

David Carchedi

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Research Interests

- Higher Category Theory, and its applications to topology and geometry
- Derived \mathbf{C}^∞ -(super)geometry
- Mathematical Physics / Quantum Field Theory
- Higher Topos Theory
- Étale Homotopy Theory
- Logarithmic geometry
- Motivic homotopy theory
- K-theory (étale, logarithmic...)

Employment

- 2021– Present **Associate Professor**, *George Mason University*, Fairfax, VA, USA.
- 2015–2021 **Assistant Professor**, *George Mason University*, Fairfax, VA, USA.
- 2014–2015 **Postdoc**, *University of British Columbia*, Vancouver, Canada.
- 2011–2014 **Postdoc**, *Max Planck Institute for Mathematics (MPI)*, Bonn, Germany.

Education

- 2007–2011 **Ph.D. in Pure Mathematics**, *Utrecht University*, The Netherlands.
- THESIS
- Categorical Properties of Topological and Differentiable Stacks
- adviser Ieke Moerdijk
- 2006–2007 **Master Class in “Symplectic Geometry and Beyond”**, *Mathematical Research Institute*, The Netherlands.

— THESIS

title *Path Groupoids as an Exponent for Smooth Étendue.*

adviser Ieke Moerdijk

2004–2008 **M.Sc. Pure Mathematics**, *Purdue University*, West Lafayette, IN, USA.

Fall of 2002 **“Math in Moscow” program**, *Independent University of Moscow*, Moscow, Russia.

2000–2004 **B.Sc. Mathematics**, *Worcester Polytechnic Institute*, Worcester, MA, USA.

2000–2004 **B.Sc. Physics**, *Worcester Polytechnic Institute*, Worcester, MA, USA.

— UNDERGRADUATE THESIS (For both majors)

title *Gravitational Fields of Azimuthally Symmetric Bodies in General Relativity*

math adviser Mayer Humi

physics adviser Lok C. Lew Yan Voon

Awarded Grants

- 2025-2025 **NSF Topology**, *Proposal Title: Integration and Geometric Quantization in Derived Differential Geometry*, DMS - 2506074.
- 2018-2021 **NSF Topology**, *Proposal Title: Derived Differential Geometry and Field Theory*, collaborative proposal with Owen Gwilliam, Award 1811864.

Award Nominations

- 2018 **Nominated for 2019 Mason Teaching Excellence Award.**

Publications

- 1) Carchedi, D. Scherotzke S., Sibilla, N., and Talpo, M., *On the profinite homotopy type of log schemes.* *Advances in Mathematics*, Volume 460, January 2025. (56 pages)
- 2) Carchedi, D., Étale homotopy types of higher stacks. *Higher Structures*, Volume 5, Issue 1, 2021, Pages 104–168.
- 3) Carchedi, D., Higher orbifolds and Deligne-Mumford stacks as structured infinity- topoi, *Memoirs of the Amer. Math. Soc.* 264 (2020), no. 1282 (120 pages).

- 4) Carchedi, D. Étale Stacks as Prolongations
Advances in Mathematics, Volume 352, 20 August 2019, Pages 56-132
- 5) Carchedi, D. Scherotzke S., Sibilla, N., and Talpo, M. Kato-Nakayama spaces, infinite root stacks, and the profinite homotopy type of log schemes.
Geometry & Topology, Volume 21, Issue 5, 2017, Pages 3093–3158.
- 6) Carchedi, D. On the homotopy type of higher orbifolds and Haefliger classifying spaces
Advances in Mathematics, Volume 294, 2016, Pages 756–818.
- 7) Carchedi, D. Erratum: “An Étale Space Construction for Stacks”.
Journal of Algebraic and Geometric Topology, Volume 16, Issue 1, 2016, Pages 541–546.
- 8) Carchedi, D. and Roytenberg, D. On Theories of Superalgebras of Differentiable Functions
Theory and Applications of Categories Volume 28, No. 30, 2013, Pages 1022–1098.
- 9) Carchedi, D. An Étale Space Construction for Stacks.
Journal of Algebraic and Geometric Topology, Volume 13, Issue 2, 2013, Pages 831–903.
- 10) Carchedi, D. Compactly Generated Stacks: A Cartesian Closed Theory of Topological Stacks.
Advances in Mathematics, Volume 229, Issue 6, April 1 2012, Pages 3339–3397.

Pre-prints

- 1) Carchedi, D. *Quasi-coherent sheaves and D-modules in Derived Differential Supergeometry* arXiv:2503.14426 (2025) (132 pages)
- 2) Carchedi, D. *Derived Manifolds as Differential Graded Manifolds.* arXiv:2303.11140 (2023) (65 pages)
- 3) Carchedi, D., Steffens, P., *On the Universal Property of Derived Manifolds.* arXiv:1905.06195 (2019) (59 pages)
- 4) Carchedi, D., Elmanto, E., *Relative étale realizations of motivic spaces and Dwyer-Friedlander K-theory of non-commutative schemes.* arXiv:1810.05544 (2018) (81 pages)
- 5) Carchedi, D. and Roytenberg, D. *Homological Algebra for Superalgebras of Differentiable Functions* arXiv:1212.3745 (2012) (62 pages)
- 6) Carchedi, D. *Sheaf Theory for Étale Geometric Stacks* arXiv:1011.6070 (2010) (74 pages)

Refereeing

I have refereed papers for:

- Memoirs of the AMS
- Compositio Mathematica
- Geometry & Topology

- Advances in Mathematics
- Mathematische Zeitschrift
- Kyoto Journal of Mathematics

--- **Reviewing**

I served as a reviewer for:

- the NSF (panel reviewer)
- the NSF (external reviewer)
- French National Research Agency (external reviewer)

--- **Funded Visiting Positions**

Jun. 2025 - **Visiting Scientist**, *Max Planck Institute for Mathematics*,
 Jun. 2026 (on sabbatical).

January **Visiting Professor**, *Institut Mittag-Leffler (IML)*,
 15-25, 2025 *Stockholm*.

August 8-14, **Visiting Professor**, *Kavli Institute for the Physics and*
 2024 *Mathematics of the Universe (IPMU)*, Tokyo.

July 2024 **Visiting Scientist**, *Max Planck Institute for Mathematics*.

Jun.-Aug. **Visiting Scientist**, *Max Planck Institute for Mathematics*.
 2023

August **Visitor**, *Erwin Schrödinger International Institute for Math-*
 5-12, 2022 *ematics and Physics (ESI)*.

June **Visitor**, *Centre de Recherches Mathématiques*.
 1-30, 2022

Jun.-Aug. **Visiting Scientist**, *Max Planck Institute for Mathematics*.
 2021

Jun. 2018 - **Visiting Scientist**, *Max Planck Institute for Mathematics*,
 Jun. 2019 (on sabbatical).

Jun.-Aug. **Visiting Scientist**, *Max Planck Institute for Mathematics*.
 2017

Jun.-Aug. **Visiting Scientist**, *Max Planck Institute for Mathematics*.
 2016

--- **Visiting Scholar Positions**

Jan.- May **Visiting Scholar**, *University of California, Berkeley*.
 2014

Summer **Visiting Scholar (Topology Group)**, *Massachusetts Insti-*
 2013 *tute of Technology*.

Summer 2012 **Visiting Scholar (Topology Group)**, *Massachusetts Institute of Technology*.

Summer 2010 **Visiting Scholar (Topology Group)**, *Massachusetts Institute of Technology*.

Summer 2009 **Visiting Scholar (Topology Group)**, *Massachusetts Institute of Technology*.

Teaching Experience

Spring 2025 George Mason University
Topology for Undergrads
Discrete Math

Fall 2024 George Mason University
Abstract Algebra (undergraduate)

Spring 2024 George Mason University
Quantum Field Theory (Grad)

Fall 2023 George Mason University
Algebraic Geometry for Undergrads
Discrete Math

Spring 2023 George Mason University
Topology for Undergrads
Discrete Math

Fall 2022 George Mason University
Abstract Algebra I (Grad)
Discrete Math

Spring 2022 George Mason University
Abstract Algebra for Undergrads
Discrete Math

Fall 2021 George Mason University
Discrete Math (two sections)

Spring 2021 George Mason University
Topology (graduate)
Intro to Advanced Mathematics

Fall 2020 George Mason University
Homotopy Theory (graduate)

Spring 2020 George Mason University
Discrete Math (two sections)

Fall 2019 George Mason University
Discrete Math

Fall 2019	George Mason University Category Theory (graduate)
Spring 2018	George Mason University Moduli Spaces and Invariant Theory (graduate).
Spring 2018	George Mason University Calculus II.
Fall 2017	George Mason University Calculus II (two sections)
Spring 2017	George Mason University Algebraic Topology (graduate)
Fall 2016	George Mason University Category Theory (graduate)
Spring 2016	George Mason University Topology (graduate)
Fall 2015	George Mason University Abstract Algebra (undergraduate)
Spring 2015	University of British Columbia Calculus II
Spring 2013	University of Bonn. Topos Theory (graduate).
Spring 2013	MPI Taught a mini-course entitled “A Differential Graded Approach to Derived Differential Geometry.”
Utrecht University	Teaching Assistant (TA) for Linear Algebra (Fall 2007, Fall 2010), Vector Calculus (Fall 2007), Differentiable Manifolds (Master course) (Spring 2008), Group Theory (Fall 2008, Fall 2009), Real Analysis (Spring 2009), Multivariable Real Analysis (Spring 2010), Functions and Series (Fall 2010).
GEX Inc.	Content designer for educational mathematics software accompanying college calculus textbooks (Summer 2006)
Purdue University	Teaching Assistant (TA) for Integral Calculus for Engineers (Fall 2005) and Taylor Series for Engineers (Spring 2006)
Norwood High School	Substitute Math Teacher (during undergraduate breaks)

Seminars Organized

Spring 2024 Quantum Field Theory, GMU

Spring 2023–Fall 2023 Higher Gauge Theory seminar, GMU

Spring 2020–Present Primary organizer of TADS seminar , GMU

Fall 2017–Fall 2019 Co-organizer of TADS seminar , GMU

Spring 2012–Summer 2014 Co-organizer of the “Higher Differential Geometry” seminar at the MPI, together with Christian Blohmann and Peter Teichner.

Advising Experience

Fall 2024–Present PhD Supervisor of Ethan Clelland

Fall 2023–Present (Unofficial) postdoc mentor of Casey Blacker

Fall 2022–Spring 2023 Undergraduate thesis adviser for Ethan Clelland

Fall 2021–Present PhD Supervisor of Michael Merkle

Fall 2020–Present PhD Supervisor of Quincy Frias

2018 George Mason University

Organized an undergraduate research project on *The Riemann-Hilbert correspondence* as part of MEGL (Mason’s experimental geometry lab).

2011 Utrecht University

Joint supervision of Camilo Angulo’s master class thesis, together with Ieke Moerdijk.

Professional Service and Outreach

Fall 2023 Research Postdoc hiring committee member

Fall 2021 Tenure track hiring committee member

Fall 2017–Present Primary faculty mentor of GMU’s **Association for Women in Mathematics** (AWM)

Fall 2017–2020 Math department representative on the curriculum committee at GMU

March 2017 Suggested and helped organize the AWM event “Professional Development Event for Aspiring Mathematicians,” GMU

Conference and Workshop Talks

- February 2024 **Invited Speaker**,
“Haefliger structures, orbifolds, topoi, and classifying spaces”
Conference En mémoire d’André Haefliger
University of Geneva, Switzerland
- August 2022 **Invited Speaker**,
“Derived Differential Geometry and Quantum Field Theory”,
Higher Structures and Field Theory
ESI, Vienna, Austria
- June 2022 **Invited Speaker**,
“Derived Differential Geometry and Quantum Field Theory”,
Workshop on Derived Geometry
CRM, Barcelona, Spain
- March 2022 **Invited Speaker**,
“Derived Differential Geometry and Quantum Field Theory”,
Workshop on Supergeometry and Bracket Structures in Mathematics and Physics
Fields Institute, Toronto, Canada
- May 2019 **Invited Speaker**,
“The universal property of derived manifolds”,
Current Directions in Homotopical Algebra
IBS Center for Geometry and Physics, Pohang, Korea
- January 2019 **Invited Speaker**,
“Dg-manifolds and a universal property for derived manifolds”,
Higher Geometric Structures along the Lower Rhine XII
Radboud University Nijmegen, the Netherlands
- May 2018 **Invited Speaker**,
“Galois Equivariant Étale Realization of Motivic Spaces”
Infinity-Categories, Infinity-Operads, and their Applications
Casa Matemática Oaxaca, Mexico (Banff research station)
- September 2017 **Invited Speaker**,
“Galois Equivariant Étale Realization” **Étale and Motivic Homotopy Theory**,
University of Heidelberg, Germany

- July 2017 **Invited Speaker**,
 “Higher Orbifolds as Structured Infinity-Topoi” **Higher Structures Lisbon**,
 Instituto Superior Técnico, Lisbon, Portugal
- June 2016 **Contributed Talk**,
 “Dg-manifolds as derived manifolds. ” **GAP XIV: Graded geometry and applications to physics**,
 University of Sheffield, UK
- June 2016 **Invited Speaker**,
 “Étale homotopy types of higher stacks” **Higher structures in geometry and physics**,
 University of Melbourne, Creswick campus MATRIX center, Australia
- October 2014 **Invited Speaker**,
 “Dg-manifolds as derived manifolds” **Higher Structures in Geometry and Physics 2014**,
 University of Geneva, Switzerland
- October 2014 **Invited Speaker**,

MPI-Oberseminar “Dg-manifolds as derived manifolds” **AMS Western Sectional Meeting, Special Session on Homotopy Theory**,
 San Francisco State University, San Francisco, CA
- March 2014 **Invited Speaker**,
 “A differential graded approach to derived manifolds” **Geometry, Topology and Physics Workshop**,
 University of Pittsburgh, PA, USA
- October 2013 **Invited Speaker**,
 “Dg-supermanifolds as derived supermanifolds” **String Geometry Meeting**,
 MPI, Bonn, Germany
- January 2012 **Invited Speaker**,
 “Sheaf theory for étale stacks”,
Higher Structures Along the Lower Rhine I,
 MPI, Bonn, Germany
- June 2009 **Invited Speaker**,
 “Compactly Generated Stacks”,
Link to Notes: Compactly Generated Stacks, CRCG Workshop - Higher Structures in Topology and Geometry III,
 Göttingen, Germany

- May 2009 “Introduction to Topological Stacks”
“Compactly Generated Stacks”,
Topology in the Swiss Alps,
Le Châtelard, Switzerland
- May 2008 “Lie Groupoids, Smooth Stacks, and Foliation Theory”,
Topology in the Swiss Alps,
Le Châtelard, Switzerland
- April 2008 “Foliations and Mapping Stacks of Groupoids”,
Workshop on Topological and Differentiable Stacks,
CRM, Bellaterra, Spain
- April 2003 “Lie Groups and Quantum Mechanics”
“Representation Theory’s ‘Toughest’ Theorem”,
Hudson River Undergraduate Mathematics Conference,
Union College, NY, USA
- April 2002 “Pythagorean Triplets”,
Hudson River Undergraduate Mathematics Conference,
Hamilton College, NY, USA

Lecture Series

- July - “A Brief Introduction to Derived Differential Geometry”
- August 2023 “Introduction to Derived Differential Geometry II: Dg-manifolds and derived C^∞ -schemes”
“Derived Differential Geometry and Physics, part I”
“Derived Differential Geometry and Physics, part II”
Topology Seminar, MPI

Invited Seminar Talks

- March 2019 “Derived manifolds and field theory.”,
Mathematics and String Theory Seminar, Kavli Institute for the Physics and Mathematics of the Universe, Tokyo
- June 2023 “Derived Manifold as Dg-Manifolds”
Higher Structures in Geometry and Mathematical Physics, Institut Henri Poincaré, Paris
- February 2023 “Introduction to Derived Differential Geometry”
Virtual Homotopy Theory Seminar, UPenn
- June 2021 “Derived Differential Geometry and Quantization”
MPI-Oberseminar

- Dec 2020 “Derived Differential Geometry and Quantization”,
Prague Mathematical Physics Seminar
- March 2019 “What are derived manifolds?”,
Mathematics and String Theory Seminar, Kavli Institute for the Physics and Mathematics of the Universe, Tokyo
- November 2018 “Galois-Equivariant Étale Realization of Motivic spaces and semi-topological K-Theory”,
Topology Seminar, University of Münster
- November 2018 “The Universal Property of Derived Manifolds”,
Department Colloquium, Trinity College, Dublin
- October 2018 “Dg-Manifolds and a Universal Property for Derived Manifolds”,
Topology Seminar, University of Copenhagen
- April 2017 “Dg-manifolds as a model for derived manifolds”,
Topology Seminar, University of Virginia
- December 2016 “Dg-manifolds as a model for derived manifolds”,
Topology Seminar, John Hopkins
- October 2016 “Dg-manifolds as a model for derived manifolds”,
Joint Cornell-PennState Symplectic Seminar, PennState
- September 2016 “A new approach to étale homotopy theory”,
Algebra-Number Theory Seminar, University of Maryland
- July 2016 “A new approach to étale homotopy theory”,
Topology Seminar, University of Osnabrück
- April 2016 “A new approach to étale homotopy theory”,
Topology Seminar, University of Illinois at Urbana-Champaign
- August 2014 “Dg-manifolds as derived manifolds”,
**MPI-Oberseminar
MPI-Oberseminar**
- September 2013 “A Differential Graded Approach to Derived Manifolds”,
Topology Seminar, Massachusetts Institute of Technology
- September 2013 “A Differential Graded Approach to Derived Manifolds”,
Topology Seminar, University of Illinois at Urbana-Champaign
- September 2013 “A Differential Graded Approach to Derived Manifolds”,
Topology Seminar, University of California, Berkeley

- March 2013 “A Differential Graded Approach to Derived Differential Geometry”,
Utrecht University
- April 2012 “Sheaf Theory for Étale Differentiable Stacks and Foliation Theory”,
Sapienza Università di Roma
- September 2010 “Compactly Generated Stacks”,
Massachusetts Institute of Technology
- August 2010 “Compactly Generated Stacks”,
University of Chicago
- July 2010 “Compactly Generated Stacks”,
University of California, Riverside

Other Seminar Talks

- 2018 **Seminar on K-Theory and TC of Henselian Pairs, University of Bonn**
Pseudocoherent functors
- 2018 **Deformation Theory Seminar, MPI**
Proof of Lurie’s main theorem
- 2018 **Topology, Algebra, and Dynamics Seminar, George Mason**
Homotopy types of moduli spaces of foliations
- 2017 **Topology, Algebra, and Dynamics Seminar, George Mason**
Manifolds, Schemes, Deligne-Mumford stacks, and Orbifolds: Why they’re all topoi
- 2016 **Higher Differential Geometry, MPI**
A new approach to étale homotopy theory
- 2015 **Topology, Algebra, and Dynamics Seminar, George Mason**
A new approach to étale homotopy theory
- 2015 **Combinatorics, Algebra, and Geometry Seminar, George Mason**
Differential graded manifolds as a model for derived manifolds
- 2014 **UBC Topology Seminar**
Differentiable Stacks and Foliation Theory Part II
- 2014 **UBC Topology Seminar**
Differentiable Stacks and Foliation Theory Part I
- 2014 **Seminar on Factorization Algebras, UC Berkeley**
The Factorization Condition

- 2013 **Graduate Student Seminar on Higher Categories II, MPI**
The Unicity Theorem for (∞, n) -categories.
- 2013 **Graduate Student Seminar on Higher Categories I, MPI**
The Homotopy Hypothesis.
- Summer 2012 **Higher Differential Geometry Seminar, MPI**
Algebraic Theories and Super C^∞ -rings.
- Spring 2012 **Goodwillie Calculus, University of Bonn**
Homogeneous functors and cross-effects
- 2009-2010 **Model Categories and Higher Topos Theory, Utrecht University**
 - Bergner's model structure on simplicial categories,
 - The covariant model structure and the ∞ -Grothendieck construction,
 - Left-exact localizations and ∞ -topoi
- Spring 2009 **Seminar on Calabi-Yau Geometry and Mirror Symmetry, Utrecht University**
 - A combinatorial model for the canonical bundle of a smooth toric variety,
 - Canonical divisors, complex vector bundles, and the Adjunction Formula
- Spring 2009 **Operads and Iterative Loop Spaces, Utrecht University**
 - Geometric realization of simplicial spaces,
 - Proof of the recognition principle for iterative loop spaces
- Spring 2009 **Higher Operads, Higher Categories, Utrecht University**
 - Multicategories and their algebras,
 - Generalized endomorphism multicategories, free T -multicategories, opetopes, and structured categories.
- Fall 2008 **“Friday Fish” Seminar on Poisson Geometry, Utrecht University**
 - Poisson Structures,
 - Symplectic groupoids and the integration of Poisson Lie algebroids

- Fall 2008 **Stable Homotopy Theory, Utrecht University**
Eilenberg-MacLane spectra, Brown's representation theorem,
 K -theory, and connective spectra
- Spring 2008 **Twisted K -Theory, Utrecht University**
 - Twisted K -theory via bundles of projective space,
 - Calculation of equivariant twisted K -groups of the adjoint action of a simple, connected, simply connected compact Lie Group
- Fall 2007 **Higher Topos Theory, Utrecht University**
The homotopy-coherent nerve and the homotopy category of an ∞ -category.
- Fall 2006 **Lie Groupoids and Algebroids, Utrecht University**
Integration of Lie algebroids

Fellowships

- 2006-2007 Master Class fellowship, MRI
2004-2006 VIGRE fellow, Purdue University

Undergraduate Awards

- 2004 Senior Math Award
2004 Provost MQP (Senior Thesis) Award - Department of Mathematics
2004 Provost MQP Award - Department of Physics
2004 Putnam Exam Award* - Department of Mathematics
2002 Bulletin Board Award - Department of Mathematics

*name published in national ranking of top participants.

Professional Affiliations

- 2001-2004 Pi Mu Epsilon - National Mathematics Honors Society
President of WPI chapter

Miscellaneous

Citizenship: USA

Languages: English: Fluent
French: Verbally fluent, can read/write at a moderate level
Dutch: Conversational
German: Beginner, but learning more.