Matthieu Faitg

Researcher and teacher in mathematics

Curriculum Vitae

Age: 32 years old.
Citizenship: French.
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Past and current positions

- *01/09/2024 – present*: **ATER**[1] (full time) at the Institut de Mathématiques de Toulouse and Université Toulouse III (France), 1 year position.
- *01/10/2022 – 31/08/2024*: **Postdoc** at the Institut de Mathématiques de Toulouse, Université Toulouse III (France), under the supervision of Francesco Costantino. 2 years position.
- *01/10/2019 – 30/09/2022*: **Postdoc** at the mathematics department of the University of Hamburg (Germany), under the supervision of Christoph Schweigert. 3 years position.

Studies

- *2016 – 2019*: **PhD student** at the University of Montpellier.
  Thesis: Mapping class groups, skein algebras and combinatorial quantization.
  Under the supervision of Stéphane Baseilhac and Philippe Roche. Defended on 16/09/2019.
- *2014 – 2016*: **Master** in fundamental mathematics, University of Montpellier.
- *2011 – 2014*: **Licence** in mathematics, University of Perpignan.
- *2011* : **Baccalauréat** in science, option mathematics.

Research interests

I am working on:

- **Quantum algebra**, more precisely quantum groups, Hopf algebras, non-commutative rings and representation theory.
- **and its applications to low-dimensional topology**, more precisely quantum character varieties of surfaces, skein algebras, mapping class groups.
- **Deformation theory of tensor categories:** Davydov-Yetter cohomology and its relations with relative homological algebra.

(Pre)-Publications

Published papers:

- M. Faitg, A.M. Gainutdinov, C. Schweigert, *Davydov–Yetter cohomology and relative homological algebra*, Selecta Math. New Ser. 30, article n° 26, 80 pages (2024). (arXiv:2202.12287)
- M. Faitg, *Holonomy and (stated) skein algebras in combinatorial quantization*, Quantum Topol., published online first (DOI 10.4171/QT/176), 73 pages (2024). (arXiv:2003.08992)

[1] Non-tenured teaching and research assistant

- M. Faitg, *Projective representations of mapping class groups in combinatorial quantization*, Comm. Math. Phys. 377(1), 161–198 (2020). (arXiv:1812.00446)
- M. Faitg, *Modular group representations in combinatorial quantization with non-semisimple Hopf algebras*, SIGMA 15 (2019), 077, 39 pages. (arXiv:1805.00924)
- M. Faitg, *A note on symmetric linear forms and traces on the restricted quantum group* $\overline{U}_q(\mathfrak{sl}(2))$, Osaka J. Math. 57, 575–595 (2020). (arXiv:1801.07524)

Preprints with positive reviews:

- S. Baseilhac, M. Faitg, P. Roche, *Unrestricted quantum moduli algebras III : surfaces of arbitrary genus and skein algebras*, arXiv:2302.00396, 75 pages (2023). Submitted to Quantum Topol., positive reviews from the referees.

Preprints:

- F. Costantino, M. Faitg, *Braided categories of bimodules from stated skein TQFTs*, arXiv:2505.16909, 62 pages (2025).
- M. Faitg, *Derived representations of quantum character varieties*, arXiv:2502.04267, 53 pages (2025).
- M. Faitg, A.M. Gainutdinov, C. Schweigert, *An adjunction theorem for Davydov-Yetter cohomology and infinitesimal braidings*, arXiv:2411.19111, 71 pages (2024).

Talks at seminars and conferences

Seminars :

- *Derived representations of quantum character varieties*, ALPE seminar (joint seminar Montpellier-Toulouse), University of Montpellier, 10/12/2024.
- *Deformation of braidings and Davydov–Yetter cohomology*, presented at:
  - AGATA seminar, 1h15, University of Montpellier, 07/11/2024.
  - Algebra and topology seminar, 1h, University of Zürich, 11/06/2024.
- *Structure of quantum moduli algebras and skein algebras*, presented at:
  - Algebra and geometry seminar, 1h, University of Caen, 30/01/2024.
  - Algebra and topology seminar, 1h, University of Strasbourg, 09/01/2024.
  - Algebra and topology seminar, 1h30, University of Dijon, 25/05/2023.
  - Algebra seminar, 1h, Institut Camille Jordan (Lyon), 16/03/2023.
- *Davydov–Yetter cohomology and relative homological algebra*, presented at:
  - Space seminar, 1h, University of Tours, 24/06/2023.
  - Mathematical physics seminar, 1h, University of Dijon (online), 15/03/2022.
  - Groups, representations and geometry seminar, 1h30, IMJ–PRG (Paris), 04/03/2022.
  - GAAO seminar, 1h, University Clermont Auvergne, 14/01/2022.
- *Deformations of tensor categories*, Algebra and mathematical physics seminar, 45 min, University of Hamburg (online), 19/11/2021.
- *Holonomy in combinatorial quantization*, Quantum Universe cluster quarterly meeting, 15 min, online, 23/06/2020.

- *Wilson loops and skein algebras in combinatorial quantization*, Algebra and mathematical physics seminar, 1h30, University of Hamburg, 28/01/2020.
- *Mapping class group representations in combinatorial quantization*, presented at:
  - Quantum Universe cluster quarterly meeting, 1h30, DESY, Hamburg, 21/01/2020.
  - Topology seminar, 1h15, University of Grenoble, 08/03/2019.
  - Geometry and topology seminar, 1h, University Toulouse III Paul Sabatier, 05/03/2019.
  - Algebra and mathematical physics seminar, 1h30, University of Hamburg, 04/12/2018.
- *Combinatorial quantization and representations of mapping class groups: the case of the torus*, Topology seminar, 1h, University of Montpellier, 31/05/2018.

Conferences :

- *Structure of quantum moduli algebras and skein algebras*, Quantum Topology Day, 1h, IMJ–PRG (Paris), 18/03/2024.
- *Holonomy and (stated) skein algebras in combinatorial quantization*, Conference "Remote Rendez-vous for Quantum Topologists", 1h, online, 13/08/2021.
- *Mapping class group representations in combinatorial quantization*, Conference "Rencontre du GdR de Topologie Algébrique", 1h, Montpellier, 25/10/2018.

Workshops :

- *Categories of bimodules inspired by topolgy*, Quantum workshop, Toulouse, 1h, 10/04/2025.
- *Moduli algebras and representations of mapping class groups, I and II*, Quantum workshop, 2×1h, Montpellier, 17/11/2023 and 25/04/2024.
- *Structure of quantum moduli algebras and skein algebras*, Day on skein algebras, University Toulouse III, 24/03/2023.

Less specialized talks :

- *Quid of the Jones polynomial?*, *Quid* seminar (for young researchers), 1h, University Toulouse III, 16/04/2025.
- *An overview of the mathematical theory of knots*, online talk for the high-school teachers of the Académie de Montpellier, 1h (+ 1h of questions), 13/02/2025.
- *Quid of quantum groups?*, *Quid* seminar (for young researchers), 1h, University Toulouse III, 15/02/2023.
- *Mapping class groups and (quantized) character varieties*, PhD students seminar, 45 min, University of Montpellier, 21/02/2019.
- *Some examples of quantum groups*, PhD students seminar, 1h, University of Montpellier, 03/05/2017.

Teaching

Total: 470 hours.

At the University of Montpellier during my PhD thesis:

- *Analysis 4* from 2017 to 2019, exercise classes, 114 hours total.
  2nd year course. Function sequences, function series, power series, Fourier series.
- *Analysis 2* in 2017 and 2018, exercise classes, 50 hours total.
  1st year course. Real sequences, real functions, limits, derivatives, asymptotic expansions.
- *Linear algebra and analysis 2* in 2019, exercise classes, 28 hours.
  1st year course. Polynomials, vector spaces, linear maps and matrices, integrals, asymptotic expansions, linear differential equations.

At the University Toulouse III in addition to my postdoc:

- *Basic mathematics III* in 2022 and 2023, lecture and exercise classes, 48 hours total.
  1st year course. Arithmetic in $\mathbb{Z}$, discrete probability theory.
- *Elementary groups and rings* in 2023 and 2024, exercise classes, 56 hours total.
  2nd year course. Groups, rings, morphisms, classical examples, arithmetic in rings.
  + one lecture in replacement (2 hours) + writing exercise sheets.

At the University Toulouse III as a teaching assistant for the academic year 2024-2025:

- *Basic mathematics III*, lecture and exercise classes, 56 hours.
  1st year course. Equivalence relations, contable sets, arithmetic in $\mathbb{Z}$, discrete probability theory.
- *Linear Algebra 1*, exercise classes (24 hours) + Python programming (4 hours).
  1st year course. Linear systems, geometry in $\mathbb{R}^3$, matrices, determinants, vector spaces.
- *Linear Algebra 2*, lecture and exercise classes, 56 hours.
  2nd year course. Linear maps and matrices, reduction of endomorphisms.
- *Elementary groups and rings*, 22 hours.
  As above.
- *Functions of several variables*, exercise classes, 10h (replacement).
  Topology in $\mathbb{R}^n$, continuity, partial derivatives.

Other activities

- I refereed papers for the journals *Communications in Mathematical Physics*, *Algebraic and Geometric Topology*, *SIGMA*.
- Diffusion of mathematics: in February 2025 I gave a one hour online talk "An overview of the mathematical theory of knots" for the math teachers of the Académie de Montpellier (high schools), followed by a one hour question session. See slides on my webpage.