# Benjamin Haïoun

*PhD student*

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## Education

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| 2021– | **PhD in mathematics**, *Université Paul Sabatier, Toulouse, France*, supervised by Francesco Costantino (Toulouse) and co-supervised by David Jordan (University of Edinburgh, UK), *Non-semisimple invariants and dualizable categories.* |
| 2020–2021 | **Research internships**, *Toulouse and Edinburgh.* |
| 2019–2020 | **Master 2 in Mathematics**, *Toulouse, France.* |
| 2017–2021 | **École Normale Supérieure de Lyon.** |

## Research visits

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| 01/2023–04/2023 | **David Jordan**, *University of Edinburgh*, 4 month, *Relative Non-Compact Topological Quantum Field Theories.* |
| 02/2022–04/2022 | **David Jordan**, *University of Edinburgh*, 3 month, *Dualizability of unit inclusion in a braided tensor category.* |
| 04/2021–06/2021 | **David Jordan**, *University of Edinburgh*, 3 month, Internship, *Homfly skein invariants and the Deligne interpolation* $Rep_q(GL_t)$. |
| 09/2020–03/2021 | **Francesco Costantino and Joan Bellier-Millès**, *Institut de Mathématiques de Toulouse*, 6 month, Internship, *Relating stated skein algebras and internal skein algebras.* |
| Summer 2020 | **Francesco Costantino and Joan Bellier-Millès**, *Institut de Mathématiques de Toulouse*, 4 month, M2 internship, *Skein algebras and factorization homology.* |
| Summer 2019 | **Jesper Grodal**, *University of Copenhagen*, 11 weeks, M1 internship, *On the $p$-completion and localization of topological spaces.* |
| Summer 2018 | **Joan Bellier-Millès**, *Institut de Mathématiques de Toulouse*, 6 weeks, L3 internship, *On the Massey products applied to the Borromean rings.* |

## Teaching and administrative tasks

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| 2022– | **PhD representative at the laboratory council**, *Université Paul Sabatier, Toulouse, France.* |
| 2021– | **Teaching Assistant**, *Université Paul Sabatier, Toulouse, France*, 64 hours per year. |
| 2018– | **Oral examiner in mathematics**, *Preparatory school*, 2 hours weekly. |
| 2012–2015 | **Private lessons in mathematics and physics**, *Middle and high school*, approx. 80 hours. |

## Publications

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| 2023 | **Skein (3+1)-TQFTs from non-semisimple ribbon categories**, *arXiv:2306.03225*, with Francesco Costantino, Nathan Geer and Bertrand Patureau-Mirand. |
| 2023 | **Unit inclusion in a (non-semisimple) braided tensor category and (non-compact) relative TQFTs**, *arXiv:2304.12167*. |

2022 **Relating stated skein algebras and internal skein algebras**, *published in SIGMA, arXiv:2104.13848.*

## Research talks

June 2023 **Non-semisimple skein invariants of (3+1)-manifolds**, *Séminaire de Géométrie et Topologie, Toulouse.*

May 2023 **Non-semisimple WRT as non-compact fully extended relative TQFTs**, *TQFT seminar, Lisbon.*

Feb. 2023 **Relative Topological Quantum Field Theories and the Cobordism Hypothesis**, *Category Theory Seminar, Edinburgh.*

Dec. 2021 **Internal and stated skein algebras**, *Winter Braids XI, Dijon, France.*

## Expository talks

May 2023 **Topological Quantum Field Theory, or physics applied to math**, *Student seminar, Toulouse.*

Jan. 2023 **The Fukaya-Morse category of a smooth manifold**, *Topology BTW3, CIRM, Marseille, France.*

Jan. 2023 **Quid of graphical calculus?**, *Quid seminar, Toulouse.*

Nov. 2022 **Modified traces, renormalized Lyubashenko invariants and non-semisimple 3-2-1 TQFTs**, *Seminar on Non-semisimple TQFTs, Edinburgh.*

May 2022 **Stated skein algebras** and **Gluing of internal skein modules**, *Matemale Spring School.*

March 2022 **Fully Extended skein TQFT**, *Hodge Club, Edinburgh, UK.*

Feb. 2022 **Quid du module skein?**, *Quid seminar, Toulouse.*

June 2021 **Introduction to 3-dimensional contact topology**, *Matemale.*

Feb. 2021 **Quantum sl(n) invariants**, *CIRM, Marseille, France.*