

# Isao SAUZEDDE

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**Fields** : Probability, Mathematical Physics.

**Main subject** : Windings of planar Brownian Motions and their application to Euclidean Quantum field theory

## Positions

- 2022- **Research fellow**, *University of Warwick*, with Aleksandar Mijatovic, financed by the EPSRC grant *Anomalous diffusion via self-interaction and reflection*
- 2021-2022 **Postdoctoral Research Associate in Mathematical Physics**, *Oxford university*, with Jon Keating, financed by the ERC grant *Log correlations and random matrices*
- 2018-2021 **PhD**, *LPSM - Sorbonne Université*, financed by the École Normale Supérieure de Lyon
- 2014 - 2018 **Élève de l'ENS**, *École Normale Supérieure de Lyon*  
(Employed as a civil servant during education)

## Long term visit

- 2025 **Junior Research Fellow of the Erwin Schrödinger Institute**, *University of Vienna*, for a two months period
- 2024 **Semester Stochastic systems for anomalous diffusion**, *Isaac Newton institute, Cambridge*, for a three months period
- 2023 **Visited Nathnaël Berestycki**, *University of Vienna*, for a two months period, to work on a joint paper in progress

## Publications

- 2024 (With P. Perruchaud) **Loop soup representation of zeta-regularised determinants and equivariant Symanzik identities**, *To appear in Annals of probability*. ArXiv : 2402.00767,
- 2024 **Homotopy and holonomy of the planar Brownian motion in a Poisson punctured plane**, *Communications in Mathematical Physics*
- 2022 (With J. Forkel) **Convergence of the logarithm of the characteristic polynomial of unitary Brownian motion in Sobolev space**, *Journal of Physics A : Mathematical and Theoretical*
- 2021 **Lévy area without approximations**, *Annales de l'Institut Henri Poincaré (B)*, ArXiv : 2101.03992
- 2021 **Planar Brownian motion winds evenly along its trajectory**, *ALEA (Latin American Journal of Probability and Mathematical Statistics)*,

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## Preprints

- 2024 (With A. Mijatovic and A. Wade) Central limit theorem for superdiffusive reflected Brownian motion , *ArXiv* : [2412.14267](#)
- 2024 Renormalised Amperean area of Brownian motions and Symanzik representation of the 2D abelian Yang-Mills-Higgs field, *ArXiv* : [2412.16781](#)
- 2023 Brownian windings, Stochastic Green's formula and inhomogeneous magnetic impurities, *ArXiv* : [2301.00551](#)
- 2021 Winding and intersection of Brownian motions, *ArXiv* : [2112.01645](#)
- 2021 Integration and stochastic integration in Gaussian multiplicative chaos, *ArXiv* : [2105.01232](#)

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## Seminars

- 2025 TBA, *University of Durham*
- 2024 Central limit theorem for superdiffusive processes, *Isaac Newton institute, Cambridge*
- 2024 Geometric formulas and Amperean area for planar Brownian loops, *University of Warwick*
- 2024 Décomposition du mouvement brownien plan, *Séminaire de probabilités et statistique, Université d'Angers*
- 2023 Stochastic formulas for determinants of Laplacians, *Vienna Probability Seminar, Wien Universität*
- 2023 Twisted Gaussian free Fields, stochastic Yang-Mills Fields and Brownian windings, *Statistical Mechanics seminar, Warwick University*
- 2023 Impuretés magnétiques inhomogènes, enlacements browniens et SLE(2), *Séminaire du LPTMS, Université d'Orsay*
- 2022 Unitary Brownian motion, 2D log-correlated fields and loop soups , *Random matrix seminar, University of Oxford*
- 2022 Brownian winding, Green's formula, and Cauchy rough path, *Probability and statistics Seminar, University of Luxembourg*
- 2022 Brownian winding and magnetic impurities, *Probability Seminar, University of Sussex*
- 2021 Brownian winding, Oxford Stochastic analysis and mathematical finance Seminar
- 2020 Covariant Young integration, *LPSM, Séminaire des thésards*
- 2019 Geometric aspects of the rough paths theory, *LPSM, Reading group on rough path theory*
- 2019 Windings of Brownian motion, *LPSM, Séminaire des thésards*
- 2019 Enlacement des courbes browniennes, *Université de Rennes, Séminaire Gaussbusters*
- 2018 Quantum Gaussian processes, *LPSM, Reading group on non-commutative rough paths*

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## Conferences

- 2023 **Some conjectures related to the stochastic quantization of Yang–Mills theory coupled with matter**, *Sussex*, Workshop on Random matrix theory in Probability and Mathematical Physics
- 2023 **Brownian motion drifted by random vector Fields**, *Lisbon*, 43rd Conference on Stochastic Processes and their Applications
- 2023 **CLT for reflecting Brownian motion in generalized parabolic domains**, *Roscoff*, 40 years of reflected Brownian motion and related topics
- 2022 **Magnetic impurities and a random rough path extension for the Brownian motion**, *Berlin*, 15th Oxford-Berlin Young researchers meeting on applied stochastic analysis
- 2021 **Unitary matrices under a Brownian dynamics at equilibrium**, (*Online*), XVII Brunel-Bielefeld workshop on random matrix theory and applications
- 2021 **Lévy area without approximation**, (*Online*), 14th Oxford-Berlin Young researchers meeting on applied stochastic analysis

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## Teaching

- 2022 **Supervised summer project**
- 2021 **Functional analysis**, *Bachelor 3rd year*, 36h, Sorbonne Université
- 2020 **Algorithmic (replacement)**, *Master 1st year*, 6h, Sorbonne Université
- Topology and differential calculus**, *Bachelor 2nd year*, 72h, Sorbonne Université
- 2019 **Linear algebra**, *Bachelor 2nd year*, 36h, Sorbonne Université
- Series, integrals, and ODE**, *Bachelor 2nd year*, 36h, Sorbonne Université
- 2015-2019 **Oral examiner (voluntary work)**, *Bachelor 2nd year*, 6 days, Lycée Blaise Pascal, Clermont-Ferrand

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## Education

- 2018-2021 **PhD**, supervised by T. Lévy
- 2017 **Master's degree in probability and random models**, *UPMC*, Paris
- 2015 **BSc in Computer Science**, *ENS de Lyon*
- BSc in Mathematics**, *Université Lyon 1*
- 2014-2018 **Élève normalien**, *ENS de Lyon*

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## Internships

- 2017 - 2018 **On knot theory and Chern-Simons theory**, *UPMC*, supervised by Thierry Lévy
- 2017 **On the stochastic proof of the Chern-Gauss-Bonnet theorem**, *UPMC*, supervised by Thierry Lévy
- 2016 **Brownian motion on Riemannian manifolds**, *Université de Rennes*, supervised by Jürgen Angst