Christopher Elliott

Contact Details

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Date of Birth	20th Sep, 1987
Nationality	British
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Work Experience

2019–2022	Visiting Assistant Professor, **University of Massachusetts, Amherst**
2016–2019	ERC Postdoctoral Fellow, **Institut des Hautes Études Scientifiques**

Education

2010–2016	PhD, **Northwestern University** Advisors: Kevin Costello and David Nadler Thesis Title: *Gauge Theoretic Aspects of the Geometric Langlands Correspondence.*
2009–2010	MMath (Mathematics Tripos: Part III), **University of Cambridge**, With Distinction. Part III Essay: *D-Modules and Hodge Theory*
2006–2009	BA (hons) (Mathematics), **University of Cambridge**, 1st Class.

Research Visits

2014–2018	**Perimeter Institute** (7 visits, each 1-3 weeks)
Oct–Nov 2017	**MPIM**, Bonn
Oct 2017	**Hausdorff Institute**, Bonn
Nov 2016	**MPIM**, Bonn

Research Interests

I'm interested in mathematical aspects and applications of quantum field theory. In particular

- The construction and classification of (not necessarily topological) twists of classical and quantum field theories, especially using techniques of derived algebraic geometry and homotopical algebra.
- The connection between structures appearing in various versions of the geometric Langlands correspondence and twists of four- and five-dimensional supersymmetric gauge theories.
- The theory of factorization algebras as a model for perturbative quantum field theory.

Papers and Preprints

- *Geometric Langlands Twists of $N = 4$ Supersymmetric Gauge Theory from Derived Algebraic Geometry* (joint with Philsang Yoo), Advances in Theoretical and Mathematical Physics, Vol 22, Number 3, Pages 615–708, 2018, arXiv:1507.03048
- *Asymptotic Freedom in the BV Formalism* (joint with Brian Williams and Philsang Yoo), Journal of Geometry and Physics, Vol 123, Jan 2018, Pages 246–283, arXiv:1702.05973

- *Topological Twists of Supersymmetric Algebras of Observables* (joint with Pavel Safronov), accepted for publication in Communications in Mathematical Physics, arXiv:1805.10806
- *Multiplicative Hitchin Systems and Supersymmetric Gauge Theory* (joint with Vasily Pestun), arXiv:1812.05516
- *A Physical Origin for Singular Support Conditions in Geometric Langlands* (joint with Philsang Yoo), arXiv:1707.01292 (submitted)
- *Abelian Duality for Generalised Maxwell Theories*, arXiv:1402.0890 (submitted)

Invited Lecture Series

Oct 2017 — Hausdorff Institute for Mathematics,
An Algebraic Introduction to Kapustin-Witten Theory

Invited Research Talks

Mar 2019 — MAGIC Seminar, Imperial College London
Supersymmetric Quantum Field Theory and its Twists

Feb 2019 — Geometry and Mathematical Physics Seminar, University of Birmingham
The Multiplicative Hitchin System in Supersymmetric Gauge Theory

Jan 2019 — Colloquium, Rutgers University, Newark
Twisted Classical and Quantum Field Theory

Nov 2018 — Geometry, Symmetry and Physics Seminar, Yale University
The Multiplicative Hitchin System in Supersymmetric Gauge Theory

Nov 2018 — Geometry, Physics, and Representation Theory Seminar, Northeastern University
The Multiplicative Hitchin System in Supersymmetric Gauge Theory

May 2018 — Algebraic Geometry Seminar, IST Austria,
Topological Twists of Supersymmetric Factorization Algebras

Apr 2018 — Edinburgh Geometry Seminar, University of Edinburgh,
The Multiplicative Hitchin System in Supersymmetric Gauge Theory

Dec 2017 — Higher Categories and Mirror Symmetry, KIAS Seoul,
Singular Support Conditions for Coherent Sheaves Coming From Vacua

Oct 2017 — Topology Seminar, MPIM Bonn,
Topological Twists of Factorization Algebras

Jun 2017 — Séminaire Groupes de Lie et Espaces des Modules, Université de Genève,
Vacua and Singular Supports

May 2017 — Mathematical Physics Seminar, Perimeter Institute,
Vacua and Singular Supports

Mar 2017 — Formal Aspects of String Theory Kickoff Meeting, University of Amsterdam,
Algebraic Structures for Kapustin-Witten Twisted Gauge Theories

Feb 2017 — Physical Mathematics Seminar, Universität Heidelberg
Algebraic Structures for Kapustin-Witten Twisted Gauge Theories

Jan 2017 — Quantization and Moduli Spaces, Université du Luxembourg,
Algebraic Structures for Kapustin-Witten Twisted Gauge Theories

Nov 2016 — Algebraic Analysis Seminar, Institut de Mathematiques de Jussieu Paris Rive Gauche,
Algebraic Structures for Kapustin-Witten Twisted Gauge Theories

Nov 2016 — Higher Differential Geometry Seminar, MPIM Bonn,
Algebraic Structures for Kapustin-Witten Twisted Gauge Theories

Dec 2014 — Geometry and Physics Seminar, Boston University
Fourier Duality in Higher Abelian Gauge Theories

Oct 2014 — Homological Methods in Quantum Field Theory, Simons Center
Non-perturbative Descriptions for Twists of Classical Field Theories

May 2014 — Representation Theory, Integrable Systems and Quantum Field Theory, Northwestern University
Fourier Duality in Higher Abelian Gauge Theories

Mar 2014 — MAGIC Seminar, Imperial College London
Fourier Duality in Higher Abelian Gauge Theories

Apr 2013 — GRASP Seminar, UC Berkeley
Abelian Duality for Generalised Maxwell Theories

Contributed and Expository Talks

Jul 2019 — QFT for Mathematicians, Perimeter Institute (teaching assistant)
Supersymmetry Algebras
Yang-Mills Theory and Asymptotic Freedom

Aug 2018 — Higher Algebra and Mathematical Physics, MPIM Bonn
Topological Twists of Supersymmetric Factorization Algebras

Feb 2017 — Introductory Seminar, Universität Heidelberg
An Introduction to the BV Formalism

Jan 2015 — Northwestern Graduate Student Seminar
Representations of the Poincaré Group

Oct 2013 — Northwestern Graduate Student Seminar
The Feynman Path Integral

Mar 2013 — Brownbag Seminar, Northwestern Physics Department
Topological Quantum Field Theory

Oct 2012 — Northwestern Graduate Student Seminar
Dirac Quantisation

Aug 2012 — Categorical Representation Theory Workshop, University of Oregon
TQFTs from Quasicoherent Sheaves on Stacks

Mar 2012 — Simons Center Graduate Workshop in Supersymmetric Gauge Theory
Supersymmetric Lagrangians

Feb 2012 — Northwestern Preseminar for Simons Center Supersymmetric Gauge Theory Workshop
Classical Lagrangian Field Theory

Oct 2011 — Northwestern Graduate Student Seminar
What is Intersection Homology?

May 2011 — MIT Talbot Workshop,
The Non-Abelian Hodge Correspondence for Non-Compact Curves

Apr 2011 — Northwestern Pre-Talbot Seminar
Twistor Space Constructions of Hyper-Kähler Manifolds

Conference Organisation

Jan 2019 — Co-organiser
Non-Local Aspects of Holomorphic and Topological Field Theory, IHÉS

Dec 2014 — Co-organiser
Workshop on Mathematical Aspects of Six-Dimensional Quantum Field Theories, Berkeley

Jan 2012 — Co-organiser
Northwestern Masterclass in Gauge Theory, Northwestern University

Other Organisation

Jan–Mar 2015 — Co-organiser
Learning Seminar on the Nekrasov Partition Function

Jan–Mar 2014 — Co-organiser
Reading Seminar on Geometric Representation Theory

Oct–Nov 2013	Co-organiser *Learning Seminar on String Topology*
Apr–Jun 2013	Co-organiser *Learning Seminar on S-Duality*
Jan–Feb 2012	Organiser *Northwestern Preseminar for Simons Center Supersymmetric Gauge Theory Workshop*

Teaching

2011 – 2015	Northwestern University Teaching Assistant for courses including Introductory Calculus, Multivariate Calculus, Linear Algebra, Group Theory, Fourier Analysis, Graph Theory, Number Theory, and Algebraic Topology.
Aug 2011	Northwestern University Summer Bridge Program Teaching Assistant (Preparatory summer course in precalculus)

Service

Referee for Communications in Number Theory and Physics, Contemporary Math. Reviewer for Math Reviews.

References

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