Dr. Martin Raum

Date of Birth	April 9, 1985
Nationality	German
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RESEARCH INTERESTS

Applications of automorphic forms	Siegel and orthogonal modular forms
Real-analytic automorphic forms	Explicit methods for automorphic forms

ACADEMIC POSITIONS

Since Oct. 2016	Associate Professor at Chalmers University of Technology, Gothenburg, Sweden.
Jun. 2015 to Sep. 2016	Senior Lecturer at Chalmers University of Technology, Gothenburg, Sweden.
Sep. 2014 to May 2015	PostDoc at MPI for Mathematics, Bonn, Germany.
Sep. 2012 to Aug. 2014	ETH Fellow at ETH Zurich, Switzerland.
Jun. 2012 to Aug. 2012	PostDoc at MPI for Mathematics, Bonn, Germany.

EDUCATION

Jun. 2012	PhD in Mathematics by University of Bonn. Dual weights in the theory of harmonic Siegel modular forms Magna cum laude. Adviser: Don B. Zagier.
Mar. 2009	Diplom Mathematik at RWTH University Aachen.

ACADEMIC ACTIVITIES

Sep. 2017	Interdisciplinary grant panel at Chalmers University.
2016 to 2017	Organizer of the Chalmers Number Theory and Geometry Seminar.
Since 2010	Referee/Reviewer for Sage, ZentralBlatt, MathSciNet, IMRN, Adv. Math., Res. Math. Sci., J. LMS etc. About 20 reviews per year.
Sep. 2013 to Aug. 2014	Co-Organizer of the ETH Number Theory Seminar.

ORGANIZED EVENTS

Sep. 2017	*Real-Analytic Automorphic Forms.* University of North Texas, Sep. 9 and 10, 2017. Organized jointly with Olav Richter.

May. 2017	*Modular forms are everywhere. Birthday conference for Don Zagier.* MPI for Mathematics, May 22 to May 26, 2017. Organized jointly with Kathrin Bringmann, Michael Griffin, Maxim Kontsevich, Pieter Moree, Ken Ono.
Nov. 2016	*Fifth workshop of the Nordic Number theory Network.* Chalmers Technical University, Nov. 25 and 26, 2016. Organized jointly with Julia Brandes, Dennis Eriksson, Per Salberger, and Amos Turchet.
Aug. 2016	*Workshop in Number Theory and Dynamics.* Chalmers Technical University, Aug. 18 and 19, 2016. Organized jointly with Michael Björklund and Dennis Eriksson.
Dec. 2015	*Third workshop of the Nordic Number theory Network.* Chalmers Technical University, Dec. 4 and 5, 2015. Organized jointly with Dennis Eriksson, Per Salberger, and Amos Turchet.
Aug. 2012	*1st EU-US conference on Automorphic Forms and related topics.* RWTH Aachen University, Jul. 30 to Aug. 10, 2012. Organized jointly with Aloys Krieg, Olav Richter, and Lynne Walling.
Mar. 2010	*AKLS Student Section.* RWTH Aachen University, Mar. 3, 2010.
Spring 2009	*Research Seminar on Borcherds Products.* RWTH Aachen University, Apr. 1, 2009 to Jun. 30, 2009.

AWARDS

Sep. 2014	Participant of the Heidelberg Laureate Forum.
May 2014	Oberwolfach Leibniz Fellow.
Oct. 2009 to Jun. 2012	IMPRS scholarship of the Max Planck Society.
Nov. 2011	Friedrich-Wilhelm-Preis by RWTH Aachen University.
Jun. 2010	Springorum-Denkmünze by RWTH Aachen University.
Oct. 2009	Highest award at the DMV Studierendenkonferenz.
Nov. 2004 to Mar. 2009	Scholarship of the Studienstiftung des deutschen Volkes.
Jun. 2008	Schöneborn-Preis by RWTH Aachen University.
Sep. 2004	Highest award at the federal competition in computer sciences and special award Human-Computer-Interface-Design.

SUCCESSFUL PROPOSALS

Sep. 2016	*Workshop Grant GoCAS.* 30,000SEK. Number Theory Visitor Seminar Fall 2016.
Sep. 2016	*Visiting Scientist Grant GoCAS.* 31,000SEK. Research visit of Yingkun Li.
Jun. 2016	*Interdisciplinary Seed Grant GoCAS.* 292,000SEK. FPGA design methods, with application to pure mathematics.

Jan. 2016	*Conference Grant GoCAS.* 45,000 SEK. Conference on Interactions between Ergodic Theory and Number Theory.
Jan. 2016	*Conference Grant GoCAS.* 25,000 SEK. Fifth Workshop of the Nordic Number theory Network.
Nov. 2015	*Ungar Forskare.* 3,000,000 SEK. Siegel Modular Generating Functions.
Jul. 2015	*Conference Grant GoCAS.* 35,000 SEK. Third Workshop of the Nordic Number theory Network.
Jun. 2012	*ETH Fellowship.* CHF200,000. Project on real analytic Siegel modular forms.
Jan. 2012	*RWTH Aachen Internal Grant.* 6,000€. 1st EU-US conference on Automorphic Forms and related topics.
Dec. 2011	*NSF-Grant DMS-1153219.* $50,000. 1st EU-US conference on Automorphic Forms and related topics.

PhD Students and PostDocs

Sebastián Herrero. Post-doc at Chalmers University of Technology.
Started Dec. 2016.

Jiacheng Xia. PhD student at Chalmers University of Technology.
Co-advised with Dennis Eriksson.
Started Sep. 2016.

Manh Hung Tran. PhD student at Chalmers University of Technology.
Co-advised with Dennis Eriksson. Former adviser was Per Sahlberger.
Started Sep. 2015.

Andreas Freh. PhD student at RWTH Aachen Univerity.
Co-advised with Aloys Krieg.
Gradutate Oct. 2017.
Dimension Formulas for Spaces of Hermitian Modular Forms

Research Publications

On Direct Integration for Mirror Curves of Genus Two and an Almost Mromorphic Siegel Modular Form.
Joint with Albrecht Klemm, Maximilian Poretschkin, and Thorsten Schimannek.
Commun. Number Theory Phys. 10.4 (2016). arXiv 1502.00557 (2015).

Almost holomorphic Poincaré series corresponding to products of harmonic Siegel-Maass forms.
Joint with Kathrin Bringmann and Olav Richter.
Res. Math. Sci. 3.30 (2016). arXiv 1604.05105 (2016).

Harmonic Weak Siegel Maaß Forms I.
Int. Math. Res. Not. (2016). arXiv 1510.03342 (2015).

Products of Vector Valued Eisenstein Series.
Forum Math. Ahead of print (2016). arXiv 1411.3877 (2014).

Harmonic Maaß-Jacobi forms of degree 1 with higher rank indices.
Joint with Charles Conley.
Int. J. Number Theory 12.07 (2016).   arXiv 1012.2897 (2010).

Computing Genus 1 Jacobi Forms.
Math. Comp. 85 (2016) pp. 931–960.   arXiv 1212.1834 (2012).

Spans of special cycles of codimension less than 5.
J. Reine Angew. Math. 718 (2016), pp. 39–57.   arXiv 1302.1451 (2013).

Sturm Bounds for Siegel Modular Forms.
Joint with Olav Richter.
Res. Number Theory (2015) 1.5.   arXiv 1501.07733 (2015).

Kudla's Modularity Conjecture and Formal Fourier-Jacobi Series.
Joint with Jan Hendrik Bruinier.
Forum Math. Pi 3 (2015), 30 pp.   arXiv 1409.4996 (2014).

Formal Fourier Jacobi Expansions and Special Cycles of Codimension Two.
Compos. Math. 151.12 (2015) pp. 2187-2211.   arXiv 1302.0880 (2013).

The Structure of Siegel Modular Forms modulo p and $U(p)$ Congruences.
Joint with Olav Richter.
Math. Res. Lett. 22.3 (2015), pp. 899-928.   arXiv 1312.559 (2013).

Harmonic Maass-Jacobi forms with singularities and a theta-like decomposition.
Joint with Kathrin Bringmann and Olav Richter.
Trans. Amer. Math. Soc. 367.9 (2015), pp. 6647-6670.   arXiv 1207.5600 (2012).

H-Harmonic Maaß-Jacobi Forms of Degree 1: The Analytic Theory of Some Indefinite Theta Series.
Res. Math. Sci. (2015) 2.12.   arXiv 1207.5603 (2012).

Holomorphic projections and Ramanujan's mock theta functions.
Joint with Özlem Imamoğlu and Olav Richter.
Proc. Nat. Acad. Sci. U.S.A. 111.11 (2014), pp. 3961-3967.   arXiv 1306.3919 (2013).

M_{24}-twisted Product Expansions are Siegel Modular Forms.
Commun. Number Theory Phys. 7.3 (2013).   arXiv 1208.3453 (2012).

Mock period functions, sesquiharmonic Maass forms, and non-critical values of L-functions.
Joint with Kathrin Bringmann and Nikolaus Diamantis.
Advances in Math. 233 (2013), pp. 115-134.   arXiv 1107.0573 (2011).

Computing Borcherds Products.
Joint with Dominic Gehre and Judith Kreuzer.
LMS J. Comput. Math. 16 (2013), pp. 200-215.   arXiv 1111.5574 (2011).

The functional equation of the twisted spinor L-function in genus 2.
Joint with Aloys Krieg.
Abh. Math. Semin. Univ. Hambg. 83.1 (2013), pp. 29-52.   arXiv 0907.2767 (2009).

Kohnen's limit process for real-analytic Siegel modular forms.
Joint with Kathrin Bringmann and Olav Richter.
Advances in Math. 231 (2012), pp. 1100-1118.   arXiv 1105.5482 (2011).

How to implement a modular form.
J. Symb. Comp. 46.12 (2011), pp. 1336-1354.   MPI Preprint 582312 (2010).

Hecke algebras related to the unimodular and modular groups over quadratic field extensions and quaternion algebras.
Proc. Amer. Math. Soc. 139.4 (2011), pp. 1321-1331.   arXiv 0907.2766 (2009).

Efficiently generated spaces of classical Siegel modular forms and the Boecherer conjecture.
J. Aust. Math. Soc. 89.3 (2010), pp. 393-405.   arXiv 1002.3883 (2010).

ACCEPTED

Indecomposable Harish-Chandra modules for Jacobi groups.
Accepted for the Proceedings of the Conference on L-Functions and Automorphic Forms in Heidelberg. (2016).

PREPRINTS

Modular forms of virtually real-arithmetic type.
arXiv 1712.03004 (2017).

Zech Representations in GPU-Arrays for Moderately Sized Finite Fields.
(2017).

Indefinite Theta Series on Tetrahedral Cones.
arXiv 1608.08874 (2016).

Hyper-Algebras of Vector-Values Modular Forms.
HAL-01289143 (2016).

HLinear: Exact Dense Linear Algebra in Haskell.
Joint with Alexandru Ghitza.
arXiv 1605.02532 (2016).

Explicit computations of Siegel modular forms of degree two.
Joint with Nathan Ryan and Gonzalo Tornaría.
arXiv 1205.6255 (2012).

Elementary divisor theory for the modular group over quadratic field extensions and quaternion algebras.
arXiv 0907.2762 (2009).

BOOKS

Siegel Modular Forms and Jacobi Forms.
In preparation. Publishing agreement with Springer.

VARIOUS PUBLICATIONS

Harmonic weak Siegel Maass forms.
Oberwolfach Reports.

Analytic properties of some indefinite theta series.
Oberwolfach Reports 2016.3.

Appendix to Pinched hypersurfaces contract to round points by M. Franzen.
arXiv 1502.07908 (2015).

Symmetric Formal Fourier Jacobi Series and Kudla's Conjecture.
Oberwolfach Reports 2014.2.

Dual weights in the theory of harmonic Siegel modular forms.
Ph.D. Thesis, University of Bonn (2012).

Konstanten der Arithmetik: Perioden und ihre Relationen.
Joint with Sven Raum.
Annual report of the Max Planck Society, MPI for Mathematics (2012).

SOFTWARE

QuickTest.jl.
Github, https://github.com/martinra/QuickTest.jl (2016).

HyCu.
Github, https://github.com/martinra/hycu (2016).

HLinear.
Github, https://github.com/martinra/hlinear (2015).

HFlint.
Github, https://github.com/martinra/hflint (2015).

algebraic-structures.
Github, https://github.com/martinra/algebraic-structures (2015).

Contributions to Sage.
Sage Trac Server #19668, #14482, #13531, #11624, #11139, #10987, #10837, #8094, #7474, #6671, #6670, #6669, #5731, #4578.

Genus 1 Jacobi Forms.
Sage Trac Server #16448 (2014).

Computation Jacobi Forms.
Sage Extension in Purple Sage (2012).

Modular Forms Framework.
Sage Extension in Purple Sage (2011).

Computation of Siegel Modular Forms of Genus 2.
Joint with Alex Ghitza, Nathan Ryan, Nils-Peter Skoruppa, and Gonzalo Tornaría.
Sage Extension in Purple Sage (2011).

SELECTED TALKS

Apr. 2016	*Harmonic Weak Siegel Maass Forms*	
	Moduli spaces and Modular forms, Oberwolfach, Germany.	
Mar. 2016	*HLinear: Fast Functional Linear Algebra*	
	Nordic Congress of Mathematicians, Stockholm, Sweden.	
Mar. 2016	*Harmonic Siegel Maass Forms*	
	Nordic Congress of Mathematicians, Stockholm, Sweden.	

Jan. 2016	*Analytic Properties of Some Indefinite Theta Series* Lattices and Applications in Number Theory, Oberwolfach, Germany.
Jun. 2015	*Topological Strings and Jacobi Forms* Arbeitstagung, MPIM Bonn, Germany.
Feb. 2015	*Generating Functions which are Automorphic Forms: Examples and Structure* Motivic invariants related to $K3$ and abelian geometries, Humboldt Universitz Berlin, Germany.
Nov. 2014	*Automatische Konvergenz symmetrischer formaler Fourier-Jacobi-Reihen* Kolloquium, University of Heidelberg, Germany.
Nov. 2014	*Formal Fourier Jacobi expansions* Explicit theory of Jacobi forms and modular forms of several variables, Hakuba, Japan.
Apr. 2014	*Formal Fourier Jacobi Expansions and Kudla's Conjecture* Workshop: ModularForms, MFO, Oberwolfach, Germany.
Mar. 2014	*Modular Generating Functions: A Powerful Device* Millican Colloquium, UNT, Denton, US-TX.
Feb. 2014	*Kudla's modularity conjecture for codimensions up to* 9 Workshop: Arithmetic intersection theory and Shimura varieties, HIM, Bonn, Germany.
Nov. 2013	*Welche Mock-Modulformen können zählen?* Kolloquium, University of Heidelberg, Germany.
Jul. 2013	*Computing Jacobi Forms and Vector Valued Modular Forms* Sage Days: Algorithms in Arithmetic Geometry, Lorenz Center, Leiden, Netherlands.
Jul. 2011	*Mock Eichler-Shimura relations* Arbeitstagung, MPIM, Bonn, Germany.
May 2011	*Computing with modular forms* Explicit theory of automorphic forms, applications and computations, CIRM, Luminy, France.

FURTHER EDUCATION

Aug. 2014	Workshop on gender aspects in higher education.
May 2014	Workshop on communication techniques.
Apr. 2011	Workshop on fund raising.
Dec. 2009	Workshop on human resource management.
Nov. 2008	Workshop on mentoring and motivation skills.
Jul. 2008	Workshop on innovation management.
Mar. 2007	Workshop on teaching skills, eloquence and leadership skills.

FURTHER QUALIFICATION

LANGUAGES	German: native, English: fluent, Swedish: fluent. Other languages at basic to good level.
MATHMATICAL SOFTWARE	Sage, Magma, Maple, Mathematica, LaTeX.
PROGRAMMING	C, C++, Haskell, Julia, Python.