

# Pablo S. Ocal

## Curriculum Vitae

University of California, Los Angeles  
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🌐 [tensor.cat](https://tensor.cat)

### Employment

- 2024–present **Postdoctoral Scholar**, *Okinawa Institute of Science and Technology*, Japan  
Mentor: Liron Speyer
- 2021–2024 **Assistant Adjunct Professor**, *University of California, Los Angeles*, CA  
Mentor: Paul Balmer

### Visiting Positions

- Summer 2024 **Research Member**, *Quantum Symmetries Reunion*, Simons Laufer Mathematical Sciences Institute
- Fall 2022 **Program Fellow**, *Spectral Methods in Algebra, Geometry, and Topology*, Hausdorff Research Institute for Mathematics
- Spring 2020 **Program Associate**, *Quantum Symmetries*, Mathematical Sciences Research Institute  
Mentors: Cris Negron and Chelsea Walton

### Education

- 2016–2021 **Ph.D., Mathematics**, *Texas A&M University*, TX  
Advisor: Sarah Witherspoon
- 2015–2016 **M.Sc., Mathematics**, *Universite Pierre-et-Marie-Curie (Paris VI)*, France  
Advisor: Bruno Kahn
- 2010–2015 **B.Sc., Mathematics**, *Universitat Autònoma de Barcelona*, Spain  
Advisor: Jaume Aguade Bover
- 2010–2015 **B.Sc., Physics**, *Universitat Autònoma de Barcelona*, Spain  
Advisor: Anna Laromaine

### Publications and Preprints

- 9  $B_\infty$  **structures, monoidal categories, and singularity categories**, with B. Keller  
• Preprint
- 8 **Locally recoverable algebro-geometric codes with multiple recovery sets from projective bundles**, with K. Aguilar, A. Alvarez, R. Ardila, C. Rodriguez Avila, and A. Varilly-Alvarado  
• [arXiv:2409.04201](https://arxiv.org/abs/2409.04201)
- 7 **Universal support for triangulated categories**, with P. Balmer, *C. R. Math. Acad. Sci. Paris*, 2024  
• [arXiv:2308.10815](https://arxiv.org/abs/2308.10815)
- 6 **Symmetric monoidal equivalences of topological quantum field theories in dimension two and Frobenius algebras**, *Proc. Amer. Math. Soc.*, 2024  
• [arXiv:2307.05309](https://arxiv.org/abs/2307.05309)

- 5 **A compositional account of motifs, mechanisms, and dynamics in biochemical regulatory networks**, with R. Aduddell, J. Fairbanks, A. Kumar, E. Patterson, and B. T. Shapiro, *Compositionality*, 2024  
• arXiv:2301.01445
- 4 **A primer on twists in the noncommutative realm focusing on algebra, representation theory, and geometry**, with K. Ueyama and P. Veerapen, *Contemp. Math.*, 2024  
• arXiv:2211.15885
- 3 **A dichotomy between twisted tensor products of bialgebras and Frobenius algebras**, with A. Oswald, *J. Algebra*, 2024  
• arXiv:2211.14754
- 2 **Homotopy liftings and Hochschild cohomology of some twisted tensor products**, with T. Oke and S. Witherspoon, *J. Algebra Appl.*, 2022  
• arXiv:2005.06660
- 1 **Gerstenhaber brackets on Hochschild cohomology of general twisted tensor products**, with T. Karadag, D. McPhate, T. Oke, and S. Witherspoon, *J. Pure Appl. Algebra*, 2021  
• arXiv:1909.02181

## Scholarships and Awards

- 2024–2025 **Team-Up**, Pacific Institute for the Mathematical Sciences  
• Project: Twisted tensor products of Hopf algebras
- 2024–2026 **AIM SQuaRE**, American Institute of Mathematics  
• Project: Locally recoverable codes from the algebraic geometry of projective spaces
- 2024 **US Junior Oberwolfach Fellowship**, Mathematisches Forschungsinstitut Oberwolfach and National Science Foundation
- 2022–2024 **AMS-Simons Travel Grant**, American Mathematical Society and Simons Foundation
- 2022 **Kovalevskaya Grant**, ICM Local Organizing Committee  
International Congress of Mathematicians
- 2022 **AMS-NSF-Simons-ICM Travel Grant**, American Mathematical Society  
International Congress of Mathematicians
- 2021 **Travel Grant**, American Mathematical Society  
Mathematical Congress of the Americas
- 2021 **Virtual Graduate Student Travel Grant**, American Mathematical Society  
Joint Mathematics Meetings
- 2016–2018 **E. R. Keown Fellow in Mathematics**, Texas A&M University
- 2016–2021 **Fulbright Scholarship**, Fulbright Program, Spain
- 2015–2016 **X Becas de Postgrado**, Fundación Mutua Madrileña, Spain
- 2012 **JAЕ Intro**, Instituto de Ciencias Matematicas, Spain  
• Program: Introduction to Ramsey Theory
- 2010 **VII Concurs EIDEA**, Escola Hamelin-Internacional Laie, Spain
- 2010 **Matricula de Honor en Bachillerato**, Universitat Autònoma de Barcelona, Spain
- 2010 **Joves i Ciència**, Imperial College London, United Kingdom  
• Program: London International Youth Science Forum (LIYSF)
- 2010 **Premio Excelencia UIC**, Universitat Internacional de Catalunya, Spain

- 2009 **Joves i Ciència**, Institut de Ciències Fotoniques, Spain  
 • Program: Classic and Quantum Cryptography
- 2008 **Joves i Ciència**, Planes de Son, Spain  
 • Program: Mathematics in Unlikely Places

## Advisees

- 2024–present **Rohan Das**, *PRIMES: Program for Research in Mathematics, Engineering and Science for High School Students*, Massachusetts Institute of Technology
- Summer 2023 **Kyan Agdassi**, Saint Francis High School

## Conference Talks

### 2024

- Mar **A twisted approach to the Balmer spectrum of a Hopf algebra**, *Southeastern Lie Theory Workshop*, University of Virginia
- Jan **Representations of algebras via universal supports**, *Joint Mathematics Meetings*, San Francisco

### 2023

- Aug **A twisted approach to the Balmer spectrum of the stable module category of a Hopf algebra**, *Young Topologists Meeting*, Ecole Polytechnique Federale de Lausanne, Switzerland
- May **A twisted approach to the Balmer spectrum of a Hopf algebra**, *Southeastern Lie Theory Workshop*, North Carolina State University
- May **Rewriting Zhang twists as twisted tensor products**, *AMS Spring Western Sectional Meeting*, California State University, Fresno
- May **A twisted approach to the Balmer spectrum of the stable module category of a Hopf algebra**, *AMS Spring Western Sectional Meeting*, California State University, Fresno

### 2022

- Oct **Towards a relative support theory**, *AMS Fall Western Sectional Meeting*, University of Utah
- Oct **Lattices, the Balmer spectrum, and representations of algebras**, *AMS Fall Western Sectional Meeting*, University of Utah
- Jun **Towards a relative support theory**, *Recent Advances and New Directions in the Interplay of Noncommutative Algebra and Geometry*, University of Washington
- Jun **The relative Künneth theorem or the search for a relative support**, *Homological Commutative Algebra and Related Topics*, Georgia Southern University
- <sup>†</sup>Jan **The relative Künneth theorem in relative Hochschild cohomology**, *Joint Mathematics Meetings*, Seattle, WA

### 2021

- <sup>†</sup>Nov **The Relative Künneth Theorem**, *AMS Fall Southeastern Sectional Meeting*, University of South Alabama
- <sup>†</sup>Oct **The Relative Künneth Theorem**, *AMS Fall Western Sectional Meeting*, University of New Mexico
- <sup>†</sup>Jan **The Gerstenhaber bracket in relative Hochschild cohomology**, *Joint Mathematics Meetings*, Washington, District of Columbia

## 2020

- Aug **Homotopy liftings and Hochschild cohomology of some twisted tensor products**, *Encuentro Virtual de Algebra Homologica*, Universidad de Buenos Aires, Universidad Nacional de Mar del Plata, Universidad Nacional del Sur, Argentina
- †May **On the Gerstenhaber bracket in relative Hochschild cohomology of associative algebras**, *A Zoom Special Session on DG Methods in Commutative Algebra and Representation Theory*, University of Utah
- †May **On the Gerstenhaber bracket in relative Hochschild cohomology of associative algebras**, *AMS Spring Western Sectional Meeting*, California State University, Fresno
- †Apr **Hochschild cohomology of twisted tensor product algebras**, *Graduate Student Topology and Geometry Conference*, Indiana University Bloomington
- †Apr **Hochschild cohomology of twisted tensor products**, *Underrepresented Students in Topology and Algebra Research Symposium*, University of Iowa
- Mar **The Gerstenhaber bracket on relative Hochschild cohomology**, *Southwest Local Algebra Meeting*, Tulane University
- Feb **On the Hochschild cohomology ring of some twisted tensor products of algebras**, *Seattle Noncommutative Algebra Day*, University of Washington

## 2019

- Jul **Hochschild cohomology of twisted tensor product algebras**, *Ragnar's Ramifications in Algebra and Geometry Emerging Workshop*, Fields Institute for Research in Mathematical Sciences, Canada
- Jul **Hochschild cohomology of twisted tensor product algebras**, *Research School on Quantum Symmetries*, Universidad de los Andes, Colombia
- Jun **Hochschild cohomology of twisted tensor product algebras (and brackets for certain quantum complete intersections)**, *Graduate Student Conference in Algebra, Geometry, and Topology*, Temple University
- Apr **Hochschild cohomology of twisted tensor product algebras**, *Texas-Oklahoma Representations and Automorphic Forms*, University of North Texas
- Mar **Hochschild cohomology of twisted tensor product algebras**, *Graduate Student Conference in Geometry and Topology*, University of Illinois at Urbana-Champaign
- Mar **Twisted tensor product algebras and compatibility of the bar resolution**, *Graduate Algebra Symposium*, University of Oklahoma
- Feb **An algebraist's view of the multinomial coefficients**, *Gathering in Graduate Expository Mathematics*, Texas A&M University

## 2018

- Oct **Relative Hochschild cohomology and its Gerstenhaber product**, *Graduate Algebra Symposium*, University of Texas at Arlington
- Apr **Using relative homological algebra in Hochschild cohomology**, *Graduate Algebra Symposium*, University of North Texas
- Mar **Using relative homological algebra in Hochschild cohomology**, *Gathering in Graduate Expository Mathematics*, Texas A&M University

## Selected Seminar Talks

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† Canceled or hosted online due to COVID-19.

## 2024

- Feb **Quantum symmetries via twisted tensor products**, *Representation Theory Seminar*, Okinawa Institute of Science and Technology, Japan

## 2023

- Nov **Quantum symmetries via twisted tensor products and their Balmer spectrum**, *Algebra Seminar*, Indiana University Bloomington
- Oct **Quantum symmetries via twisted tensor products and their Balmer spectrum**, *Algebra Seminar*, University of Southern California
- Feb **A twisted approach to the Balmer spectrum of the stable module category of a Hopf algebra**, *Algebra Seminar*, University of California, San Diego

## 2022

- Nov **Lattices, the Balmer spectrum, and representations of algebras**, *Algebra Seminar*, Uppsala University, Sweden
- Oct **Principles of support varieties for relative Hochschild cohomology**, *Algebra and Representation Theory Seminar*, The University of Oklahoma
- Aug **Lattices, the Balmer spectrum, and representations of algebras**, *3 weeks of Representation Theory in Canterbury*, University of Kent, United Kingdom
- Jul **Lattices, the Balmer spectrum, and representations of algebras**, *Seminario de Algebra Homologica y Hierbas Afines*, Universidad de Buenos Aires, Argentina
- Mar **Stable categories in modular representation theory**, *Algebra Seminar*, University of California, Los Angeles
- Mar **Understanding twisted tensor products through deformations**, *Algebra Seminar*, University of California, Irvine

## 2021

- Jul **The relative Künneth theorem**, *Building Relationships for an Inclusive and Diverse Group of Emerging Students*, University of Utah
- May **Hochschild cohomology of general twisted tensor products**, *Seminario Moduli, Algebra, Anelli*, University of Padua, University of Verona
- Mar **Hochschild cohomology of general twisted tensor products**, *Topology Seminar*, Bilkent University

## 2020

- Nov **Hochschild cohomology of general twisted tensor products**, *Algebra and Combinatorics Seminar*, Texas A&M University
- Nov **Hochschild cohomology of general twisted tensor products**, *Algebra and Algebraic Geometry Seminar*, University of Washington
- Nov **Hochschild cohomology of general twisted tensor products**, *Algebra Seminar*, University of Texas at Arlington
- Nov **Hochschild cohomology of general twisted tensor products**, *Algebra and Geometry Seminar*, Iowa State University
- Nov **Hochschild cohomology of general twisted tensor products**, *Algebra Seminar*, Indiana University Bloomington
- Oct **Hochschild cohomology of general twisted tensor products**, *Representation Theory and Related Topics Seminar*, Northeastern University

- Oct **Hochschild cohomology of general twisted tensor products**, *Lie Theory Seminar*, University of California, Riverside
- Oct **Hochschild cohomology of general twisted tensor products**, *Seminario de Algebra Homologica y Hierbas Afines*, Universidad de Buenos Aires, Argentina
- Oct **Hochschild cohomology of general twisted tensor products**, *Algebra Seminar*, University of Oregon
- Oct **Summary on Lie algebras and their representations**, *Learning Seminar on Topological Quantum Field Theories and Invariants of Low-dimensional Manifolds*, Rice University
- Sep **Hochschild cohomology of general twisted tensor products**, *Algebra and Number Theory Seminar*, Louisiana State University
- Sep **Hochschild cohomology of general twisted tensor products**, *Algebra and Number Theory Seminar*, Texas Tech University
- Aug **The vector space structure of the quantized enveloping algebra**, *Quantum Symmetries Seminar*, Texas A&M University
- Aug **Representations of the special linear Lie algebra of order two**, *Quantum Symmetries Seminar*, Texas A&M University
- Apr **Structures in Hochschild cohomology**, *MSRI Online Seminar*, Mathematical Sciences Research Institute
- <sup>†</sup>Apr **Inner workings of the Hochschild cohomology of some twisted tensor products**, *Algebra and Geometry Seminar*, Iowa State University
- 2019**
- Sep **Functors and multi-functors between semisimple categories**, *Quantum Symmetries Seminar*, Texas A&M University
- 2016**
- Jul **A reading on “Algebraic coherent sheaves” by J.-P. Serre**, *M.Sc. defense*, Universite Pierre-et-Marie-Curie, France
- 2015**
- Jul **Triality: a particularity of  $\text{Spin}(8)$** , *B.Sc. defense*, Universitat Autònoma de Barcelona, Spain

## Professional Service

### Conference Organization

#### **AMS Sectional Meeting**, United States

- Spring Eastern 2024: *Commutative and noncommutative algebra, together at last*
- Spring Eastern 2021: *Hopf algebras, tensor categories, and related homological methods*

#### **Graduate Algebra Symposium**, Texas-Oklahoma

- Spring 2021: University of Oklahoma
- Fall 2020: University of Texas at Arlington
- Spring 2019: University of North Texas
- Fall 2019: Texas A&M University

#### **Gathering in Graduate Expository Mathematics**, Texas A&M University

- Spring 2021
- Fall 2020
- Spring 2019

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<sup>†</sup>Canceled or hosted online due to COVID-19.

## Committees

### **Equity, Diversity and Inclusion**, University of California, Los Angeles

- Member: 2021–2024

### **Math Grad Student Diversity Committee**, Texas A&M University

- 2020–2021: Co-Founder

## Seminar Organization

### **Quantum Symmetries Seminar**, Texas A&M University

- Spring 2021
- Fall 2020
- Fall 2019

### **Student Working Seminar in Algebra and Geometry**, Texas A&M University

- Fall 2020
- Spring 2020
- Fall 2019
- Spring 2019
- Fall 2018

## Directed Reading Programs

### **University of California, Berkeley**

- Spring 2020: Mentor

### **Texas A&M University**

- 2020–2021: Organizer
- Fall 2019: Mentor
- Spring 2019: Mentor

## Student Government

### **AMS Chapter**, Texas A&M University

- 2020–2021: Vice-President
- 2018–2019: Vice-President

### **AWM Chapter Peer Mentoring Program**, Texas A&M University

- 2018–2021: Mentor

### **Fulbright Student Association**, Texas A&M University

- 2017–2018: IT officer and Webmaster

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## Teaching

### University of California, Los Angeles

#### **Instructor**

- Spring 2024: Math 31B (Integration and Infinite Series)
- Winter 2024: Math 31B (Integration and Infinite Series)
- Fall 2023: Math 33A (Linear Algebra and Applications)
- Spring 2023: Math 115A (Linear Algebra)
- Winter 2023: Math 31B (Integration and Infinite Series)
- Summer 2022: Math 31B (Integration and Infinite Series)
- Summer 2022: Math 33A (Linear Algebra and Applications)
- Spring 2022: Math 115A (Linear Algebra)
- Winter 2022: Math 33A (Linear Algebra and Applications)
- Fall 2021: Math 110AH (Algebra (Honors))
- Fall 2021: Math 31B (Integration and Infinite Series)

### Texas A&M University

### **Instructor**

- Summer 2021: Summer Educational Enrichment in Math
- Summer 2020: Math 663 (Algebra Qualifying Exam Preparatory Course)
- Summer 2020: Summer Educational Enrichment in Math
- Fall 2019: Math 141 (Finite Mathematics)
- Summer 2019: Summer Educational Enrichment in Math

### **Graduate Teaching Assistant**

- Fall 2020: Math 152 (Engineering Mathematics II)
- Spring 2019: Math 654 (Algebra II)
- Fall 2018: Math 653 (Algebra I)

### Universitat Autònoma de Barcelona

### **Undergraduate Teaching Assistant**

- Fall 2014: Foundations of Mathematics

### Private Tutor

### **Undergraduate algebra and calculus, high school mathematics and physics**

- 2008–2015

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## **Outreach and Service**

### Programs

#### **Applied Mathematics Mentorship Program**, UCLA Curtis Center for Mathematics & Teaching

- Video series on Black and Latino/a mathematicians for K-12 schools.

#### **California State University Math Summer Bridge Program**, University of California, Los Angeles, and the California State Universities of Long Beach, Los Angeles, Northridge, and San Bernardino

- 2021–2024: Co-Organizer

#### **Matching Mathematicians with Classrooms Nationwide**, American Institute of Mathematics

- 2021–2022: MATCH Fellow

### Panel Discussions and Committees

#### **Undergraduate Math Council Speaker Series**, University of California, Los Angeles

- Winter 2022: Invited speaker

#### **Equity, Diversity and Inclusion Committee**, University of California, Los Angeles

- 2021–2024: Faculty member

#### **First Year Graduate Student Seminar**, Texas A&M University

- Fall 2020: Outreach Opportunities
- Spring 2019: Choosing an Advisor
- Fall 2017: Adjusting to Graduate School

### Math Circles

#### **Bridges to Science (Katy, TX)**

- Summer 2020: Speaker

#### **University of California, Berkeley**

- Spring 2020: Speaker

#### **San Francisco State University**

- Spring 2020: Volunteer



### **Texas A&M University**

- Fall 2020: Speaker
- Fall 2019: Speaker
- Spring 2019: Speaker
- 2016–2021: Volunteer

### Science Contests

#### **Texas Science Olympiad**, Texas A&M University

- Spring 2019: Volunteer

#### **Regional Science Bowl**, Texas A&M University

- Spring 2019: Moderator
- Spring 2018: Scientific Judge
- Spring 2017: Scientific Judge

#### **Junior Science Bowl**, Texas A&M University

- Spring 2018: Moderator

#### **Integral Bee**, Texas A&M University

- Spring 2020: Volunteer
- Spring 2018: Volunteer

#### **Derivative Bee**, Texas A&M University

- Fall 2019: Volunteer
- Fall 2018: Volunteer
- Fall 2017: Volunteer

#### **High School Math Contest**, Texas A&M University

- Fall 2018: Grader
- Fall 2017: Grader
- Fall 2016: Grader

### Science Fairs

#### **Math and Stat Fair**, Texas A&M University

- Spring 2017: Volunteer

#### **1a Semana de la Ciencia de Paris**, Colegio de España (Paris, France)

- Spring 2016: Volunteer

#### **Dissabtes de les Matemàtiques**, Universitat Autònoma de Barcelona

- 2011–2015: Volunteer

### Student Government

#### **Graduate and Professional Student Government**, Texas A&M University

- 2019: Senator
- Spring 2017: Participant