Matthew Szczesny *February 2013* Curriculum Vitae

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Personal Born in Wroclaw, Poland, on July 14, 1976.
Canadian citizen. US permanent resident.

Education
- **University of Toronto** - B.Sc. (Honors), 1994-1997. Mathematics and Computer Science.
- **University of California at Berkeley** - Ph.D., 1997-2002, under the supervision of Edward Frenkel.

  Thesis: *Algebraic Curves, Twisted Vertex Operators and Prym Varieties.*

Employment
- **Boston University** - Associate Professor, 2011-.
- **Boston University** - Assistant Professor, 2005 - 2011.
- **University of Pennsylvania** - Postdoc, 2002 - 2005.

Grants awarded
- NSA Young Investigators Grant - *Geometric and Algebraic Structures in Conformal and Perturbative Quantum Field Theory*, 2009-2011, $30,000. Sole PI.
- NSF DMS-0401619 - *Orbifold Conformal Field Theory and Algebraic Geometry*, 2004-2008, $96,533. Sole PI.
- Boston University startup grant, 2005-2007, $20,000. Sole PI.

Honors and Awards
- Listed in Who's Who in The World, 2011.
- Recognized as one of the Student Leaders' favorite professor by the Office of Orientation at BU in 2010.
- Dept. of Mathematics and Statistics Commencement speaker 2008.
- University of Pennsylvania, Award for Good Teaching, Math 412, 2004.
- University of Pennsylvania, Award for Good Teaching, Math 371, 2003.
- University of Pennsylvania, Award for Good Teaching, Math 350, 2002.
- National Science and Engineering Research Council of Canada Postdoctoral fellowship 2002-2004 (declined).
- National Science and Engineering Research Council of Canada Julie Payette Graduate Fellowship, 2000 - 2002.

· National Science and Engineering Research Council of Canada Graduate Fellowship, 1998-2000.

· Morrey Prize (UC Berkeley), 1999.

· University of Toronto National Scholarship, 1994-1997.

· Canada Scholarship, 1994-1997.

Refereed Publications

All entries below appear in refereed journals. Authors appear in alphabetical order, and collaborative publications contain equal contributions from each author.

1. Attard A.; Percy J.R.; Szczesny M. *Photometric variability of* P. Cygni: *1985-1993*, Astron. and Astrophys. Suppl. **117** (1996), 255-259.

2. Szczesny M. *Wakimoto modules for twisted affine Lie algebras*, Math. Res. Lett. **9** no. 4 (2002), 433-448.

3. Frenkel E.; Szczesny M. *Twisted modules over vertex algebras on algebraic curves*, Adv. Math. **187** no. 1 (2004), 195-227.

4. Szczesny M. *Orbifold conformal blocks and the stack of pointed G-covers*, J. of Geom. and Phys. **56** no. 9 (2006), 1920-1939.

5. Libgober A.; Szczesny M. *Discrete torsion, orbifold elliptic genera, and the chiral de Rham complex*, Pure and Appl. Math. Quart. **2** no. 4 (2006) (special volume in honor of R. MacPherson), 1217-1236.

6. Cadman C.; Coskun I.; Jabbusch K.; Joyce M.; Kovacs S.; Lieblich M.; Sato F.; Szczesny M.; Zhang J. *A first glimpse at the minimal model program*, Contemp. Math. **Vol 388** 17-42, AMS, 2005.

7. Frenkel E.; Szczesny M. *Chiral de Rham complex and orbifolds*, J. of Alg. Geom., **16** no. 1 (2007), 599-624.

8. Ben-Zvi D.; Heluani R.; Szczesny M. *Supersymmetry of the Chiral de Rham Complex*, Compos. Math. **244** (2008), 503-521.

9. Szczesny M. *On the structure and representations of the Insertion-Elimination Lie algebra*, Lett. Math. Phys. **84** no. 1 (2008), 65-74.

10. Kremnizer K.; Szczesny M. *Feynman graphs, rooted trees, and Ringel-Hall algebras*, Comm. Math. Phys. **289** (2009), no. 2, 561–577.

11. Szczesny M. *Hecke correspondences and Feynman graphs,* Comm. in Number Theory and Phys. **4** no. 1 (2010), 161-186.

12. Szczesny M. *Colored trees and noncommutative symmetric functions,* Electronic Journal of Combinatorics. **17** (2010) N19, 10 pages.

13. Szczesny M. *Incidence Categories,* Journal of Pure and Applied Algebra, **215** no. 4 (2011).

14. Szczesny M. *Representations of quivers over* $\mathbb{F}_1$. Int. Math. Res. Notices (2012) Vol. 2012 no. 10, 2377-2404.

15. Szczesny M. *Pre-Lie algebras and Incidence Categories of Colored Rooted Trees.* Preprint `arXiv:1008.2780`, submitted.

16. Szczesny M. *On the Hall algebra of coherent sheaves on* $\mathbb{P}^1/\mathbb{F}_1$. Journal of Pure and Applied Algebra **216** no. 2 (2012).

17. Szczesny M. *On the Hall algebra of semigroup representations over* $\mathbb{F}_1$. Preprint `arXiv:1204.5395`, to appear in Math. Z.

In preparation

18. Szczesny M. *Coherent sheaves on projective schemes over* $mathbbF_1$.

19. Szczesny M. *On the representation ring of* $< t >$.

20. Kremnizer K.; Szczesny M. *Chiral homology of lattice orbifolds and Prym theta functions.*

21. Szczesny M. *On the central charge of G–modular functors.*

22. Szczesny M. *The stack of twisted equivariant bundles, conformal blocks, and theta functions.*

23. Szczesny M. *On the Hall algebra of coherent sheaves on* $\mathbb{P}^n/\mathbb{F}_1$

24. Deitmar A.; Szczesny M. *Yoneda and derived functor Ext for belian categories.*

25. Deitmar A.; Szczesny M. *Tannakian reconstruction for monoids.*

26. Deitmar A.; Szczesny M. *Monoid cohomology.*

Non-refereed Publications

27. Szczesny M. *Algebraic curves, twisted vertex operators, and Prym varieties,* Ph.D. thesis, Berkeley 2002.

28. Szczesny M. *The geometric Langlands program and physics,* notes, available at:
    `http://www2.math.northwestern.edu/langlands/mtgprtn04.htm`

Conferences   Invited talks at the following conferences ($*$ indicates declined engagements):

· *Mock modular functions, moonshine, and string theory,* August 2013.

· *String theory and arithmetic geometry,* Bristol, September 2012

· *La Theorie Quantique des champs et quelques algebres,* Paris 7, March 2012.

· *Chiral differential operators and quantum field theory,* Northwestern, Aug. 2011.

· *AMS Special Session on Species and Hopf Algebraic Combinatorics*, Cornell, Sep. 2011.
· *Geometry and Strings*, UPenn, June 2011.
· *Langlands-Type Dualities in Quantum Field Theory* - KITP, August 2010.
· *Combinatorial Hopf Algebras* - Austin, TX. June 2010*.
· *The Structure of Local Quantum Fields* - Les Houches, France, June 2010.
· *The Geometry and Arithmetic of Algebraic Varieties* - Fields Institute, Toronto, Canada, Oct. 2009.
· *Renormalization and Number Theory* - IHES, Paris, France, June 2009.
· *Lie Theory and its Applications in Physics* - Varna, Bulgaria, June 2009*.
· *Algebraic and Combinatorial Structures in QFT* - Cargese, Corsica, March 2009*.
· *Number Theory and Physics* - ESI, Vienna, Austria, March 2009.
· *Moduli Spaces and Representation Theory* - UIUC, March 2009.
· *The Chiral de Rham Complex and Geometry* - MPI, Bonn, Germany, June 2008.
· *AMS Special Session - Mathematics Motivated by Physics* - Salt Lake City, Oct. 2006*.
· *Homological Mirror Symmetry* - ESI, Vienna, Austria, June 2006.
· *Vertex Algebras and Related Topics* - ESI, Vienna, Austria, June 2005.
· *Geometry and Physics* - ABC-KLM conference, Gregynog, Wales, October 2004.
· AMS conference - *Algebraic Geometry Special Session* - Houston, May 2004.
· *Tensor Categories and Applications* - ESI, Vienna, Austria, July 2004.
· *Infinite Dimensional Lie algebras* - Fields Institute, Toronto, Canada, July 2003.
· *Motivic Integration, Elliptic Genera, and the Chiral de Rham Complex* - BIRS, Alberta, Canada, June 2003.
· *Vector Bundles on Algebraic Curves* - Luminy, France, June 2002.

Invited visits
· Universite Paris 7, Paris - March - April 2012, (2 months).
· Humboldt University, Berlin - Jan. - Feb. 2012 (2 months).
· Kavli Institute for Theoretical Physics, Santa Barbara - August 2010 (3 weeks).
· Les Houches, France - June 2010 (3 weeks).
· Institut des Hautes Etudes Scientifiques, Bures-Sur-Yvette, France - June 2009 (1 month).
· Institut des Hautes Etudes Scientifiques, Bures-Sur-Yvette, France - July

2006 (1 month).

· Erwin Schrödinger Institut, Vienna, Austria - March 2009 (3 weeks).

· Erwin Schrödinger Institut, Vienna, Austria - August 2007 (declined).

· Erwin Schrödinger Institut, Vienna, Austria - June 2006 (3 weeks).

· Institudo di Matematica Pura e Applicada, Rio De Janeiro, Brazil - January 2006 (3 weeks).

· Research Institute for Mathematical Sciences, Kyoto, Japan - July 2005 (3 weeks).

· The Aspen Center for Physics, July 2004 (3 weeks).

Invited lectures
· **Boston University** - Geometry and Physics Seminar, Sep. 2013
Algebraic geometry and representation theory over $\mathbb{F}_1$

· **Northeastern University** - Quivers Seminar, Oct. 2012.
Hall algebras and representation theory over F_1.

· **Institut Henri Poincare** - Algebra Seminar, March 2012.
Representation theory and Hall algebras over the field with one element.

· **Tubingen University** - Number theory and harmonic analysis seminar, Feb. 2012
Hall algebras of belian (and related) categories.

· **Humboldt University**, Berlin - Mathematical Physics Seminar, Feb. 2012.
Rooted trees, Feynman graphs, Hall algebras, and the field with one element.

· **Brandeis** - Everytopic Seminar, Oct. 2011.
F_1–linear categories and Hall algebras.

· **MIT** Infinite Dimensional Lie algebras Seminar, April 2011.
Representation theory and Hall algebras over F_1.

· **IMPA, Rio de Janeiro** - Algebra Seminar, Feb. 2011.
F_1–linear categories and Hall algebras.

· **University of Texas, Austin** - GRASP Seminar, April 2010.
Incidence categories and quiver varieties over F_1.

· **MIT** - Infinite Dimensional Lie algebras Seminar, March 2010.
Feynman graphs, Hall algebras, and incidence categories.

· **Boston University** - Mathematical Physics Seminar, Oct. 2009.
Hall algebras, incidence categories, and Hecke correspondences.

· **Northeastern University** - GASC Seminar, Nov. 2008.
Algebraic and combinatorial structures in the renormalization of perturbative quantum field theories.

- **Brandeis University** - Everytopic Seminar, Nov. 2008.
  Algebraic and combinatorial structures in the renormalization of perturbative quantum field theories.
- **Boston University** - Mathematical Physics Seminar, Oct. 2008.
  Feynman graphs, rooted trees, and Ringel-Hall algebras.
- **MIT** - Group Actions Seminar ,March 2008.
  Elliptic genera: orbifold and equivariant genera.
- **MIT** - Mathematical Physics Seminar, Oct. 2007.
  An overview of the chiral de Rham complex.
- **Boston University** - Mathematical Physics Seminar, Nov. 2006.
  The geometric Langlands program and conformal field theory.
- **Wroclaw University, Poland** - Discrete Harmonic Analysis Seminar, June 2006. *Vertex algebras and moduli spaces.*
- **Wroclaw University, Poland** - Geometric Group Theory Seminar, June 2006. *Elliptic genera and automorphic forms.*
- **University of Wisconsin** - Algebraic Geometry Seminar, April 2006.
  Supersymmetry in the chiral de Rham complex.
- **IMPA, Brazil** - Algebra Seminar, Jan. 2006.
  Elliptic genera and the chiral de Rham complex.
- **Boston University** - Mathematical Physics Seminar, Nov. 2005.
  Supersymmetry in the chiral de Rham complex.
- **UIC** - Algebraic Geometry Seminar, Oct. 2005.
  The chiral de Rham complex on orbifolds and orbifold elliptic genera.
- **Nagoya University, Japan** - Mathematical Physics Seminar, July 2005.
  The chiral de Rham complex, elliptic genera, and automorphic forms.
- **University of Connecticut** - Colloquium, April 2005.
  The chiral de Rham complex, elliptic genera, and automorphic forms.
- **Johns Hopkins** - Algebraic geometry Seminar, March 2005.
  The chiral de Rham complex and orbifolds.
- **Boston University** - Geometry Serminar, Feb. 2005. *The chiral de Rham complex, orbifolds, and automorphic forms.*
- **University of Waterloo, Canada** - Colloquium, Feb. 2005.
  The chiral de Rham complex, elliptic genera, and automorphic forms.
- **UMass Amherst** - Colloquium, Feb. 2005.
  The chiral de Rham complex, elliptic genera, and automorphic forms.
- **Notre Dame** - Colloquium, January 2005.
  The chiral de Rham complex, elliptic genera, and automorphic forms.
- **University of Ottawa, Canada** - Colloquium, Jan. 2005.
  The chiral de Rham complex, elliptic genera, and automorphic forms.
- **University of Western Ontario, Canada** - Colloquium, Jan. 2005.

The chiral de Rham complex, elliptic genera, and automorphic forms.

· **SUNY Stony Brook** - Geometry and Physics Seminar, Oct. 2004.
The chiral de Rham complex on orbifolds and orbifold cohomology.

· **UIUC** - Algebraic Geometry Seminar, Sept. 2004.
The chiral de Rham complex and orbifolds.

· **Yale University** - Colloquium, March 2004.
The chiral de Rham complex and the sigma model.

· **University of Michigan** - Algebraic Geometry Seminar, March 2004.
The chiral de Rham complex and orbifolds.

· **Boston University** - Geometry Seminar, Feb. 2004.
Orbifold conformal blocks and the stack of admissible G–covers.

· **University of Massachusetts, Amherst** - Representation Theory Seminar, March 2004. *The chiral de Rham complex and orbifold cohomology.*

· **Rutgers University** - Vertex algebra Seminar, Dec. 2003.
Twisted vertex operators on algebraic curves.

· **Columbia University** - Algebraic Geometry Seminar, Oct. 2003.
The chiral de Rham complex on orbifolds and orbifold cohomology.

· **University of Wisconsin, Madison** - Algebraic Geometry Seminar, Sept. 2003. *Orbifold cohomology and the chiral de Rham complex.*

· **UPenn** - Math/Physics Seminar, May 2003.
Elliptic genera and the chiral de Rham complex.

· **UPenn** - Algebra Seminar, Sept. 2002.
Twisted vertex operators on algebraic curves.

· **Berkeley** - Infinite-dimensional Lie Algebras Seminar, April 2002.
Twisted vertex operators on algebraic curves.

· **Berkeley** - Quiver Varieties Seminar, Nov. 2001.
Nakajima's quiver varieties and GIT quotients.

Courses taught

- **Boston University:**

  Graduate Courses:

  · MA 822 - Topics in Geometry - *Elliptic genera and automorphic forms*, Spring 2007.
  · MA 745 - Algebraic Geometry I, Fall 2007, Fall 2011.
  · MA 742 - Representation Theory, Spring 2011.
  · MA 731 - Lie Groups, Fall 2006.
  · MA 727 - Algebraic Topology, Fall 2013.
  · MA 726 - Complex Geometry, Spring 2013.
  · MA 722 - Differential Topology II, Spring 2006.

· MA 721 - Differential Topology I, Fall 2009, Fall 2012.

Undergraduate courses:

· MA 564 - Topology, Spring 2008 and Spring 2009.
· MA 412 - Complex Variables, Summer 2012, 2013.
· MA 242 - Linear Algebra, Fall 2005, Summer 2007, Fall 2008, and Summer 2012, Summer 2013.
· MA 293 - Discrete Mathematics, Fall 2005.
· MA 230 - Honors Multivariable Calculus, Spring 2010.
· MA 225 - Multivariable Calculus, Fall 2010.
· MA 124 - Calculus II, Fall 2013.
· MA 123 - Calculus, Fall 2006, Summer 2007, Fall 2007, Fall 2008, Fall 2009, Fall 2010, Fall 2011, Fall 2012.

- **UPenn:**

  · Graduate topics course: *Vertex algebras and algebraic curves*
  · Graduate abstract algebra II.
  · Advanced linear algebra
  · Calculus for business
  · Vector calculus
  · Abstract algebra II
  · Number theory

Service

- **Boston University:**

  · Director of Graduate Studies, 2012-2014.
  · AMS graduate student chapter faculty advisor 2013-2014.
  · Member of ERC workshop faculty panel, Fall 2013.
  · CAS representative for Provost's Learning Outcome Assessment Committee.
  · Member of APR Committee 2013.
  · Chair of Graduate Academic Affairs Committee 2013-2014.
  · Member of Graduate Academic Affairs Committee, 2012-2013.
  · Member of search committee 2012.
  · Member of two search committees 2011 (postdoc and tenure-track).
  · Member of RULE curriculum development project team, 2010-.
  · Member of search committee 2009.

· Member of GAANN committee 2009, 2012.

· Boston University Graduate Committee, 2005-current

· Boston University Putnam Committee, 2006-current.

· Co-organizer of BU Geometry Seminar 2005-current.

· Organizer of BU graduate complex geometry seminar, 2008-2009.

· Organizer of BU graduate quantum mechanics seminar, 2009-2010.

· Served on qualifying exam committees of Jeehoon Park, Myoungil Kim, Ross Sweet, and Ander Steele, Brandon Ward, Tommy Macaulay.

· Served on thesis committees of Tomoo Matsumura, Fabian Torres-Ardila, Karen Yeats, and Ryota Matsuura.

· Supervised graduate reading course - *The Geometry of Schemes*, for Chan-Ho Kim.

· Supervised graduate reading course - *Vertex Algebras and Algebraic Curves*, for Tomoo Matsumura and Abhijnan Rej.

· Superivsed honors thesis project - *The Representation Theory of Lie Algebras*, for Stephen Cattell.

- **UPenn:**

  · Putnam Examination Committee, 2004-2005;

  · Preliminary Examination Committee, 2004-2005;

  · Advisor for Mathematics Minors, 2002-2005;

  · Graduate Admissions Committee, 2002-2004.

- **Professional**

  – Referee for: JAMS, Duke, Crelle's, Nagoya J. Math, Osaka J. Math, Comm. Math. Phys, TAMS, IMRN, American J. of Math, J. of the Aust. Math. Soc, Comm. in Number Th. and Phys., J. Algebra, Nuclear Phys. B. .

  – Ph.D. defense committee member for Anandam Banerjee (Northeastern), and Zhenbin Luo (Brandeis).

Graduate Students

- Brandon Ward, Ph.D. 2013.

Languages   Polish, Swedish, French, English, Russian