

# Leonardo Patimo

## Curriculum Vitae

Edificio A, Primo piano, Stanza 316

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## Employment

- Feb 2024 - **Ricercatore a Tempo Determinato di tipo B**, *University of Pisa*, Pisa (Italy)  
Tenure-track researcher in Algebra
- June 2018 - **Wissenschaftliche Mitarbeiter**, *University of Freiburg*, Freiburg im Breisgau (Germany)  
Research Assistant of Prof. Wolfgang Soergel
- Jan-May 2018 **Postdoctoral Fellow**, *Mathematical Sciences Research Institute*, Berkeley (USA)  
Semester Program on: Group Representation Theory and Applications

## Other Appointments

- Oct 2020 - **Internal Junior Fellow**, *Freiburg Institute for Advanced Studies (FRIAS)*, Freiburg im Breisgau (Germany), 10 months research fellowship without teaching obligations for outstanding young researcher at the University of Freiburg
- Jul 2021

## Education

- 2014-2018 **Ph.D. in Mathematics**, *Max Planck Institute for Mathematics*, Bonn (Germany)  
Thesis title: *Hodge theoretic aspects of Soergel bimodules and representation theory* (Supervisor: Prof. G. Williamson)
- 2012-2014 **Master's Degree in Mathematics**, *University of Pisa*, Pisa (Italy)
- 2009-2014 **Diploma in Mathematics**, *Scuola Normale Superiore*, Pisa
- 2009-2012 **Bachelor's Degree in Mathematics**, *University of Pisa*, Pisa

## Publications

- 2018 **The Hard Lefschetz Theorem in positive characteristic for the Flag Varieties**, *Int. Math. Res. Not. IMRN 2018*, no. 18, arXiv:1608.04202
- 2018 **The Néron-Severi Lie Algebra of a Soergel Module**, *Transform. Groups 23 (2018)*, no. 4, arXiv:1607.05565
- 2021 **A combinatorial formula for the coefficient of  $q$  in Kazhdan-Lusztig polynomials**, *Int. Math. Res. Not. IMRN 2021*, no. 5, arxiv:1811.08184
- 2022 **Bases of the Intersection Cohomology of Grassmannian Schubert Varieties**, *J. Algebra*, 589:345-400, 2022, arXiv:1908.11606
- 2022 **Pre-canonical bases on affine Hecke algebras**, *Adv. Math.*, 399 (2022), arXiv:2103.06903, joint with N. Libedinsky and D. Plaza

- 2022 **Singular Rouquier Complexes**, *Proc. Lon. Math. Soc.*, 125(6), 2022. 1332–1352., arXiv:1908.10966
- 2023 **On the induction of  $p$ -cells**, *Transform. Groups*, arXiv:1911.08969, joint with L.T. Jensen
- 2023 **On the affine Hecke category for  $SL_3$** , *Selecta Math.*, arXiv:2005.02647, joint with N. Libedinsky
- 2018 **Hodge theoretic aspects of Soergel bimodules and representation theory**, *Rheinischen Friedrich-Wilhelms-Universität Bonn*, Available at <http://hdl.handle.net/20.500.11811/7487>

#### Preprints

- 2021 **Charges via the Affine Grassmannian**, arXiv:2106.06903
- 2023 **Atoms and Charge in type  $C_2$** , joint with J. Torres, arXiv:2303.15560
- 2023 **Demazure operators for double cosets**, joint with B.Elias, H. Ko and N. Libedinsky, arXiv:2307.15021
- 2023 **Subexpressions and the Bruhat order for double cosets**, joint with B.Elias, H. Ko and N. Libedinsky, arXiv:2307.15726
- 2024 **Singular Light Leaves**, joint with B.Elias, H. Ko and N. Libedinsky, arXiv:2401.03053

#### Other contributions

- How to Draw Soergel Bimodules.**, Chapter 12 of the book **Introduction to Soergel bimodules**, by B. Elias, S. Makisumi, U. Thiel and G. Williamson., Vol. 5. RSME Springer, Chapter 12, 239–256, written with S. Shelley-Abrahamson and S. Venkatesh.
- 2018 **Minimal reflections and the coefficient of  $q$  in Kazhdan-Lusztig polynomials**, *Oberwolfach Report 52/2018, 22–23*, Workshop: Enveloping Algebras and Geometric Representation Theory (hybrid meeting).
- 2021 **Charges via the affine Grassmannian**, *Oberwolfach Report 52/2021, 22–23*, Workshop: Enveloping Algebras and Geometric Representation Theory (hybrid meeting).
- 2022 **Geometric Satake and Finkelberg–Mirković**, *Oberwolfach Report 18/2022, 22–23*, Arbeitsgemeinschaft: Geometric Representation Theory.

#### Research Visits

- May '23 **University of Tours**, *Tours, France*, 1 Week
- February '20 **Sydney Mathematical Research Institute**, *Sydney, Australia*, 3 Weeks
- October '19 **Universidad de Chile**, *Santiago, Chile*, 3 Weeks
- Fall '16 **Research Institute for Mathematical Sciences**, *Kyoto, Japan*, 2 Months
- Spring '17 **University of Sydney**, *Sydney, Australia*, 3 Months

#### Selected Invited Talks

- September '23 **XXII congresso UMI, Section "Lie Theory", Pisa (Italy)**, The charge of a representation through the geometry of the affine Grassmannian
- June '23 **ARTIG (Algebras and Representation Theory in Germany) Meeting, University of Stuttgart (Germany)**, Charge, Atoms and Crystals in Representation Theory.
- June '23 **Séminaire SPACE, University of Tours (France)**, Charge, Atoms and Crystals in Representation Theory.
- April '23 **Seminar on Combinatorics and Lie Theory and Topology, Pisa (Italy)**, Charge, Atoms and Crystals in Representation Theory.
- September '22 **INdAM Meeting "Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology", Cortona (Italy)**, Using GKM graphs to construct statistics in representation theory.
- July '22 **AMS-SMF-EMS Joint International Meeting: Special Session on Modular Representation Theory, Grenoble (France)**, Charges and atoms in the affine Grassmannian
- April '22 **Arbeitsgemeinschaft: Geometric Representation Theory, Oberwolfach (Germany)**, The Geometric Satake equivalence and the Finkelberg–Mirkovic conjecture
- November '21 **Workshop: Enveloping Algebras and Geometric Representation Theory, Oberwolfach (Germany)**, Charges via the affine Grassmannian
- July '21 **Conference: IMPANGA 20 "Schubert Varieties", Banach Center, Poland**, Charges via the affine Grassmannian
- July '21 **Oberseminar Darstellungstheorie, University of Bonn**, Charges via the affine Grassmannian
- October '20 **Pure Maths Seminar, University of East Anglia, Norwich (UK)**, Bases of intersection cohomology of Schubert varieties and Kazhdan-Lusztig polynomials
- April '20 **ARTS - Algebra and Representation Theory Seminar, University of Rome "Tor Vergata"**, The quest for bases of the intersection cohomology of Schubert varieties
- February '20 **Algebra Seminar, University of Sydney**, p-hybrid bases of the Hecke algebra
- February '20 **Conference: New Connections in Representation Theory, Mooloolaba (Australia)**, The quest for bases of the intersection cohomology of Schubert varieties
- June '19 **Seminar: Groupes, Représentations et Géométrie, University Paris Diderot, France**, Dyck partitions and the intersection cohomology of Schubert varieties
- May '19 **Forms, Flags, Graphs, and Beyond, University of Ottawa, Canada**, Dyck partitions and the intersection cohomology of Schubert varieties
- April '19 **Algebra Seminar, University of Florence, Italy**, Moment graph and the combinatorics of Kazhdan-Lusztig polynomials
- November '18 **Workshop: Enveloping Algebras and Geometric Representation Theory, Oberwolfach (Germany)**, Minimal reflections and the coefficient of  $q$  in Kazhdan-Lusztig polynomials
- September '18 **Conference: Théorie Géométrique des Représentations, Besse, France**, Moment graphs, Kazhdan-Lusztig polynomials and combinatorics

- May '18 **Algebra Seminar**, *University of Oregon, Eugene, USA*, Moment graphs, Kazhdan-Lusztig polynomials and combinatorics
- April '18 **Group and Representation Theory Seminar**, *MSRI, Berkeley, USA*, Moment graphs, Kazhdan-Lusztig polynomials and combinatorics
- May '17 **Quinto Incontro Combinatoria Sistemi di Radici (Fifth Meeting on Combinatorics of Root Systems)**, *Cortona, Italy*, Some Applications of Hodge Theory in Representation Theory
- April '17 **Pure Mathematics Seminar**, *University of Queensland, Brisbane, Australia*, Hodge Theoretic Properties in Representation Theory
- October '16 **Representation Theory Seminar**, *RIMS Kyoto, Japan*, The Hard Lefschetz Theorem in Positive Characteristic for Flag Varieties

## Teaching

- Sept. '23 **Coxeter Groups and Kazhdan–Lusztig polynomials**, *Minicourse (3h) at the XXIV International Workshop for Young Mathematicians “Representation Theory”, Jagiellonian University of Krakow*
- WS 2022/23 **Analysis I**, *as Assistant*, University of Freiburg
- SS 2022 **Topology**, *as Assistant*, University of Freiburg
- WS 2021/22 **Noncommutative Algebra and Symmetry**, *as Lecturer*, University of Freiburg
- SS 2020 **Lie Groups**, *as Lecturer*, University of Freiburg
- WS 2019/20 **Algebra and Number Theory**, *as Assistant*, University of Freiburg
- SS 2019 **Non-Commutative Algebra and Symmetry**, *as Assistant*, University of Freiburg
- WS 2018/19 **Reflection Groups Seminar**, *as Tutor*, University of Freiburg
- WS 2018/19 **Linear Algebra I**, *as Assistant*, University of Freiburg
- SS 2018 **Sheaf Cohomology II**, *as Tutor*, University of Freiburg
- June 2017 **Summer School on Soergel Bimodules**, *as Teaching Assistant*, MSRI, Berkeley, USA
- WS 2015/16 **Representation Theory II**, *as Wissenschaftliche Hilfskräfte (Tutoring and Exercise Sessions)*, University of Bonn

## Languages

- Italian Mother tongue
- English Fluent
- German Advanced