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Current Position

Post Doc, RTG 1670, University of Hamburg 2012-

Previous Positions

Harry S. Bateman Instructor, Caltech 2009-2012

Education

PhD in Mathematics, Johns Hopkins University 2009

MA Mathematics, Johns Hopkins University 2006

Bachelors of Science Mathematics, MIT 2001
Bachelors of Science Physics, MIT 2001

Papers

"Generalizing the Connes Moscovici Hopf algebra to contain all rooted trees"
(Joint with Colleen Delaney) arXiv:1302.4004

"Dynkin operators, renormalization and the geometric β function"
arXiv:1211.4466
submitted

"Dihedral symmetries of multiple logarithms"
arXiv:1112.1474
Revise and Resubmit from Communications in Number Theory and Physics

"Geometrically relating momentum cut-off and dimensional regularization " (2013)
International Journal of Geometric Methods in Mathematical Physics, Volume 10

"The β-function over curved space-time under ζ-function regularization"
arXiv:0909.4122
Submitted

"A perspective on renormalization" (2009) Letters in Mathematical Physics, Volume 93, Issue 2, pp.187-201

"The geometry of renormalization" PhD Thesis, Johns Hopkins University
`http://its.caltech.edu/~susama/thesis.pdf`

In Preparation

"Geometric aspects of gereralized Dynkin operators"

"Polygons, trees, iterated integrals and a graphical representaion of mixed Tate motives"

"Motives and curved space-time"

Invited Talks

University of Essex
Towards a graphical representation of Motives — February, 14 2013

Bristol University
R-deco polygon relations: Towards a motivic understanding — November 14, 2012

ICMAT Madrid
Interesting Lie elements in algebraic renormalization — October 5, 2012

Renormalization at the confluence of analysis,algebra and geometry
Renormalized QFT: A geometric interpretation — September 18, 2012

IISER Kolkata
Some modern Applications of Combinatorial Hopf Algebras — July 10, 2012

Periods and Motives: A Modern Perspective on Renormalization
Dihedral Symmetries of Multiple logarithms — July 2, 2012

Dyson-Schwinger and Faà di Bruno Hopf Algebras 2011
A geometric relation between regulation schemes:
momentum cutoff an dimensional regularization — June 28, 2011

Northwestern University
Global β-functions under ζ-function regularization — Sept 30, 2010

Geometry and Physics VIII
Global β-functions under ζ-function regularization — Sept 17, 2010

ICM 2010 August 21, 2010
Poster: The β-function over curved space-time under ζ-function regularization

Low dimensional topology and number theory II
Global β-functions under ζ-function regularization March 16, 2010

Hopf in Lux
The Geometry of Renormalization July 17, 2009

CIMAT Summer School: Renormalization, graph polynomials, Hopf algebras and relations with motives
Hopf Algebras V June 24, 2009

CIMAT International Workshop: Algebraic geometry and algebra related to renormalization
The β-function over curved background manifolds July 4, 2009

Boston University Department of Mathematics
Differential Geometry on the Renormalization Bundle October 18, 2007

Boston University Department of Mathematics
Hopf Actions October 17, 2007

University of Pennsylvania Department of Mathematics
Connes Kreimer Hopf algebra - specific example June 15, 2006

Johns Hopkins University Department of Physics and Astronomy
Feynman Diagrams, Hopf Algebra and Birkhoff Decomposition December 9, 2005

Conferences Organized:
Young Researchers' Session
Periods and Motives: A Modern Perspective on Renormalization July 2012

Slow Pitch Talks Sept 2007- May 2008
(In house seminar series organized by and for graduate students)

Honors and Awards:
Clare Booth Luce Fellow 2009-10

Advising:
Undergraduate Independent Research:
Colleen Delaney, "Towards an Expression of the Rankin-Cohen Bracket for a sub-Hopf Algebra of Rooted Trees", arXiv:1302.4004

Meng Ge, "Symmetric Group Action on Multiple Logarithms"
PhD Comittee member:
Dapeng Zhang
Thesis Proposal Committee:
Branimir Cacic, Kevin Teh, Dapeng Zhang

Teaching:
As a TA at Johns Hopkins:
Introduction to Calculus
Calculus I for Engineers
Calculus I for Biology
Calculus II for Biology
Calculus III
Linear Algebra
Differential Equations

On line courses at Johns Hopkins:
Introduction to Calculus
Linear Algebra

At Caltech:
Differential Geometry and Topology I, Point Set Topology
Abstract Algebra II, Rings and Modules
Abstract Algebra III, Field and Galois Theory
Functional Analysis
Algebraic Geometry II, Sheaves and Schemes
Renormalization and Hopf algebras
Motives

Languages:
English, Bengali, Spanish