

Curriculum vitae

Hongyu He

ADDRESS:

Dept. of Mathematics
Louisiana State University
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EDUCATION:

- 1998 Massachusetts Institute of Technology, Ph.D. in mathematics.
Thesis Title: Howe's Rank and Dual Pair Correspondence in Semistable Range,
Thesis Adviser: David Vogan.
- 1993 Ohio State University, M.S. in mathematics.

POSITIONS

- 2011– Associate Professor of Mathematics, Louisiana State University
- 2013-2014 Visiting Associate Professor, Yale University
- July–August 2011 Visiting Professor, Tsinghua University
- 2005-2011 Assistant Professor of Mathematics, Louisiana State University
- May–June 2010 Visiting Senior Research Fellow, National University of Singapore
- 1999-2005 Assistant Professor of Mathematics, Georgia State University
- 1998-1999 Assistant Professor of Mathematics, Cornell University

RESEARCH INTERESTS

Representation Theory of Classical Groups,
Geometry and Harmonic Analysis on Homogeneous Spaces,
Mathematical Modeling and Computational Biology.

INSTRUCTIONAL INTERESTS

Mathematical Curriculum for Biological Students
Undergraduate Mathematical Research
K-12 and High School Mathematical Competition

PUBLICATIONS AND PREPRINTS

- [1]. He, H. *An Analytic Compactification of Symplectic Group*, **Journal of Differential Geometry**, Vol. 51, No. 2 (1999), 375-399.
- [2]. Chen, T., He, H. and Church, G. *Modeling Gene Expression with Differential Equations*, **Pacific Symposium on Biocomputing' 99**, World Scientific, 29-40.
- [3]. He, H. *Theta Correspondence in Semistable Range: Construction and Irreducibility*, **Communications in Contemporary Mathematics**, Vol 2, (2000) 255-283.
- [4]. He, H. *Nonvanishing of A Certain Sesquilinear Form in the Theta Correspondence* , **AMS Journal of Representation Theory**, (2001), 437-454.
- [5]. He, H. *Compactification of Classical Groups*, **Communications in Analysis and Geometry**, Vol. 10, No. 4 (2002), 709-740.
- [6]. He, H. *Unitary Representations and Theta Correspondence for Type I Classical Groups*, **Journal of Functional Analysis**, Vol. 199, NO. 1, (2003), 92-121.
- [7]. He, H. *Compositions of Theta Correspondences*, **Advances in Mathematics**, 190 (2005), 225-263.
- [8]. He, H. *Reconstruction and Higher Dimensional Euclidean Geometry*, **Journal of Combin. Theory Ser. B** Vol. 97 Issue 3 (2007) 421-429.
- [9]. He, H. *Functions on Symmetric Spaces and Oscillator Representations*, **Journal of Functional Analysis** Vol. 244 Issue 2 (2007) 536-564.
- [10]. He, H. *Eigenvectors and Reconstruction*, **Electronic Journal of Combinatorics**, Vol 14, No 1, (2007) 1-8.
- [11]. He, H. *Associated Variety and Howe's Rank*, **Pacific Journal of Math**, Vol 237, No 1 (2008) 97-119.
- [12]. He, H. *Bounds on Smooth Matrix Coefficients on L^2 -spaces*, **Selecta Mathematica**. Vol 13, No 3 (2009) 419-433.
- [13]. Kato, N., He, H. and Steger, A. *A systems model of vesicle trafficking in Arabidopsis pollen tubes*, **Plant Physiology** Vol 152 Nov (2009) 590-601.
- [14]. He, H. *Restrictions of Complementary Series of the Universal Covering of the Symplectic Group*, **Journal of Lie Theory**, Vol 20, No 1 (2010) 31-48.
- [15]. He, H. and Kato, N. *Equilibrium Submanifold in a Biological System*, **Discrete and Continuous Dynamical Systems**, Series-S (DCDS-S), special issue on biomathematics: Newly developed applied mathematics and new mathematics arising from biosciences Vol 4 No. 6 (2011) (1429-1441).
- [16]. He, H. *Unitary Representations and Heisenberg Parabolic Subgroup*, **Journal of Lie Theory**, Vol 21 (2011) 847-860.

- [17]. Huang, H. and He, H. *Symmetric Subgroup Actions On Isotropic Grassmannian*, **Journal of Algebra**, Vol 337 (2011) (141-168).
- [18]. He, H. and Hoffman, J. W., *Picard Groups of Siegel Modular 3-Folds and θ -Liftings*, **Journal of Lie Theory**, Vol 22 No 3 (2012) 769-801.
- [19]. Harris, B., He, H., Olafsson, G. *The Continuous Spectrum in Discrete Series Branching Laws*, **International Mathematics Research Notice**, Vol 24 Issue 7, (2013) 1-29.
- [20]. He, H. *Generalized Matrix Coefficients of Unitary Representations*, **Journal of Ramanujan Mathematical Society** Vol 29 Issue 3 (2014) 253-272.
- [21]. He, H. *On Matrix-Valued Square Integrable Positive Definite Functions*, **Monatshefte für Mathematik** Volume 177, Issue 3 (2015) (437-449).
- [22]. Harris, B., He, H. and Olafsson, G. *Wave Front Sets of Reductive Lie Group Representations*, to appear in **Duke Mathematical Journal** (2015).

Other Papers

- [0]. *On the Gan-Gross-Prasad Conjecture for $U(p, q)$* , submitted to **Inventiones Mathematicae** (2015).
- [1]. *Quantum Induction for Classical Groups*.
- [2]. *Unipotent Representation and Quantum Induction* <http://arxiv.org/abs/math/0210372>, 1-86.
- [3]. *Certain Unitary Langlands-Vogan Parameter for Special Orthogonal Groups* (2010) 1-41.
- [4]. *Certain Induced Complementary Series of the Universal Covering of symplectic group* (2008)

Federal Funding

- [1]. *Unitary Representations of Symplectic Groups*, funded by Analysis Program, National Science Foundation, \$105,100, Duration: July 2007-June 2011, Principal Investigator: Hongyu He.
- [2]. *Statistical Methods for Adherence Issues in HIV Prevention Research*, funded by National Institute of Health, \$351,290 (LSU portion), Duration: July 2015-June 2019, Principal Investigator at LSU: Hongyu He

Organizer

- [0]. Co-organizer, (with B. Harris and G. Olafsson), Special Session on Lie groups, American Mathematical Society Central Section Meeting, Lubbock, April 2014.
- [1]. Co-organizer, (with L. Barchini of Oklahoma State), Special Session on Analytic and Geometric Methods in Representation Theory, American Mathematical Society Annual Meeting, New Orleans, Jan 2011.

- [2]. Co-organizer, (with S. Pilyugin of Florida and P. Tian of William and Mary), Special Session on Mathematical Modeling in Biology, American Mathematical Society Southeastern Section Meeting, Baton Rouge, March 2008.
- [3]. Co-organizer, (with Wee-Teck Gan of U.C. San Diego, A. Paul of Western Michigan), Special session on Representation Theory and The Theta Correspondence, American Mathematical Society Annual Meeting, New Orleans, Jan 2007.

Talks and Presentations

- [-8]. *Interlacing relations in representation and matrix theory*, Colloquium, Tulane University, October 2015.
- [-7]. *Reconstruction of Grassmanian*, AMS Southeastern Section Meeting, Oxford, MS, February 2013.
- [-6]. *Mathematical Modeling of Vesicle Trafficking*, MAA-Florida Section Meeting, November 2012.
- [-5]. *Generalization of Godement's Theorem on Positive Definite Functions*, Capital Normal University, Beijing China, August 2011.
- [-4]. *Unitary Representations and Theta Correspondences*, Morningside Institute of mathematics, Chinese Academy of Sciences, July 2011.
- [-3]. *Homogeneous spaces and Unitary Representation*, ChongQing University, ChongQing China, July 2011.
- [-2]. *Unitary Representations and Harmonic Analysis*, Southwest University, ChongQing China, June 2011.
- [-1]. *Certain Unitary Representations of Special Orthogonal Groups in Arthur's packets*, Workshop on Lie Groups, Lie Algebras and their Representations, LSU, Feb 2011.
- [0]. *Uniform Bounds on Smooth Matrix Coefficients on L^2 -spaces*, Workshop in Analysis and Geometry, LSU, January 2011.
- [1]. *Matrix Valued Positive Definite Functions*, **First Joint Meeting of Chinese Mathematical Society and Korean Mathematical Society**, Chong Qing, China, May 2010.
- [2]. *Two Problems Concerning Adjoint Orbits*, **Southwest University**, Chong Qing China, May 2010.
- [3]. *A Generalization of Godement's Theorems*, **Sichuan University**, Chengdu China, May 2010.
- [4]. *Symmetric Group Action on Isotropic Grassmanian*, **American Mathematical Society Central Section Meeting**, Waco TX, Oct 2009.
- [5]. *Certain Complementary Series of the Universal Covering of the Symplectic Group*, **Yale University**, New Haven CT, Dec 2008.

- [6]. *Induced Complementary Series*, **American Mathematical Society Southeastern Section Meeting**, Baton Rouge LA, Mar 2008.
- [7]. *Linear Algebra Method in Reconstruction*, **Robert C. Thompson Meeting-2007**, Auburn AL, Mar 2007.
- [8]. *Certain Complementary Series of the Universal Covering of the Symplectic Group*, **LSU**, Sep 2006.
- [9]. *Geometric Quantization and Nilpotent Orbits*, **Southeastern Louisiana University**, Hammond LA, Oct 2005.
- [10]. *Invariant Tensor Product and Unitary Representations*, **Massachusetts Institute of Technology**, Cambridge, MA, Mar 2005.
- [11]. *Invariant Tensor Product and Unipotent Representations*, Geometric Representation Theory Conference, **University of Arizona**, Tuscon AZ, Mar 2005.
- [12]. *Invariant Tensor Product and Parabolic Induction*, **American Mathematical Society Southeastern Section Meeting**, Western Kentucky University, KY, Mar 2005.
- [13]. *Invariant Tensor Product and Representation Theory*, Karcher Special Lecture, **University of Oklahoma**, Norman OK, Feb 2005.
- [14]. *Tensor Product of Oscillator Representations*, **Louisanna State University**, Baton Rouge LA, Feb 2005.
- [15]. *Invariant Tensor Product and Parabolic Induction*, **Auburn University**, Auburn AL, Jan 2005.
- [16]. *Quantum Induction*, **American Mathematical Society Annual Meeting**, Atlanta GA, Jan 2005.
- [17]. *Reconstruction and Higher Dimensional Geometry*, **Clemson University**, Clemson SC, Sep 2004.
- [18]. *Compactification of the General Linear Group*, **Auburn University**, Auburn LA, Feb 2003.
- [19]. *Introduction to Dual Pairs*, **Georgia Institute of Technology**, Atlanta GA, Nov 2002.
- [20]. *Quantum Induction*, **International Congress of Mathematicians**, Beijing China, Aug 2002.
- [21]. *Some Inequalities on $A \times B$ for Classical Groups*, **American Mathematical Society Southeastern Section Meeting**, Atlanta GA, Mar 2002.
- [22]. *Theta Correspondence and Unipotent Representations*, I,II,III,IV, **University of Georgia**, Athens GA, Fall 2001.
- [23]. *Unitarity for Theta Correspondence*, **First Joint Meeting of American Mathematical Society and Hong Kong Mathematical Society**, Hong Kong, Dec 2000.

- [24]. *Positivity of Godement*, **University of Georgia**, Athens GA, Spring 2000.
- [25]. *Triangular Formula for Lie Groups*, **Sichuan University**, Chengdu China, Nov 1999.
- [26]. *Nonvanishing Theorems for Theta Correspondence*, **American Mathematical Society Eastern Section Meeting**, Providence RI, Fall 1999.
- [27]. *Compactification of Symplectic Group*, **Baylor University**, Waco TX, Mar 1999.
- [28]. *Rank and Associated Variety*, **Cornell University**, Ithaca NY, Mar 1998.
An Analytic Compactification of Symplectic Groups, **Cornell University**, Ithaca NY, Sep 1998.
- [29]. *Associated Variety and N-Spectrum*, **Karcher Colloquim, University of Oklahoma**, Norman OK, Feb 1998.
- [30]. *Abelian Harmonic Analysis I, II*, **MIT Graduate Student Seminar**, 1997.
Flag Variety and Steinberg Variety, **MIT Graduate Student Seminar**, 1996.

Invited Lectures and Courses

- [1]. Summer Course on *Representation Theory of Reductive Groups* (joint with Binyong Sun), Tsinghua University, Beijing China, 2011.
- [2]. Lectures on *Nilpotent Orbits and Unitary Representations*, Workshop on Automorphic Forms and Representations, Morningside Institute of Mathematics, Chinese Academy of Sciences, 2011.

Referee and Reviewer

- 0. Book Review: John Wiley & Sons.
- 1. Book Review: Yale University Press;
- 2. Referee: Journal of Algebra;
- 3. Reviewer: Zentralblatt Math;
- 4. Reviewer: Mathematical Review;
- 5. Referee: Journal of Combinatorial Theory, Series B;
- 6. Referee: Journal of Lie Theory;
- 7. Referee: International Journal of Mathematics and Mathematical Sciences;
- 8. Referee: Applied Mathematics Letter;
- 9. Referee: Linear Algebra and Its Applications;
- 10. Referee: Pacific Symposium on Biocomputing;
- 11. Reviewer: International Multi-Conference on Engineering and Technological Inovation;
- 12. Referee: Central European Journal of Mathematics;
- 13. Referee: Geometric and Functional Analysis.
- 14. Funding Review: Georgia Science Foundation (Europe).
- 15. Referee: Discrete and Continuous Dynamical Systems.

Educational Activities

- [1]. Mentor: Research Science Institute, Washington, D.C. (1996), one Westinghouse Finalist, one Westinghouse Semifinalist.
- [2]. Mentor: Summer Program for Undergraduate Research, MIT (1997 and 1998).
- [3]. Panelists: Governor's Honor's Program, Atlanta Public System, (2001-2004).
- [4]. Quantitative Biology Consortium, Howard Hughes Medical Institute, (2007-2009).
- [5]. Mentor: Delong Meng (USA 2009 IMO Team, Silver Medalist).
- [6]. Curriculum Development: Mathematical Modeling in Cellular Biology (Spring 2010), joint with N. Kato.
- [7]. VIGRE Course: Physics and Group Representation (Fall 2009 & Spring 2010), joint with G. Olafsson.
- [8]. Doctoral Committee: Keng Wiboonton (2009, LSU Math).
 Doctoral Committee: Ryan Glasser (2009, LSU Physics).
 Doctoral Exam Committee: Matt Dawson (2011, LSU Math).
 Doctoral Exam Committee: Adam Cross (2011, LSU Math).
 Doctoral Committee: Maiia J. Bakhova (2011, LSU Math).
 Doctoral Committee: Shata Parajuli (2011, LSU Agricultural Economics).
 Doctoral Exam Committee: Peter Lambert-Cole (2011, LSU Math).
 Doctoral Committee: Vivian Ho (2012, LSU Math).
 Master's Thesis Committee: Matthew Caillet (2012, LSU Math Education).
 Ph. D. Thesis Examiner: Jiajun Ma (2012, National University of Singapore).
 Master's Committee: Dachuan Zhang (2014, LSU Experimental Statistics).
 Ph.D Thesis Committee: Matt Dawson (2014, LSU Math).
 Master Thesis Committee: Renee Dale (2015, LSU Biology)
 Ph.D Thesis Committee: Adam Cross (2015, LSU Math).
- [9]. VIGRE Undergraduate Trainee: Philip Bengé (2009-2010).
 Ph.D Student: Alex Frieden (2009-2011).

College and Departmental Committee

1. LSU: University Senator (Alternate 2007-2009).
2. LSU: Departmental Graduate Committee (2006-2009).
3. LSU: Departmental Undergraduate Studies Committee (2009-).
4. LSU: Admission and Scholarship Committee, College of Basic Sciences (2010-2011).
5. LSU: Department Executive Committee (2010-2011).

Honor and Professional Membership

Sigma-Xi Honor Society,
 American Mathematical Society,
 American Association for the Advancement of Science,
 Gold Medalist—29th International Mathematical Olympiad, Canberra. Australia, 1988.