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## Career

- Jan. 2021 – **Assoc. Prof. (Maître de conférence)**, *Laboratoire de Mathématiques d'Orsay*, Université Paris-Saclay, France
- 2019 – Dec. **Postdoc SNF**, *Université de Fribourg*, Switzerland, under the supervision of Ioan Manolescu
- 2020
- 2016 – 2019 **PhD**, *LPSM - Sorbonne Université*, under the supervision of Cédric Boutillier and Béatrice de Tilière  
Title: Integrable spin, vertex and loop models.
- 2016 **Agrégation de mathématiques**
- 2015 – 2016 **Master in mathematics teaching**, *Université Pierre et Marie Curie*, Paris
- 2013 – 2015 **Master in probability and random models**, *Université Pierre et Marie Curie*, Paris
- 2012 – 2013 **Bachelor in pure mathematics**, *Université Paris Sud*
- 2012 – 2016 **Student at the École Normale Supérieure**, Paris

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## Publications

- N. Affolter, B. de Tilière, P. Melotti. “The Schwarzian octahedron recurrence (dSKP equation) II: geometric systems”. 2024, *Discrete & Computational Geometry*
- N. Affolter, B. de Tilière, P. Melotti. “The Schwarzian octahedron recurrence (dSKP equation) I: explicit solutions”. 2023, *Combinatorial Theory*
- P. Melotti, S. Ramassamy and P. Thévenin. “Points and lines configurations of perpendicular bisectors of convex cyclic polygons” 2022, *Electronic Journal of Combinatorics*
- P. Melotti, S. Ramassamy and P. Thévenin. “Cube moves for  $s$ -embeddings and  $\alpha$ -realizations” 2021, *Annales de l’IHP D*
- P. Melotti. “The free-fermion eight-vertex model: couplings, bipartite dimers and  $Z$ -invariance”. *Communications in Mathematical Physics* (2020).
- P. Melotti and E. Saias. “On path partitions of the divisor graph”. *Acta Arithmetica* 192 (2020), 329-339.

- P. Melotti. “The free-fermionic  $C_2^{(1)}$  loop model, double dimers and Kashaev’s recurrence.” *Journal of Combinatorial Theory, Series A*. August 2018.
- T. Bourgeat et al. “New Algorithmic Approaches to Point Constellation Recognition.” In *ICT Systems Security and Privacy Protection*. Springer Berlin Heidelberg, 2014 (pp. 80-90).

## Preprints

- M. D’Achille, N. Enriquez, P. Melotti. “Local limit of massive spanning forests on the complete graph”. 2024
- T. Bourgeat, M. Heinrich, P. Melotti, J.-M. Robert. “A probabilistic Hadwiger-Nelson problem.” 2015, preprint. arXiv:1501.02441

## Thesis and essays

- P. Melotti, “Integrable spin, vertex and loop models” (*“Modèles intégrables de spins, vertex et boucles”*). June 2019. *PhD thesis*, under the supervision of C. Boutillier and B. de Tilière. Referees: Vincent Beffara, Julien Dubédat.
- P. Melotti, “Combinatorial links between planar Ising models and dimer models” (*“Liens combinatoires entre le modèle d’Ising planaire et un modèle de dimères”*). 2015. *Master’s thesis (in French)*, under the supervision of B. de Tilière.
- P. Melotti and A. Prevost, “A random growth model: the world discovered by  $N$  explorers” (*“Un modèle de croissance aléatoire : le monde découvert par  $N$  explorateurs”*). 2013. *Essay for the ENS bachelor (in French)*, under the supervision of P. Bertin.

## Supervision

- 2024 **Mathieu Dagès**, “A proof of Cardy’s formula for critical percolation on the hexagonal lattice”, Master thesis
- 2023 **Laura Thieffine, Marie Coutereel**, “Wilson’s algorithm for unpredictable mazes”, Master thesis  
**Nathan Belleville, Thomas Roland**, “Real zeros of random polynomials”, Bachelor thesis
- 2022 **Jean-Bapiste Stiegler**, “Discrete holomorphic dynamics”, Master internship  
**Yuan Tian**, “Aspects of the dimer model”, Master thesis

2021 **Alexis Geroux, Nicolas Gressier, Peiheng Tan**, “Zeros of random polynomials”, Master thesis

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## Talks and seminars

- November 2024 **Orsay**, *Informal Probability Seminar*, On bicycle mathematics
- October 2024 **PIICQ**, *online seminar on integrable probability*, The Dimer Model and Geometric Dynamics
- October 2024 **Université Gustave Eiffel**, *Probability Seminar*, An Introduction to Vertex Models
- September 2024 **Toulouse**, *Probability Seminar*, Dimer Models and Geometric Dynamics
- May 2024 **TU Berlin**, *Discrete Differential Geometry and Dimers*, Dimers from octahedral integrable equations
- February 2024 **Marseille**, *Probability Seminar*, Dynamics of Discrete Holomorphic Functions and Combinatorics
- November 2023 **IHES**, *Probability and Analysis Seminar*, Dynamics of discrete holomorphic functions
- October 2023 **Grenoble, Institut Fourier**, *Probability Seminar*, Dynamics of orthogonal circle patterns
- March 2023 **TU Berlin**, *DGD Seminar*, New results and open questions on P-nets
- September 2022 **TU Wien**, *Discrete geometric structures 2022*, Combinatorics of dSKP and geometric systems
- March 2022 **Orsay**, *Séminaire “Explique-moi”*, Comment dessiner joliment un graphe
- February 2022 **IHP**, *Séminaire MEGA*, The eight-vertex model via dimers
- October 2021 **Université Paris Dauphine**, *Séminaire d’Analyse et Probabilités*, The dSKP equation in statistical mechanics and geometry
- May 2021 **Geneva (remote)**, *Mathematical Physics seminar*, Cube flips in s-embeddings and  $\alpha$ -realizations
- May 2021 **Lisbon (remote)**, *IST QM3*, The free-fermion eight-vertex model via dimers
- March 2021 **remote**, *journées ALÉA*, Configurations of points and bisectors
- March 2021 **Orsay**, *Probability seminar*, Combinatorics of discrete integrable systems: the dSKP case

- November 2020 **Fribourg**, *Probability seminar*, Introduction to Markov Chain Monte Carlo methods
- November 2020 **Oberwolfach (remote)**, *Mini-Workshop: Dimers, Ising and Spanning Trees beyond the Critical Isoradial Case*, Cube flips of s-embeddings and alpha-immersions
- September 2020 **Fribourg**, *Oberseminar Geometrie*, Cube moves from statistical mechanics to discrete geometry
- August 2020 **MIT (remote)**, *Seminar from a Safe Distance*, The eight-vertex model via dimers
- May 2020 **Geneva (remote)**, *Mathematical Physics seminar*, The eight-vertex model via dimers
- May 2020 **DIMERS ANR**, *Virtual meeting*, Combinatorics of spatial recurrences: several species of dimers
- March 2020 **Orsay - LMO**, *Probability and Statistics seminar*, Modèle d'Ising et boucles bicolores – Ising model and bicolor loops
- February 2020 **Les Diablerets**, *Workshop on Mathematical Physics*, From the Ising model star-triangle move to a bicolor loop model
- January 2020 **TU Berlin**, *Discretization in Geometry and Dynamics seminar*, Cube flips in statistical mechanics and in planar geometry
- November 2019 **BIRS, Banff**, *Workshop Dimers, Ising Model, and their Interactions*, The eight-vertex model via dimers
- September 2019 **ENS Lyon, LIP, MC2 team**, *seminar*, Introduction aux transformations triangle-étoile – Introduction to star-triangle relations
- June 2019 **Dourdan**, *Journées de probabilités*, Modèles vertex via les dimères – Vertex models via dimers
- May 2019 **Institut Mathématique de Bordeaux**, *Journées Inter'Actions*, Le modèle à huit sommets en mécanique statistique – The eight-vertex model in statistical mechanics
- April 2019 **Université Paris Diderot**, *Rencontres master doctorants – Master - PhD meeting*, Mineurs principaux et modèles de boucles – Principal minors and loop models
- March 2019 **ENS Lyon**, *Meeting of the ANR DIMERS*, Autour des transformations triangle-étoile – Around star-triangle transformations
- November 2018 **IHES**, *Séminaire de probabilités et physique statistique*, Kashaev's relation for the Ising model, and a loop model
- October 2018 **Université Paris Est Créteil**, *Séminaire des thésards*, From spatial recurrences to limit shapes

- June 2018 **Université Paris Diderot**, *Groupe de travail des thésards*, Triangle, étoile, intégrabilité – Star, triangle, integrability
- May 2018 **Institut Mathématique de Bordeaux**, *Séminaire des thésards*, Relations de Plücker et cercle arctique – Plücker relation and arctic circle
- November 2017 **IHP, J-PSI** (*Working group of young researchers in statistical mechanics and interactions*), Variational principle of the dimer model
- October 2017 **Isfahan University of Technology**, The dimers’ urban renewal and applications
- June 2017 **Saint-Flour**, *Probability summer school*, Limit shapes of Kashev’s recurrence
- May 2017 **IHES**, *Les probabilités de demain*, Spatial recurrences, associated models, limit shapes
- January 2017 **CIRM**, *Winter school: Combinatorics and interactions*, Poster: combinatorial interpretation of spatial recurrences
- October 2016 **Sorbonne Université**, *Groupe de travail des thésards*, Récurrences spatiales et formes limites

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## Research stays

- March 2023 **TU Berlin**, *Discretization in Geometry and Dynamics group*, Invited by Niklas Affolter, Alexander Bobenko, Boris Springborn, one week  
Investigation of explicit expressions and singularity behaviour of discrete integrable equations
- January 2020 **TU Berlin**, *Discretization in Geometry and Dynamics group*, Invited by Niklas Affolter, Alexander Bobenko, Boris Springborn, one week  
On interpretations in discrete geometry of star-triangle transformations, cluster algebras and combinatorics.
- September 2019 **ENS Lyon**, *LIP, MC2 group*, Invited by Silvère Gangloff, one week  
On the Bethe Ansatz for the eight-vertex model and computational aspects of physical integrability.
- October 2017 **Isfahan Institute of Technology**, Invited by Amir Hashemi, two weeks  
On algebraic aspects of tiling problems.

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## Financial support

- 2019 – 2023 **Member of the ANR DIMERS**, *Project led by Cédric Boutillier and Jérémie Bouttier*, ANR-18-CE40-0033

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## Conference organization

July 2023 **DIMERS Closing conference**, co-organized with Cédric Boutillier, Béatrice de Tilière, Thierry Lévy

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## Responsibilities

2023- **Orsay**, Co-organizer of the probability 'seminar

2023- **Orsay**, Lab referent of the Math. Department for the computation Mesocenter

2022- **Orsay**, Member of the CCUPS commission

2021-2023 **Orsay**, Co-organizer of the “Pizzamath” seminar

2019 – 2020 **Unifr**, Organizer of the probability seminar

2019 – 2020 **Fribourg**, Math teacher for refugees in the association La Red, various levels

2017-2018 **LPSM**, Co-organizer of the PhD's seminar (weekly)

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## Teaching

July-August **Summer School “Probability in Turkey”**, *Random Tilings*, Master level, Nesin Mathematics Village

2024 – 2025 **Cours accéléré Probabilités**, *Master 2nd year*, M2MDA00a, Orsay  
courses. 30h

**Ising model**, *Master 2*, Orsay  
courses. 30h

**Projet**, *Bachelor 3rd year*, MEU359, Orsay  
projects supervision. 23h

**MAO Probabilités-Statistiques**, *Master 1st year*, M1MF18, Orsay  
courses, exercises, exams. 62.5h

**Markov chains**, *Master 1st year*, PRB201, ENSTA  
exercises. 15h

**Probabilités 1**, *Bachelor 2nd year*, MEU254, Orsay  
exercises. 24h

2023 – 2024 **Cours accéléré Probabilités**

**Ising model**

**Projet**

**MAO Probabilités-Statistiques**

**Markov chains**

- Martingales**, *Master 1st year*, M1MA11, ENSTA  
exercises. 15h
- Probabilités 1**
- Projet TER**, *Master 1st year*, Orsay  
1st year master thesis direction.
- 2022 – 2023 **Cours accéléré Probabilités**
- Projet**
- MAO Probabilités-Statistiques**
- Martingales**
- Probabilités 1**
- Algèbre et Géométrie**, *Bachelor 1st year*, MEU102, Orsay  
exercises. 24h
- Projet TER**
- 2021 – 2022 **Cours accéléré Probabilités**
- MAO Probabilités-Statistiques**
- Martingales**
- Probabilités 1**
- 2020 – 2021 **MAO Probabilités-Statistiques**
- Probabilités 1**
- Projet TER**
- 2019 – 2020 **Analysis I and II**, *Bachelor 1st year*, Université de Fribourg  
exercises.
- 2017 – 2019 **Elementary probabilities; Intensive probabilities**,  
*Bachelor 2nd year*, Sorbonne Université  
exercises. 64h/year
- 2016 – 2017 **Series, integrals and linear algebra**, *Bachelor 1st year*,  
Sorbonne Université  
exercises. 64h/year
- 2013 – 2014 **Tutor in computer science**, *Preparatory classes*, Caml and  
general computer science, Lycée Condorcet, Paris

## Skills

Computer	Python, Ruby, C++, OCaml; Sage, Scilab, Matlab; L <sup>A</sup> T <sub>E</sub> X, Linux.
French	mother tongue
English	fluent
Spanish	good

Italian, notions  
Japanese