Chul-hee Lee

School of Mathematics and Physics, University of Queensland
Brisbane St Lucia, QLD 4072, Australia

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Education

B.S. Mathematics, Seoul National University, Aug 2006

Ph.D. Mathematics, University of California, Berkeley (advisor: Richard E. Borcherds), May 2012

Positions

Postdoc, Max-Planck-Institut für Mathematik, Oct 2012-Dec 2013

Postdoc, Department of Mathematical Sciences, Seoul National University, Mar 2014-Aug 2014 (host: Seok-Jin Kang)

Postdoc, School of Mathematics and Physics, University of Queensland, Sep 2014-Present (host: Ole Warnaar)

Research Interests

modular forms and q-hypergeometric series

connections between number theory and mathematical physics

representations of Lie algebras and quantum groups

functional relations in integrable systems (such as Q-systems, T-systems and Y-systems)

computer algebra systems and experimental mathematics

Research Outputs

dissertation

Algebraic structures in modular q-hypergeometric series, Ph.D. dissertation, U.C. Berkeley, (2012)

refereed journal articles

A Note on Nahm's Conjecture in Rank 2 Case (with An Huang), *Communications in Number Theory and Physics* Vol. 4, No. 4 (2010), 609-622

A proof of the KNS conjecture : D_r case, *J. Phys. A: Math. Theor.* Vol. 46, No. 16 (2013), 165201

Nahm's conjecture and Y-systems, *Communications in Number Theory and Physics* Vol. 7, No.1 (2013), 1-14

Linear recurrence relations in Q-systems and difference L-operators, *J. Phys. A: Math. Theor.* Vol. 48, No. 19 (2015), 195201

Positivity and periodicity of Q-systems in the WZW fusion ring, *Advances in Mathematics* Vol. 311 (2017)

preprints

Linear recurrence relations in Q-systems via lattice points in polyhedra, arXiv:1602.02347, *submitted*

computer codes

KR-quasipolynomial, GitHub repository (2017), `https://github.com/chlee-0/KR-quasipolynomial` (supplementary computer code for arXiv:1602.02347)

work in progress

Bounded Littlewood identities for Macdonald-Koornwinder polynomials (with Ole Warnaar)

Honors and Fellowships

Samsung Scholarship, 2006-2010

Conferences and Workshops attended

Workshop on W-algebras, University of Melbourne, Melbourne, Australia, Nov. 28-Dec. 2, 2016

Number Theory Down Under, Newcastle, Australia, Sep. 23-26, 2016

Geometric and categorical representation theory, Mooloolaba, Australia, Dec. 14-18, 2015

The Mathematics of Conformal Field Theory, Australian National University, Canberra, Australia, Jul. 13-17, 2015

Regulators, Mahler measures, and special values of L-functions, Centre de recherches mathématiques, Montreal, Canada, Feb. 16-20, 2015

Infinite Analysis 14 : New Perspectives in Integrable Systems and Representation Theory, University of Tokyo, Tokyo, Japan, Mar. 4-7, 2014

Oberwolfach Seminar: Cluster Algebras and Representation Theory, Oberwolfach, Germany, Oct. 13 -19, 2013

Amplitudes and Periods, Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France, Dec. 3-7, 2012

Joint Introductory Workshop: Cluster Algebras and Commutative Algebra, Mathematical Sciences Research Institute, Berkeley, US, Aug. 27- Sep. 07, 2012

Cluster Algebras and Statistical Physics, Institute for Computational and Experimental Research in Mathematics, Providence, US, Aug. 15-19, 2011

Mock modular forms in combinatorics and arithmetic geometry, American Institute of Mathematics, Palo Alto, US, Mar. 8-12, 2010

Mock theta functions and applications in combinatorics, algebraic geometry, and mathematical physics, Max Planck Institute for Mathematics, Bonn, Germany, May 25-29, 2009

Talks and Presentations

On fusion product of affine integrable representations, Seoul National University, Seoul, Korea, Dec. 27-28, 2016

Nahm's conjecture and representation theory of classical and quantum affine algebras, International Conference for the 70th Anniversary of Korean Mathematical Society, Seoul, Korea, Oct. 23, 2016

Computation in Weyl groups, Seoul National University, Seoul, Korea, Jul. 19, 2016

An IMO problem and Coxeter groups, Korea Institute for Advanced Study, Seoul, Korea, Jun. 22, 2016

Linear recurrence relations in Q-systems, Australian National University, Canberra, Australia, Mar. 15, 2016

Linear recurrence relations in Q-systems via lattices points in polyhedra, IBS Center for Geometry and Physics, Pohang, Korea, Feb. 19, 2016

Linear recurrence relations in Q-systems via lattices points in polyhedra, KAIST, Daejeon, Korea, Feb. 12, 2016

On some properties of solutions of constant Y-systems, Geometric and categorical representation theory conference, Mooloolaba, Australia, Dec. 18, 2015

On dilogarithm identities from conformal field theory, The Mathematics of Conformal Field Theory conference, Australian National University, Canberra, Australia, Jul. 13, 2015

Jacobi's theta function from a representation theoretic viewpoint, Seoul National University, Seoul, Korea, Jun. 11, 2015

On dilogarithm identities from conformal field theory, Centre de Recherches Mathématiques, Montreal, Canada, Feb. 19, 2015

Nahm's conjecture and related algebraic structures, KAIST, Daejeon, Korea, Feb. 20, 2015

Introduction to Mahler measure, Korea Institute for Advanced Study, Seoul, Korea, Feb. 4, 2015

Nahm's conjecture and related algebraic structures, Number Theory Down Under, Newcastle, Australia, Oct. 25, 2014

Kirillov-Reshetikhin modules and the WZW fusion ring, University of Melbourne, Melbourne, Australia, Oct. 10, 2014

Q-systems and the WZW fusion ring, University of Queensland, Brisbane, Australia, Oct. 7, 2014

Linear recurrence relations in Q-systems, Seoul, Korea, Jul. 2, 2014

Introduction to Hecke operators, Seoul National University, Seoul, Korea, Jun. 24, 2014

What is a Coxeter number?, Seoul National University, Seoul, Korea, Jun. 24, 2014

Kirillov-Reshetikhin modules and the WZW fusion ring, RIMS, Kyoto, Japan, May. 10, 2014

Bethe ansatz for beginners, Korea Institute for Advanced Study, Seoul, Korea, Apr. 7, 2014

When Kirillov-Reshetikhin modules meet the fusion ring, Infinite Analysis 14, University of Tokyo, Japan, Mar. 5, 2014

Kirillov-Reshetikhin modules and fusion rings from conformal field theory, Dublin Institute for Advanced Studies, Dublin, Ireland, Sep. 26, 2013

Kirillov-Reshetikhin modules and fusion rings from conformal field theory, Korea Institute for Advanced Study, Seoul, Korea, Jul. 30, 2013

Nahm's conjecture and related algebraic structures I and II, Lecture series on q-series and modular forms, Korea Institute for Advanced Study, Seoul, Korea, Jul. 24-25, 2013

Kirillov-Reshetikhin modules and fusion rings from conformal field theory, Seminar on Algebra, Geometry and Physics, Max-Planck-Institut für Mathematik, Bonn, Germany, Jul. 9, 2013

On the boundary of Q-systems : introduction to the KNS conjecture, Séminaire d'Algèbre, Paris, France, Dec. 3, 2012

Around Nahm's conjecture, Max-Planck-Institut für Mathematik, Bonn, Germany, Nov. 15, 2012

Around Nahm's conjecture, Mathematisches Institut der Universität zu Köln, Germany, Nov. 13, 2012

Solitons and infinite dimensional Lie algebras, Berkeley, US, May. 3, 2011

Nahm's conjecture, Korea Institute for Advanced Study, Seoul, Korea, Jul. 8, 2010

From triangles to automorphic functions, Berkeley, US, Sep. 16, 2008

No-Ghost theorem, Berkeley, US, Mar. 18, 2008

Kac determinant formula, Berkeley, US, Feb. 19, 2008

$e^{\pi\sqrt{163}}$ is an almost-integer, Berkeley, US, Oct. 25, 2007

Teaching Experiences

Graduate Student Instructor at the University of California, Berkeley

GSI (teaching assistant) for courses in Calculus, Multivariable Calculus, Linear algebra and Differential equations, Analytic Geometry and Calculus, 2008-2012

Instructor at the University of Queensland

Math 3306 (Set Theory and Mathematical Logic), Semester 2, 2017

Math 3405 (Differential Geometry), Semester 2, 2017

Math 4304 (Number Theory), Semester 2, 2016