

Léo Bénard

Curriculum Vitae

Employment

- 2019–Present **Post-doctoral position**, with *T. Schick*, Mathematisches Institut, Georg-August University, Göttingen.
member of the Research Training Group 2491 "Fourier Analysis and Spectral Theory"
- 2018–2019 **Post-doctoral position**, with *R. Kashaev*, Section de Mathématiques, Université de Genève.

Education

- 2014–2018 **PhD of Mathematics**, Advisor : *J. Marché*, Université Pierre et Marie Curie, IMJ-PRG, Paris.
- 2012–2014 **Master in pure Mathematics**, Université Pierre et Marie Curie, Paris.

Published papers

- Twisted L^2 -torsion on the character variety**, with *J. Raimbault*, *Publicacions Matemàtiques*, volume 66, Issue 2, 857 - 881, 2022.
- Asymptotic of twisted Alexander polynomials and hyperbolic volume**, with *J. Dubois*, *M. Heusener*, *J. Porti*, *Indiana Univ. Math. J.* 71 (2022), 1155-1207.
- A multivariable Casson–Lin type invariant**, with *A. Conway*, *Annales de l'Institut Fourier*, volume 7, p.1029-1084, 2020.
- Torsion function on character varieties**, *Osaka J. Math.* 58 (2021), no. 2, 291-318.
- Singularities of the Reidemeister torsion form on the character variety**, *Algebraic and Geometric Topology*, 20(6) :2821-2884, 2020.

Preprints

- The twisted Ruelle zeta function on compact hyperbolic orbisurfaces and Reidemeister–Turaev torsion**, with *J. Frahm* and *P. Spilioti*, arXiv :2110.06683.
- Slope invariant and the A-polynomial of knots**, with *V. Florens* and *A. Rodau*, arXiv : 2103.14151.

Others

- An analytical solution for the exhumation of an orogenic wedge and a comparison with thermochronology data**, *Eartharxiv version*, With *Elco Luijendijk*, *Sarah Louis*, *Christoph von Hagke*, *Jonas Kley*, <https://eartharxiv.org/repository/view/2135/>.
A geology preprint
- Oberwolfach report**, *Manifolds and groups*, Volume 17, Issue 1, 2020, pp. 417–463, European Mathematical society.
- Reidemeister torsion on character varieties**, *Thèse de doctorat*, Soutenue le 14 Mars 2018, <https://www.uni-math.gwdg.de/benard1/These.pdf>.

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GEAR Workshop : June 2017, *Compactification of moduli spaces of representations*, Chapter 3 : Morgan-Shalen compactification of the $SL(2, \mathbb{C})$ -character variety.

Teaching experience

- 2020-2021 **2nd semester**, *Licence 2 : "Diskrete Mathematik"*, assistant for L. Bartholdi, Georg-August Universität, Göttingen.
- 2020-2021 **1st semester**, *Licence 2 : "Algebra"*, assistant for D. Schindler, Georg-August Universität, Göttingen.
- 2019-2020 **March**, *Intensive one-week course : Initiation to $\LaTeX$* , Georg-August Universität, Göttingen.
- 2019-2020 **Winter semester**, *1st Semester : "Differenzial- und Integralrechnung I"*, teaching assistant for Pr. Dorothea Bahns, Georg-August Universität, Göttingen.
- 2018-2019 **2nd semester**, *Bachelor 3rd year : "Analyse III"*, assistant of R. Kashaev, Université de Genève.
- 2018-2019 **1st semester**, *Bachelor 1st year : "Mathématiques générales"*, assistant of Sylvain Sardy, Université de Genève.
- 2017-2018 **Colles ECS1**, *Lycée Jacques Decour*, Paris 9ème.
- Spring 2018 **Master 2 : "Variétés de caractères des variétés hyperboliques de dimension 3"**, *Teaching assistant of A. Guilloux*, Université Pierre et Marie Curie.
- Fall 2017 **License 2 : "Suites, séries et intégrales"**, *Teaching assistant of A. Iordan*, Université Pierre et Marie Curie.
- Fall 2017 **License 2 : "Groupes de permutation et isométries"**, *Teaching assistant of A. Ducros*, Université Pierre et Marie Curie.
- Fall 2017 **License 2 : "Arithmétique pour l'informatique"**, *Teaching assistant of L. Koelblen*, Université Pierre et Marie Curie.
- Fall 2015 **Master 2 : "Topologie algébrique des variétés"**, *Teaching assistant of N. Bergeron and G. Ginot*, Université Pierre et Marie Curie.
- Fall 2015 **License 1 : "Analyse et algèbre pour les sciences"**, *Teaching assistant of S. Delabrière*, Université Pierre et Marie Curie.
- Fall 2014 **License 1 : "Analyse et algèbre pour les sciences"**, *Teaching assistant of A. Benabdesselem*, Université Pierre et Marie Curie.
- Fall 2014 **License 2 : "Compléments d'analyse et d'algèbre"**, *Teaching assistant of C. Demarche*, Université Pierre et Marie Curie.
- 2013-2014 **Colles MPSI**, *Lycée Saint Louis*, Paris 5ème.

Research interests

Low dimensional topology, knot theory, character varieties, Riemannian geometry, geometric analysis, L^2 -invariants, locally symmetric spaces, dynamical systems, quantum chaos, (topological) quantum field theories.

Guest talks in conferences

- Feb. 2022 **Paderborn University**, *Ruelle dynamical zeta function and Reidemeister–Turaev torsion for unit tangent bundles of hyperbolic surfaces*, Conference "Spectra and Dynamics on (Locally) Symmetric Spaces".
- Feb. 2020 **Oberwolfach**, *Conference "Manifolds and Groups"*, "Twisted Alexander polynomials and hyperbolic volume".
- Nov. 2019 **ENS Lyon**, *Journées de topologie de la fédération Auvergne-Rhône-Alpes*, "Twisted Alexander polynomials and hyperbolic volume".

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- Sep. 2019 **Université de Pau et des pays de l'Adour**, *Rencontres sur la topologie des courbes algébriques*, 2h lecture "Character varieties and Reidemeister torsion".
- Jul. 2019 **ETH, Swiss knots**, "Twisted Alexander polynomials and hyperbolic volume".

Talks in seminars

- Apr. 2022 **Dijon University**, *Une série de Poincaré pour l'invariant de Casson via la dynamique Anosov*, Seminar of the team "Géométrie, Algèbre, Dynamique et Topologie".
- Mar. 2022 **Clermont–Auvergne University**, *Ruelle dynamical zeta function and Reidemeister–Turaev torsion for unit tangent bundles of hyperbolic surfaces*, Seminar of the team "Géométrie, Algèbre et Algèbre d'Opérateurs".
- Nov. 2021 **Aix–Marseille university**, *Ruelle dynamical zeta function and Reidemeister–Turaev torsion for unit tangent bundles of hyperbolic surfaces*, Topology seminar.
- Nov. 2020 **Online**, *Twisted L^2 -torsion on the character variety*, Knot Online Seminar.
- Aug. 2020 **Tokyo Denki University**, *Twisted Alexander polynomials and hyperbolic volume*, Mathematics seminar, Online.
- Apr. 2020 **Online seminar**, *Twisted Alexander polynomials and hyperbolic volume*.
- Apr. 2020 **Max Plank Institut, Bonn**, *Twisted Alexander polynomials and hyperbolic volume*, Topology seminar, Online.
- Mar. 2020 **Paris Sud University**, *Twisted Alexander polynomials and hyperbolic volume*, Geometry and topology seminar, Online.
- Dec. 2019 **Freiburg i.B. Universität**, *Geometry seminar*, "Twisted Alexander polynomials and hyperbolic volume".
- Nov. 2019 **Georg-August Universität, Göttingen**, *Kolloquium of RTG "Fourier Analysis and Spectral Theory"*, "Twisted Alexander polynomials and hyperbolic volume".
- Sep. 2018 **Geneva university**, *Topology seminar*, "A multivariable Casson–Lin invariant for links".
- Jul. 2018 **Karlsruhe Institut of Technology**, *Topology seminar*, "Reidemeister torsions on character varieties".
- Mar. 2018 **Université de Lille I**, *Séminaire des doctorants*, "Arithmetic groups and quantum representations".
- Mar. 2018 **Université de Genève**, *Topology seminar*, "Acyclic torsion and incompressible surfaces".
- Jan. 2018 **Université Paris Diderot**, *Topology seminar*, "Acyclic torsion and incompressible surfaces".
- Nov. 2017 **Université de Grenoble**, *Journées des doctorants du GDR Tresses*, "Arithmeticity of quantum representations : the one-holed torus".
- Oct. 2017 **Université de Toulouse III**, *Topology and geometry seminar*, "Reidemeister torsion form on character varieties".
- Apr. 2017 **Université d'Aix-Marseille**, *Geometry seminar*, "Reidemeister torsion form on the character variety".
- Apr. 2017 **Université de Genève**, *Topology seminar*, "Reidemeister torsion form on the character variety".
- Apr. 2017 **Université de Clermont-Ferrand I**, *Geometry seminar*, "Reidemeister torsion form on the character variety".
- Feb. 2017 **Universidad Autonoma de Barcelona**, *Geometry Seminar*, "Reidemeister torsion form the character variety".
- Feb. 2017 **Université Paris Diderot**, *Topology seminar*, "Reidemeister torsion form the character variety".

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Contributed talks in conferences

- Sep. 2021 **Dijon university**, *Ruelle dynamical zeta function and Reidemeister–Turaev torsion for unit tangent bundles of hyperbolic surfaces*, GDR Tresses meeting : "Geometric and quantum topology".
- Dec. 2019 **Aussois, Paul Langevin center for CNRS**, *Conference Aussois 2019 "Géométrie et dynamique"*, "Twisted Alexander polynomials and hyperbolic volume".
- May 2019 **Georg-August Universität, Göttingen**, *Summer school on L_2 -torsion and symmetric spaces*, "Twisted Alexander polynomials and hyperbolic volume".
- May 2019 **NTNU Trondheim**, *Knots and braids in Norway*, "A multivariable Casson-Lin invariant for links".
- Mar. 2019 **Université de Reims**, *Winter Braids*, "A multivariable Casson-Lin invariant for links".
- Apr. 2018 **Université Cheik Anta Diop de Dakar**, *Spring school "Analyse géométrique des formes optimales sur des variétés riemanniennes, sur les groupes hyperboliques et sur les graphes"*, "Reidemeister torsion and volume on character varieties".
- Apr. 2018 **Institut d'Etudes Scientifiques de Cargèse**, *Conference "TQFT and categorification"*, "Acyclic torsion and incompressible surfaces".
- Mar. 2017 **Université de Caen**, *Winter Braids VII*, "Reidemeister torsion form on the character variety".

Other selected talks

- Apr. 2022 **Dijon University**, *Polynômes de collier et suite centrale descendante*, Workshop : "Mapping class groups".
- May 2019 **University of Geneva**, *Variété des caractères et fonction torsion de Reidemeister*, Workshop : "Invariants L_2 et volumes".
- Oct. 2018 **Université de Genève**, *Workshop : Thompson's group F* , "Braids and links".
- Jun. 2017 **GEAR junior retreat, West Glacier, Montana**, *Workshop : Compactification of Moduli Spaces*, "Morgan-Shalen compactification of the SL_2 character variety".
- Mar. 2017 **La Llagonne**, *Workshop : L^2 Invariants*, "Simplicial and hyperbolic volume".
- Oct. 2016 **Université Paris Diderot**, *Workshop : Non semi-simple TQFT's*, "Algèbres de Hopf enrubannées, l'exemple de $sl(2)$ quantique".
- Spring 2015 **Université Pierre et Marie Curie**, *Workshop : Quantum Teichmüller space and skein algebras*, "Character varieties : G.I.T. versus skein I and II".
- Jan. 2015 **La Llagonne**, *Workshop : Character varieties*, "Birationalité de la composante géométrique à sa restriction au bord, d'après Dunfield".
- Jan. 2014 **La Llagonne**, *Workshop : The volume conjecture*, "Relations entre polynôme de Tutte et polynôme de Jones".

Organization of scientific events

- Jan. 2023 **Workshop "Topology BTW III : Morse and Floer Theories"**, CIRM, Marseille, Co-organizer with Marco De Renzi, Jules Martel, Delphine Moussard, Louis-Hadrien Robert.
- Nov. 2022 **Workshop "Around Quantum Unique Ergodicity"**, Auffargis, Co-organizer with Adrien Boulanger, Selim Ghazouani, Louis loos and Antoine Julia.
- Oct. 2022 **Retreat of the RTG "Fourier Analysis and spectral theory"**, Göttingen.
- Oct. 2022 **Graduate school of the Research Training Group "Fourier Analysis and Spectral Theory"**, Random walks and related random topics, Göttingen, Co-organizer with Marialaura Noce, Thomas Schick and Federico Vigolo.

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- June 2022 **Workshop "Entropy of semiclassical measures"**, *Caes Les Plantiers*, Co-organizer with Adrien Boulanger, Selim Ghazouani, Louis loos and Antoine Julia.
- Apr. 2022 **Workshop "Topology BTW II : Sliceness, exotic pairs and quantum invariant"**, *CAES Aussois*, Co-organisateur avec Marco De Renzi, Jules Martel, Delphine Moussard, Louis-Hadrien Robert.
- Nov. 2021 **Workshop "Semi-classical trace formula"**, *Auffargis*, Co-organizer with Adrien Boulanger and Louis loos.
- Oct. 2021 **Retreat of the RTG "Fourier Analysis and spectral theory"**, *Göttingen*.
- Feb. 2021 **Conference "Topology BTW I : Homological and quantum invariants"**, *CIRM, Marseille*, Co-organizer with Jules Martel, Delphine Moussard, Louis-Hadrien Robert.
- Sept. 2020 **Retreat of the RTG "Fourier Analysis and spectral theory"**, *Göttingen*.
- 2019–present **Colloquium of the RTG "Fourier Analysis and spectral theory"**, *Georg-August Universität, Göttingen*, Coorganizer.
- Jan. 2020 **Retreat of the RTG "Fourier Analysis and spectral theory"**, *Göttingen*, Organizer.
- 2018–2019 **Topology seminar**, *Université de Genève*, Coorganizer.
- 2016–2018 **Seminar : Aromaths**, *Université Pierre et Marie Curie*, Coorganised with a group of six colleagues and students.
Seminar intended for UPMC's students any level
- 2016–2017 **Workshop : Riemann surfaces and algebraic curves**, *Université Pierre et Marie Curie*, With Adrien Boulanger and Louis loos.
- 2015–2015 **Workshop : Quantum Teichmüller space and skein algebras**, *Université Pierre et Marie Curie*, With Ramanujan Santharoubane and Jeremy Toulisse.
- 2014–2015 **Workshop : Algebraic geometry for beginners**, *Université Pierre et Marie Curie*, With Louis loos and Nicolina Istrati.

Other scientific activities or responsibilities

I am very interested in scientific communication in general. I have collaborated to the "Fête de la science" several times. I have also participated to the creation of a specific activity for the "Rallye Mathématique" in 2016 and 2017. Furthermore I have been a member of the "Bureau des Doctorants de l'IMJ-PRG" which is a group of PhD students who are in charge of many organizational tasks such as office distribution or implementation and maintenance of the internet website <https://www.imj-prg.fr/doctorants/>. I have also initiated and co-hosted the PhD Students Welcoming Day on October 2016 where participants usually give short talks about their research topics, and I gave a talk at the February 2017 session. This event takes now place twice a year.

Grants

- 2019-2020 **Projet Emergence CAP 2025 (I-Site Clermont)**, 5000 euros, With J. Dubois, M. Heusen, J. Porti.
Grant for organization of meetings around the projects " L^2 -invariants and approximation"
- 2012-2014 **PGSM Master Fellowship**, 26400 euros, Grant from the Fondation Sciences Mathématiques de Paris for my Master in Paris 6 during two years.

References

- Nicolas Bergeron**, *Professor in Ecole Normale Supérieure, Paris*, nicolas.bergeron@ens.fr.
- Nguyen Viet Dang**, *Professor in Paris 6 University*, dang@imj-prg.fr.
- PhD advisor **Julien Marché**, *Professor in Paris 6 University*, julien.marche@imj-prg.fr.
- Joan Porti**, *Professor in Universitat Autònoma de Barcelona*, porti@math.uab.cat.

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Thomas Schick, *Professor in the University of Göttingen*, thomas.schick@math.uni-goettingen.de.

Personal informations

Date of birth **05/25/1985**.

Place of birth **Paris**.

Nationality **French**.

Languages, IT skills

French **Native language**.

English **Fluent**.

German **Fluent**.

Spanish **Notions**.

Skills in SageMath, RStudio, Maple.

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