Theories*, G. Galilei Institute of Theoretical Physics, Florence, Italie.
08/2012 Conférence *Topological States of Matter: Insulators, Superconductors, and Quantum Hall Liquids*, Nordita, Stockholm, Suède.
06/2012 Conférence *Conformal invariance, discrete holomorphicity and integrability*, Université de Helsinki, Finlande.
09-11/2011 Conférence *Advanced Conformal Field theory and applications*, Institut Henri Poincaré, Paris, France.

Publications

1. E. Vernier, H.C. Yeh, L. Piroli, A. Mitra, (2024). *Strong zero modes in integrable quantum circuits*. arXiv preprint arXiv:2401.12305.

2. K. Fukai, R. Kleinemühl, B. Pozsgay, E. Vernier, *On correlation functions in models related to the Temperley-Lieb algebra*, arXiv:2309.07472.

3. M. de Leeuw, C. Paletta, B. Pozsgay, E. Vernier, *Hidden quasi-local charges and Gibbs ensemble in a Lindblad system*, arXiv:2305.01922.

4. Y. Miao, E. Vernier, *Integrable Quantum Circuits from the Star-Triangle Relation*, arXiv:2302.12675.

5. F. Ares, S. Murciano, E. Vernier, P. Calabrese, *Lack of symmetry restoration after a quantum quench: an entanglement asymmetry study*, arXiv:2302.03330.

6. E. Vernier, B. Bertini, G. Giudici, L. Piroli, *Integrable Digital Quantum Simulation: Generalized Gibbs Ensembles and Trotter Transitions*, Phys. Rev. Lett. **130**, 260401, arXiv:2212.06455.

7. B. Fernandez and E. Vernier, *Symmetry-breaking-induced loss of ergodicity in maps of the simplex with inversion symmetry*, arXiv:2211.11078.

8. L. Piroli, E. Vernier, M. Collura, P. Calabrese, Phys. Rev. E **104**, 044106 (2021) *Thermodynamic symmetry resolved entanglement entropies in integrable systems*, arXiv:2203.09158

9. B. Pozsgay, T. Gombor, A. Hutsalyuk, Y. Jiang, L. Pristyák, E. Vernier, Phys. Rev. E **104**, 044106 (2021) *Integrable spin chain with Hilbert space fragmentation and solvable real-time dynamics*, arXiv:2105.02252.

10. O. Giraud, N. Macé, E. Vernier, F. Alet, Phys. Rev. X **12**, 011006 (2022) *Probing symmetries of quantum many-body systems through gap ratio statistics*, arXiv:2008.11173.

11. E. Vernier, SciPost Phys. **9**, 049 (2020), *Mixing times and cutoffs in open quadratic fermionic systems*.

12. E. O'Brien, E. Vernier, P. Fendley, *The "not-A", RSPT and Potts phases in an $S3$-invariant chain*, Phys. Rev. B **101**, 235108 (2020).

13. B. Pozsgay, L. Piroli and E. Vernier, *Integrable Matrix Product States from boundary integrability*, SciPost Phys. **6**, 062 (2019).

14. E. Vernier, E. O'Brien and P. Fendley, J. Stat. Mech. (2019) 043107, *Onsager symmetries in $U(1)$-invariant clock models*.

15. L. Piroli, E. Vernier, P. Calabrese, B. Pozsgay, *Integrable quenches in nested spin chains II: the Quantum Transfer Matrix approach*, J. Stat. Mech. (2019) 063104, arXiv:1812.05330.

16. L. Piroli, E. Vernier, P. Calabrese, B. Pozsgay, *Integrable quenches in nested spin chains I: the exact steady states*, J. Stat. Mech. (2019) 063103, arXiv:1811.00432.

17. R. Couvreur, E. Vernier, J. Jacobsen and H. Saleur, Nucl. Phys. B **941**, 507-559 (2019) *On truncations of the Chalker-Coddington model*.

18. L. Piroli, B. Pozsgay and E. Vernier, Nucl. Phys. B **933**, 454-481 (2018), *Non-analytic behavior of the Loschmidt echo in XXZ spin chains: exact results*

19. L. Piroli, B. Pozsgay and E. Vernier, Nucl. Phys. B **925**, 362-402 (2017), *What is an integrable quench ?*.

20. B. Pozsgay, E. Vernier and M. A. Werner, J. Stat. Mech. (2017) 023106, *On Generalized Gibbs Ensembles with an infinite set of conserved charges*.

21. L. Piroli, E. Vernier, P. Calabrese and M. Rigol, Phys. Rev. B **95**, 054308 (2017), *Correlations and diagonal entropy following a quantum quench in XXZ Heisenberg chains*.

22. L. Piroli, B. Pozsgay and E. Vernier, J. Stat. Mech. (2017) 023106, *From the Quantum Transfer Matrix to the Quench Action: The Loschmidt echo in XXZ Heisenberg spin chains*.

23. E. Vernier, J.L. Jacobsen and H. Saleur, SciPost Phys. **2**, 004 (2017), *Elaborating the phase diagram of spin-1 anyonic chains*.

24. E. Vernier, Axel Cortés-Cubero, J. Stat. Mech. 2017 (2), 023101, *Quasilocal charges and progress towards the complete GGE for field theories with non-diagonal scattering*,.

25. L. Piroli, E. Vernier, P. Calabrese, Phys. Rev. B **94**, 054313 (2016) *Exact steady states for quantum quenches in integrable Heisenberg spin chains* .

26. L. Piroli, E. Vernier, J. Stat. Mech. 2016 053106 (2016), *Quasi-local conserved charges and spin transport in spin-1 integrable chains*.

27. E. Vernier, J.L. Jacobsen and H. Saleur, Nucl. Phys. B **911**, 52-93 (2016), *The continuum limit of $a^{(2)}_{N-1}$ spin chains*.

28. E. Vernier, J.L. Jacobsen and H. Saleur, J. Phys. A: Math. Theor. **49** (6), 064002 (2016), *Dilute oriented loop models* .

29. E. Vernier, J.L. Jacobsen and J. Salas, J. Phys. A: Math. Theor. **49** 174004 (2016), *Q-colourings of the triangular lattice: Exact exponents and conformal field theory*.

30. E. Vernier, J.L. Jacobsen and H. Saleur, J. Stat. Mech. 2015, P09001 (2015), *A new look at the collapse of two-dimensional polymers*.

31. E. Vernier, J.L. Jacobsen, H. Saleur, J. Stat. Mech. (2014) P10003, *Non compact continuum limit of two coupled Potts models*.

32. E. Vernier, J.L. Jacobsen, H. Saleur, J. Phys. A: Math. Theor. **47** (28), 285202 (2014), *Non compact conformal field theory and the $a^{(2)}_2$ (Izergin-Korepin) model in regime III*.

33. E. Vernier, J.L. Jacobsen, J. Phys. A: Math. Theor. **45** (4), 045003 (2012), *Corner free energies and boundary effects for Ising, Potts and fully packed loop models on the square and triangular lattices*.

34. E. Vernier, D. Pekker, M.W. Zwierlein, E. Demler, Phys. Rev. A **83** (3), 033619 (2011), *Bound states of a localized magnetic impurity in a superfluid of paired ultracold fermions*.