

# Jorge Becerra Garrido

Curriculum Vitae<sup>1</sup>

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## RESEARCH INTERESTS

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Quantum topology, more precisely quantum knot invariants. I am also interested in categorification in the context of low-dimensional topology. Some keywords are: *ribbon Hopf algebra*, *universal tangle invariant*, *Kontsevich invariant*, *TQFTs*, *modular category* and *modular functor*.

## EMPLOYMENT

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**Université Bourgogne Europe** (France). 2024 – present  
Postdoc in the research group of L. Woike.

## EDUCATION

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**Ph.D. in Mathematics**, *University of Groningen* (The Netherlands). 2019 – 2024  
Thesis: *Universal quantum knots invariants*, supervised by R. van der Veen.

**M.Sc. Mathematical Sciences**, *Utrecht University* (The Netherlands). 2017 – 2019  
Honours programme UGC, Cum Laude.  
Thesis: *K-theory with Reality*, supervised by L. Meier.

**B.Sc. Mathematics**, *University of Extremadura* (Spain). 2013 – 2017  
Thesis: *Theory of Relativity*, supervised by J.A. Navarro.

## PUBLICATIONS & PREPRINTS

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1. *A refined functorial universal tangle invariant* (preprint).
2. *Strictification and non-strictification of monoidal categories* (preprint).
3. *On Bar-Natan - van der Veen's perturbed Gaussians*, Rev. Real Acad. Cienc. Exactas Fis. Nat. Ser. A-Mat., 118(2):46, 2024.
4. *A combinatorial PROP for bialgebras*. European J. Combin. 124 (2025), Paper No. 104086.
5. *An Introduction to Knot Homology Theories*, TEMat monográficos, 2 (2021): Proceedings of the 3rd BYMAT Conference, pp. 11-14. ISSN: 2660-6003.
6. *Finite, Infinite and Twisted Ascent and Descent* (joint with JMF Castillo), La Gaceta de la Real Sociedad Matemática Española, Vol. 21 (2018), Núm. 3, Págs 497–516.

## RESEARCH TALKS

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- *Hopf-algebraic quantum knot invariants*, [GADT groupe de travail](#), Dijon. Nov 2024
- *Universal quantum knot invariants*, [Groningen Quantum Topology Dag](#). May 2024
- *Hopf algebras and knot invariants*, [ICMAT Geometry Seminar](#), Madrid. Jan 2024
- *Drinfeld doubles and Gaussian calculus for universal knot invariants*, [MAPHYAG Seminar](#), Madrid. Jan 2024

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<sup>1</sup>Last updated: 30 January 2025

- *Quantum invariants of knots and tangles*, [IMUEX Seminar](#), Badajoz. Jan 2024
- *Hopf algebras and the 2-loop polynomial of knots*, [Algebra Seminar](#), Groningen. Dec 2022
- *Three faces of the 2-loop polynomial of knots*, [4th BYMAT](#), online. Nov 2022
- *Universal quantum knot invariants*, [GQT School & Colloquium](#), Zeist. Aug 2022
- *Quantum invariants via perturbed Gaussian expressions*, [Winter Braids XI](#), Dijon Dec 2021
- *A categorical approach to the universal tangle invariant*, [DIAMANT symposium](#), Utrecht. Nov 2021
- *An introduction to knot homology theories*, [3rd BYMAT](#), online. Dec 2020
- *Foundations of stable homotopy theory*, [IMUEX Seminar](#), Badajoz. May 2019
- *Functional inequalities and convergence in diffusion processes*, [13th Meeting on Functional Analysis and Applications](#). Cáceres . Mar 2017

For a list of non-research talks, see [sites.google.com/view/becerra/talks](https://sites.google.com/view/becerra/talks).

### SELECTED ATTENDANCE

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- *Algebraic, geometric and quantum topology in Picardie*, Amiens. Mar 2024
- *Swiss Knots 2023*, Regensburg. Sep 2023
- *From Subfactors to Quantum Topology - In memory of Vaughan Jones*, Geneva. Jun 2022
- *Quantum Topology and Geometry (conference in honor of Vladimir Turaev)*, Paris. Jun 2022
- *Winter Braids XI*, Dijon. Dec 2021
- *Georgia Tech Topology Summer School on 4-manifolds*, Online. Jul 2021
- *Bath Summer School on K-Theory and Representation Theory*, Online. Jul 2021
- *Monooidal and 2-categories in representation theory and categorification*, Online. Dec 2020
- *QUAntum groups, Categorification, Knot invariants, and Soergel bimodules*, Online Conference . Aug 2020
- *Nearly Carbon Neutral Geometric Topology Conference*, Online Conference. Jun 2020

For a complete list, see [sites.google.com/view/becerra/attendance](https://sites.google.com/view/becerra/attendance).

### TEACHING

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- **University of Groningen:**
  - Co-lecturer of *Topics in Topology* (Master, universal knot invariants). Spring 2023
  - Co-lecturer of *Topics in Topology* (Master, Kirby calculus). Spring 2022
  - Co-lecturer of *Topics in Topology* (Master, grid homology). Spring 2021
  - Teaching Assistant for *Multivariable Analysis* (Bachelor). Autumn 2020
  - Co-organiser of the *Knot Theory Seminar* (Bach./Master). Spring 2020
  - Co-organiser of the *Groningen Topology Seminar* (Bach./Master). Autumn 2019
- **Utrecht University:**
  - Teaching Assistant for *Topologie en Meetkunde* (Bachelor,  $\pi_1$ ). Spring 2019
  - Teaching Assistant for *Algebraic Topology* (Master,  $H_n$ 's and  $\pi_n$ 's). Autumn 2018
  - Teaching Assistant for *Topologie en Meetkunde* (Bachelor,  $\pi_1$ ). Spring 2018

### BACHELOR'S THESES SUPERVISION

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- Daniël Apol, *Representability of cohomology theories on CW-complexes*, Groningen. 2021

## SKILLS

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- **Languages:** Spanish (native), English (fluent), French (basic), Dutch (basic).
- **Programming languages:**  
Python (with [verified certificate](#) by HarvardX), including SAGE, Numpy, Pandas, Matplotlib, NetworkX and Scikit-learn.  
Mathematica, C, R-Commander, Fortran, L<sup>A</sup>T<sub>E</sub>X, Linux.
- **Teaching:** Teacher training certificate.

## GRANTS

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- [Research Assistant](#), Department of Mathematics, University of Extremadura (Badajoz, Spain). €2,000. 2016–2017
- Fee waiver for talented students, *Summer School on Geometry*, Utrecht (The Netherlands). €400 2016
- Twelve university course tuition fee waivers for top student of a course. €1,200 2013–2016
- One-year university tuition fee waiver for top high-school student. €1,000 2013

## ORGANISATION

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- Co-organiser of the workshop [Groningen Quantum Topology Dag](#) (with Roland van der Veen). May 2024

## PROFESSIONAL ACTIVITIES

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- Organiser of a number of seminars and reading groups at Groningen University, cf. [PhD Seminar](#), [Knot homology theories reading group](#), [Quantum Mechanics bookclub](#).
- Speaker at the *European Researchers' Night* and similar outreach activities at University of Extremadura (2014 – 2017).
- Private tutor of English, Mathematics and Physics for high school students (2013 – 2017).