Caterina Consani

Contact and Personal Information

Johns Hopkins University
Department of Mathematics, Krieger Hall, 410-B
3400 N Charles St
Baltimore, MD 21218-2683

cconsan1@jhu.edu
https://www.math.jhu.edu/~kc

Citizenship: United States and Italy

Research Interests

Arithmetic-Noncommutative Geometry, Algebraic Geometry, Number Theory

Academic Appointments

Johns Hopkins University, Baltimore, MD

Professor, July 2008-Present
Associate Professor (tenured), 2005-2008

University of Toronto, Toronto, ON (Canada)

Associate Professor of Mathematics (tenured), 2003-2005
Assistant Professor of Mathematics, 2000-2003

Institute for Advanced Study, Princeton, NJ

Member of the School of Mathematics, 1999-2000
Mentor: Prof. Pierre Deligne

Cambridge University Cambridge (UK)

Research Associate, January-June 1998

Massachusetts Institute of Technology, Cambridge, MA

C.L.E. Moore Instructor, 1996-1999
Mentor: Prof. Alexander Goncharov

Education

The University of Chicago, Chicago, IL

Ph.D., Mathematics, September 1993–June 1996
Advisor: Prof. Spencer Bloch
Thesis: *Double Complexes and Euler L-Factors on Degenerations of Algebraic Varieties*

Universities of Genoa and Turin, Italy

Ph.D., Mathematics, 1988–1993
Advisor: Prof. Claudio Pedrini
Thesis: *Intersection Theories and K-Theory on Singular Varieties*

Scuola Nazionale di Alta Matematica (F. Severi), Italy

Postdoctoral fellow (Rome La Sapienza and U. Florence), October 1986-June 1988

University of Genoa, Italy

A.B. in Mathematics *cum laude*, October 1981-June 1986

Grants (Last 12 years)

PI Simons Foundation, Collaboration Grant for Mathematicians n. 691493, (2020-2025)
Co-PI NSF-DMS-1854546 Special Meetings Grant (2019-2020)
Co-PI NSF-DMS-1701934 Special Meetings Grant (2017-2018)
PI Simons Foundation, Collaboration Grant for Mathematicians n. 353677 (2015-2020)
PI NSF DMS-1069218 (2011-2015)
PI NSF FRG-0652431 (2007-2011)

Current and Pending Support

Simons Foundation, Collaboration Grant for Mathematicians n. 691493
The Absolute Point in Geometry and Algebra $7,000 Annual direct costs (Current Support).

Synergistic Activities (Last 10 years)

Co-Organizer of a Virtual Zoom-Conference at the Fields Institute, Toronto (Canada), September 2021
Cyclic cohomology at 40: achievements and future prospects
Co-Organizer of a Virtual Zoom-Seminar in Noncommutative Geometry, October 2020–Present
Global Noncommutative Geometry Seminar: https://globalncgseminar.org/
Co-Organizer of the 2019 Jami Program at Johns Hopkins U.
Riemann-Roch in characteristic 1 and related topics
Co-Organizer of a Conference in Como, Villa del Grumello (Italy), June 2018
Toposes in Como: https://tcsc.lakecomoschool.org
Co-Organizer of the Conference in honor of A. Connes 70th Birthday, Fundan University, Shanghai (China), May 2017
Section: *Noncommutative Geometry and Number Theory*
Co-Organizer of the Conference in honor of H. Moscovici 70th Birthday, U. of Texas A&M, April-May 2014
Noncommutative Geometry - Festival
Co-Organizer of the 2013 Jami Program at Johns Hopkins U. (in honor of T. Ono)
Number-Theory and Related Topic

Visiting Positions (Last 10 years)

Lagrange Research Center, Paris (France), January 2023
IHES Bures sure l'Yvette (France), March 2022
MFO Oberwolfach (Germany), Several visits 2011-2022
Ohio State University, Columbus OH, Several visits: 2013-2019
Shanghai Center for Mathematical Sciences (China), April-May 2017
IHES, France, November 2015
Hausdorff Center for Mathematics, Bonn (Germany), November 2014

Editorial Work and Reviewer Service

Member of the Editorial Board of the *Journal de Mathématiques de l'Institut de Mathématiques de Jussieu*
Member of the Editorial Board of the *Journal of Noncommutative Geometry*
Member of the Editorial Board of the *Journal of Number Theory*
Member of the Editorial Board of the *Rendiconti Seminario Matematico della Università di Padova*
Co-Editor of the Proceedings of Symposia in Pure Mathematics, AMS (2023)
Cyclic cohomology at 40: achievements and future prospects
Co-Editor of the Proceedings *Advances in Noncommutative Geometry. On the Occasion of Alain Connes' 70th Birthday*, Springer (2019)
Co-Editor of the Proceedings *Proceedings of the 21st JAMI Conference*, Baltimore 2009, JHUP (2012)
Co-Editor of the book *Noncommutative geometry and number theory: where arithmetic meets geometry and physics*, Aspects of Mathematics E 37, Vieweg-Verlag (2006)
Referree Work (selected): NSF, NSERC, Royal Society URF (UK), Math. Rev., Zentralblatt Math., Algebra and Number Theory, Canadian Journal of Mathematics, Journal of Number Theory, Journal of Algebraic Geometry, Journal für die reine und angewandte Mathematik, Americal Journal of Mathematics, Journal of Pure and Applied Algebra, Pacific Journal of Mathematics, etc

Preprints

A. Connes, C. Consani, *Riemann-Roch for* $\overline{\mathrm{Spec}\,\mathbf{Z}}$ (2022) https://arxiv.org/pdf/2205.01391.pdf

Publications

A. Connes, C. Consani, *Cyclic theory and the pericyclic category*, to appear in Proceedings of Symposia in Pure Mathematics, AMS (2023), https://arxiv.org/pdf/2208.08339.pdf
A. Connes, C. Consani, *Hochschild homology, trace map and ζ-cycles*, to appear in Proceedings of Symposia in Pure Mathematics, AMS (2023), https://arxiv.org/pdf/2207.10419.pdf
A. Connes, C. Consani, *Spectral triples and ζ-cycles*, to appear in Enseign. Math. (2023), special volume dedicated to Vaughan Jones, https://arxiv.org/pdf/2106.01715.pdf
A. Connes, C. Consani, *BC-system, absolute cyclotomy and the quantized calculus*, to appear in Enseign. Math. (2023), special volume for Sullivan's 80-th Birthday, https://arxiv.org/abs/2112.08820

A. Connes, C. Consani, *Quasi-inner functions and local factors*, J. Number Theory **226** (2021), 139–167

A. Connes, C. Consani, *Weil positivity and Trace formula: the archimedean place*, Selecta Mathematica (N.S.) **27** 4, (2021), 1–70

A. Connes, C. Consani, *Segal's Gamma rings and universal arithmetic*, The Quarterly Journal of Mathematics, **72** 1-2, (2021), 1–29

A. Connes, C. Consani, *The Scaling Hamiltonian*, J. Operator Theory **85** 1 (2021), 257–276

A. Connes, C. Consani, *On Absolute Algebraic Geometry the affine case*, Advances in Mathematics **390** (2021), 44 pp.

A. Connes, C. Consani, *$\overline{Spec(\mathbf{Z})}$ and the Gromov norm*, Theory and Applications of Categories, **35**, 6, (2020), 155–178.

A. Connes, C. Consani, *The Riemann-Roch strategy, Complex lift of the Scaling Site*, in *Advances in Noncommutative Geometry, On the Occasion of Alain Connes' 70th Birthday*, Chamseddine, A., Consani, C., Higson, N., Khalkhali, M., Moscovici, H., Yu, G. (Eds.), Springer (2019)

A. Connes, C. Consani, *Homological Algebra in Characteristic One*, Higher Structures Journal **3** (2019), 1, 155–247

A. Connes, C. Consani, *Geometry of the Scaling Site*, Selecta Math. (N.S.) **23** (2017) 3, 1803–1850.

A. Connes, C. Consani, *The Scaling Site*, C. R. Math. Acad. Sci. Paris **354** (2016) 1, 1–6

A. Connes, C. Consani, *Absolute Algebra and Segal's Γ-Rings: au Dessou de $\overline{Spec(\mathbf{Z})}$*, J. Number Theory **162** (2016), 518–551

A. Connes, C. Consani, *Geometry of the Arithmetic Site*, Advances in Math. **291** (2016), 274–329

A. Connes, C. Consani, *The Cyclic and Epicyclic Sites*, Rend. Semin. Mat. Univ. Padova **134** (2015), 197–237

A. Connes, C. Consani, *The Arithmetic Site*, C. R. Math. Acad. Sci. Paris **352** (2014), 12, 971–975

A. Connes, C. Consani, *Projective Geometry in Characteristic One and the Epicyclic Category*, Nagoya Math. J. **217** (2015), 95–132

A. Connes, C. Consani, *Cyclic Structures and the Topos of Simplicial Sets*, J. Pure Appl. Algebra **219** (2015), 4, 1211–1235

A. Connes, C. Consani, *Cyclic Homology, Serre's Local Factors and the λ-Operations*, J. K-Theory **14** (2014), 1, 1–45

A. Connes, C. Consani, *The Universal Thickening of the Field of Real Numbers*, in *Advances in the theory of numbers*, Fields Institute Commun., **77**, Fields Inst. Res. Math. Sci., Toronto, ON, (2015), 11–74

A. Connes, C. Consani (Editors), *Noncommutative Geometry, Arithmetic, and Related Topics*, Proceedings of the Twenty-First Meeting of the Japan-U.S. Mathematics Institute, Johns Hopkins University Press (2012)

A. Connes, C. Consani *On the Arithmetic of the BC-System*, J. of Noncommutative Geometry **8** (2014), 3, 873–945

A. Connes, C. Consani *Characteristic One, Entropy and the Absolute Point*, in *Noncommutative geometry, arithmetic, and related topics*, Johns Hopkins Univ. Press, Baltimore, MD, (2011), 75–139

A. Connes, C. Consani *The Hyperring of Adèle Classes*, J. of Number Theory **131** (2011), 2, 159–194

A. Connes, C. Consani *Schemes over $\mathbf{F}_1$ and Zeta Functions*, Compositio Math. **146** 6 (2010), 1383–1415

A. Connes, C. Consani *From Monoids to Hyperstructures: in Search of an Absolute Arithmetic*, in *Casimir force, Casimir operators and the Riemann hypothesis*, Walter de Gruyter, Berlin, (2010), 147–198

A. Connes, C. Consani *On the Notion of Geometry over $\mathbf{F}_1$*, J. of Algebraic Geometry **20** (2011) 3, 525–557

A. Connes, C. Consani, M. Marcolli, *The Weil Proof and the Geometry of the Adèles Class Space*, in *Algebra, arithmetic, and geometry: in honor of Yu. I. Manin*, Vol. I, Progr. Math., **269**, Birkhäuser Boston, Inc., Boston, MA, (2009), 339–405

A. Connes, C. Consani, M. Marcolli, *Fun with $\mathbf{F}_1$*, J. of Number Theory **129** (2009) 6, 1532–1561. **Selected by Elsevier B.V. as "Article of the Future 2011" in Mathematics & Computer Science**

C. Consani, *Noncommutative Geometry and Motives (a quoi Servent les Endomotifs?)* in *Renormalization and Galois theories*, IRMA Lect. Math. Theor. Phys., **15**, Eur. Math. Soc., Zürich, (2009), 1–37

A. Connes, C. Consani, M. Marcolli, *Noncommutative Geometry and Motives: the Thermodynamics of Endomotives*, Advances in Math. **214** (2007) 2, 761–831

C. Consani, M. Marcolli, *Quantum Statistical Mechanics over Function Fields*, J. of Number Theory **123** (2007) 2, 487–528

C. Consani, M. Marcolli, *Archimedean Cohomology Revisited*, in *Noncommutative geometry and number theory*, Aspects Math., **E37**, Friedr. Vieweg, Wiesbaden, (2006), 109–140

C. Consani, M. Marcolli (Editors), *Noncommutative Geometry and Number Theory: Where Arithmetic Meets Geometry and Physics*, Aspects of Mathematics **E37** Vieweg (2006)

C. Consani, C. Faber, *On the Cusp Form Motives in Genus One and Level One*, in *Moduli spaces and arithmetic geometry*, Adv. Stud. Pure Math., **45**, Math. Soc. Japan, Tokyo, (2006), 297–314

C. Consani, M. Marcolli *Non-commutative Geometry, Dynamics and ∞-adic Arakelov Geometry*, Selecta Math. (N.S.) **10** 2 (2004), 167–251

C. Consani, M. Marcolli, *New Perspectives in Arakelov Geometry*, in Number theory, CRM Proc. Lecture Notes, **36**, Amer. Math. Soc., Providence, RI, (2004), 81–102

C. Consani, M. Marcolli *Spectral triples from Mumford Curves*, Int. Math. Res. Notices **36** (2003), 1945–1972

C. Consani, M. Marcolli *Triplets Spectraux en Géometrie d'Arakelov*, C. R. Math. Acad. Sci. Paris **335** 10 (2002), 779–784

C. Consani, M. Kim, *The Picard-Lefschetz Formula and a Conjecture of Kato: the Case of Lefschetz Fibrations*, Math. Res. Letters **9** 5–6 (2002), 621–631

C. Consani, J. Scholten *Arithmetic on a Quintic Threefold*, Internat. J. Math. **12** 8 (2001), 943–972

C. Consani, *The Local Monodromy as a Generalized Algebraic Correspondence*, With an appendix by Spencer Bloch. Documenta Math. **4** (1999), 65–108

C. Consani, *Double Complexes and Euler L–Factors*, Compositio Math. **111** 3 (1998), 323–358

C. Consani, *K–Theory of Blow–ups and Vector Bundles on the Cone over a Surface*, K-Theory **7** 3 (1993), 269–284

C. Consani, *A Moving–Lemma for a Singular Variety and Applications to the Grothendieck Group* $K_0(X)$, in Algebraic K-theory, Commutative algebra, and Algebraic geometry (Santa Margherita Ligure, 1989), Contemp. Math., **126**, Amer. Math. Soc., Providence, RI, (1992), 21–45

Meetings and Seminars (Last 9 years)

Plenary talk at the 51st Canadian Operator Symposium (COSy), University of Western Ontario, May 22–26, 2023

Plenary talk at the Great Plains Operator Theory Symposium (GPOTS), Ohio State University, May 15-19, 2023

Invited research talk at the Universidad Nacional de Colombia (Bogotá, Colombia), December 2021, (Zoom)

Invited research talk at the Fields Institute (Toronto, Canada), September 2021, (Zoom)

Invited research talk at the Yorkshire and Midlands Category Seminar (UK), September 2021, (Zoom)

Colloquium Talk at Western University (London, Canada), December 2020, (Zoom)

Invited research talk at Texas A&M University, September 2019

Invited research talks at Ohio State University, 2014–2019

Invited research talk at the Shanghai Center for Mathematical Sciences (China), May 2017

Plenary Talk at the Conference: *Topos à l'IHES*, November 2015

Invited research talk at the Meeting: *Trimester Program in Noncommutative Geometry and its Applications*, Hausdorff Center for Mathematics (Bonn, Germany), November 2014

Plenary Talk at the XIII Meeting of the Canadian Number Theory Association, Carleton University (Ottawa, Canada), July 2014

Colloquium talk at the University of Washington St. Louis, April 2014

Invited research talk at the Université Paris VII (Paris, France), April 2014

Invited research talk at the Université de Strasbourg (France), January 2014

Students (Last 12 years)

Luqiao Xu Ph.D. student JHU (3rd year) 2020-Present

Sean Owen Ph.D. student JHU (5th year) 2019-Present

Benjamin Diamond Ph.D. student JHU 2016–2017

Thesis title: *Smooth Surfaces in Smooth Fourfolds with Vanishing First Chern Class*

Kalina Mincheva Ph.D. student JHU 2011–2016

Thesis title: *Semiring congruences and tropical geometry*

JaiUng Jun Ph.D. student JHU 2010–2015

Thesis title: *Algebraic geometry over semistructures and hyperstructures in characteristic one*

Jeffrey Tolliver Ph.D. student JHU 2010–2015

Thesis title: *Hyperstructures and idempotent semistructures*

Postdoctoral Fellows (Last 12 years)

Aurélien Sagnier J.J. Sylvester Assistant Professor JHU 2019–2022

Snigdhayan Mahanta J.J. Sylvester Assistant Professor JHU 2008–2010