

Christian Krogager Zickert

- CONTACT INFORMATION Department of Mathematics +1 301-405-5072 (office)
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University of Maryland http://math.umd.edu/~zickert
College Park, MD, 20742, USA
- PERSONAL INFORMATION Born October 30, 1980, in Struer, Denmark
- RESEARCH INTERESTS My primary research interest is in low dimensional topology and its interactions with arithmetic and mathematical physics. I am particularly interested in representation varieties, scissors congruence, and Chern-Simons theory.
- EMPLOYMENT **University of Maryland, College Park**
Associate Professor, July 2017 -
Assistant Professor, July 2011 - June 2017
- University of California, Berkeley**
Morrey Assistant Professor, July 2008 - June 2011
• Postdoctoral sponsor: Ian Agol
- Max Planck Institute for Mathematics, Bonn, Germany**
Visiting position, Feb 1 - May 31, 2009
- EDUCATION **Columbia University, New York**
Ph.D. in Mathematics (with distinction), May 2008
• Dissertation title: *Hyperbolic 3-manifolds and the Cheeger-Chern-Simons class*
• Advisor: Walter D. Neumann
- Aarhus University, Denmark**
M.S. in Mathematics, June 2005
• Thesis title: *A dilogarithmic formula for the Cheeger-Chern-Simons class*
• Advisor: Johan L. Dupont
B.S. in Mathematics, June 2002
• Thesis title: *The fundamental group and de Rham cohomology*
• Advisor: Johan L. Dupont

AWARDS AND
GRANTS

NSF grant (PI), *Character varieties and cluster mutations*, DMS-1711405, 2017-2021

NSF grant (PI), *Representations of 3-manifold groups*, DMS-1309088, 2013-2017

NSF grant (PI), *The volume and Chern-Simons invariant in topology and number theory*, DMS-1007054 (DMS-1145374 after relocation), 2010-2013

GEAR conference grant, *Curve-2015*, conference at Institut de Mathématiques de Jussieu, Paris, France, 2015

Rejselegat for Matematikere (Traveling Scholarship for Mathematicians), full scholarship to Columbia University covering tuition, fees and living expenses, 2005-2008

PUBLICATIONS
AND PREPRINTS

C. Zickert, *Polylogarithms, Bloch complexes, and quiver mutations*, submitted, arXiv:1902.03971

J. Cho, S. Yoon, C. Zickert, *On the Hikami-Inoue conjecture*, *Algebr. Geom. Topol.* 20 (2020) 279–301

C. Zickert, *Fock-Goncharov coordinates for rank 2 Lie groups*, *Math. Z.* 294 (2020) 251–286

M. Goerner, C. Zickert, *Triangulation independent Ptolemy varieties*, *Math. Z.* 289 (2018) 663–693

S. Garoufalidis, C. Zickert, *The symplectic properties of the $\mathrm{PGL}(n, \mathbb{C})$ -gluing equations*, *Quantum Topol.* 7 no. 3 (2016) 505–551

C. Zickert, *Ptolemy coordinates, Dehn invariant, and the A -polynomial*, *Math. Z.* 283 (2016) 515–537

S. Garoufalidis, D. Thurston, C. Zickert, *The complex volume of $\mathrm{SL}(n, \mathbb{C})$ -representations of 3-manifolds*, *Duke Math. J.* 164 no. 11 (2015) 2099–2160,

S. Garoufalidis, M. Goerner, C. Zickert, *Gluing equations for $\mathrm{PGL}(n, \mathbb{C})$ -representations of 3-manifolds*, *Algebr. Geom. Topol.* 15 (2015) 565–622

S. Garoufalidis, M. Goerner, C. Zickert, *The Ptolemy field of 3-manifold-representations*, *Algebr. Geom. Topol.* 15 (2015) 371–397

C. Zickert, *The extended Bloch group and algebraic K -theory*, *J. Reine Angew. Math.* 704 (2015) 21–54

C. Zickert, *The volume and Chern-Simons invariant of a representation*, *Duke*

Math. J. 150 no. 3 (2009) 489–532,

S. Goette, C. Zickert, *The extended Bloch group and the Cheeger-Chern-Simons class*, Geom. Topol. 11 (2007) 1623–1635

J. Dupont, C. Zickert, *A dilogarithmic formula for the Cheeger-Chern-Simons class*, Geom. Topol. 10 (2006) 1347–1372

THESIS
SUPERVISION

Ryan Kirk, PhD 2019, now a Teaching Instructor at East Carolina University

Stephen Gilles, PhD 2021 (expected)

Laura Iosip, PhD 2021 (expected)

Zachary Greenberg, PhD 2021 (expected)

Dani Kaufman, PhD 2021 (expected)

Haoran Li, PhD 2023 (expected)

MENTORING

Masters exam advisor (non-thesis option) for Laura Iosip, University of Maryland, 2016

Mentor for Yousheng Shi, University of Maryland, fall 2014

3-manifolds, triangulations and volume computations, REU project for advanced undergraduates, summer 2014

Postdoctoral supervisor for Matthias Goerner, University of Maryland, spring 2012. Matthias is now a software developer at Pixar Animation Studios.

PROFESSIONAL
SERVICE

PhD exam chair for Ryan Kirk, 2019

PhD exam committee member for Robert Maschal (2017), Jean-Philippe Burrelle (2017), Gregory Laun (2016)

Preliminary PhD exam committee member for Jianlong Liu (2019), Charles Daly (2018), Corry Bedwell (2017), Tianyu Ma (2014)

Policy committee member (2017-2018, 2013-2014)

Merit pay committee member 2015

Coorganizer of *Curve-2015*, conference on representations of 3-manifold groups, geometric structures and exact computations, Institut de Mathématique de Jussieu, Paris, France, June 22-26, 2015

Coorganizer of *Second GEAR network retreat*, University of Maryland, March 17-21, 2014

NSF panel service, February, 2015

Organizer of Geometry-Topology seminar, University of Maryland, spring 2014, spring 2012

Coorganizer of Geometry-Topology seminar, University of Maryland, fall 2019, fall 2013, spring 2013, fall 2012

OUTREACH

Organizer of a demonstration on scissors congruence, Maryland day, community outreach event, April 29, 2017

Organizer of a demonstration on scissors congruence, Maryland day, community outreach event, April 30, 2016

Polygons, presentation at Howard County Math Festival, Centennial High School, November 10, 2015

Presentation for first graders on polygons and polyhedra, Takoma Education Campus, May 29, 2015

Organizer of a demonstration on scissors congruence, Maryland day, community outreach event, April 25, 2015

Keynote speaker at *Math night*, Takoma Education Campus, Jan 15, 2015

Polygons, polyhedra and scissors congruence, minicourse for high school teachers, June 23-27, 2014

Organizer of a demonstration on scissors congruence, Maryland day, community outreach event, April 26, 2014

Fun with shapes, presentation at Howard County Math Festival, Centennial High School, January 29, 2014

Organizer of a demonstration on scissors congruence, Maryland day, community outreach event, April 27, 2013

INVITED TALKS

Minicourses

Coordinates on representation varieties, Korea Institute for Advanced Study, Seoul, Korea, August 22-26, 2016, three lectures

Chern-Simons theory and representations of 3-manifold groups, University of Pittsburgh, PA, May 4-6, 2013, three lectures

Triangulations, gluing equations and simplicial Chern-Simons theory, QGM, Aarhus University, Denmark, August 20-21, 2012, three lectures

The extended Bloch group and representations of 3-manifold groups, Seoul National University, South Korea, October 7-9, 2010, three lectures each of two hours length

The extended Bloch group and the Chern-Simons invariant, three lecture mini-course at the workshop *Volume conjecture, invariants and geometry of knots*, Waseda University, Tokyo, Japan, January 14-16, 2010

Hyperbolic manifolds and $\mathrm{PSL}(2, \mathbb{C})$ -representations, Seoul National University, South Korea, July 21-25, 2008, five lectures each of two hours length

INVITED
TALKS

Conferences and workshops

Special session on geometry of representation spaces, AMS joint mathematics meeting, Baltimore convention center, Baltimore, MD, January 19, 2019

Volume conjecture in Tokyo, University of Tokyo, Japan, August 22-24, 2018

Computational problems in low dimensional topology, Okinawa Institute of Science and Technology, Japan, March 12-14, 2018

Low dimensional topology and number theory, Oberwolfach, Germany, August 20-26, 2017

Geometry of groups, surfaces and 3-manifolds, AMS sectional meeting, Rutgers University, New Brunswick, NJ, November 14-15, 2015

Invariants in low dimensional geometry, Gazi University, Ankara, Turkey, August 10-14, 2015

New developments in TQFT, QGM, Aarhus University, Denmark, July 27-31, 2015

Curve-2015, Institut de Mathématiques de Jussieu, Paris, France, June 22-26, 2015

Dynamics on moduli spaces, MSRI, Berkeley, April 13-17, 2015

Differential geometry and mathematical physics, AMS sectional meeting, Dalhousie University, Nova Scotia, Canada, October 18-19, 2014

Low dimensional topology and number theory, Oberwolfach, Germany, August 17-23, 2014

GEAR junior retreat, University of Michigan, Ann Arbor, May 23 - June 1, 2014

Geometric topology in New York, Columbia University, New York, NY, August 12-16, 2013

Quantum topology and hyperbolic geometry, Nha Trang, Vietnam, May 13-17, 2013

Teichmüller theory: Quantization and relations with physics, ESI, Vienna, Austria, April 15-19, 2013

Algebraic and geometric structures on 3-manifolds, AMS sectional meeting, Boston College, Chestnut Hill, MA, April 6-7, 2013

Low dimensional topology and number theory, Oberwolfach, Germany, August 26 - September 1, 2012

Progress in low dimensional topology: Teichmüller theory and 3-manifold groups, QGM, Aarhus University, Denmark, August 11-14, 2012

Faces of geometry: 3-manifolds, groups and singularities, conference in honor of Walter Neumann, Columbia University, New York, NY, June 6-10, 2011

Ahlfors-Bers colloquium, Rice University, Houston, TX, March 24-27, 2011

Low dimensional topology and number theory, Oberwolfach, Germany, August 15-21, 2010

Quantum dilogarithm and quantum Teichmüller theory, Aarhus University, Denmark, August 9-13, 2010

Quantum geometry and topology, CIRM, Luminy, France, July 5-9, 2010

Special session on invariants of knots, links, and 3-manifolds, AMS sectional meeting, New Jersey Institute of Technology, Newark, NJ, May 22-23, 2010

Volume conjecture, invariants and geometry of knots, Waseda University, Tokyo, Japan, January 14-16, 2010, three lecture minicourse (see above)

Interactions between hyperbolic geometry, quantum topology and number theory, Columbia University, New York, NY, June 3-19, 2009

Low dimensional topology and number theory, BIRS, Banff, Canada, October 21-26, 2007

A second time around the volume conjecture, Louisiana State University, Baton Rouge, LA, May 30 - June 3, 2007

Around the volume conjecture, Columbia University, New York, NY, March 13-19, 2006

Mahler measure in Mobile, University of South Alabama, Mobile, AL, January 5-8, 2006

INVITED
TALKS

Colloquia

Thurston's gluing equations for $\mathrm{PGL}(n, \mathbb{C})$, Howard University, Washington, DC, November 9, 2012

The volume and Chern-Simons invariant of a hyperbolic manifold, Boston College, MA, March 27, 2008

INVITED
TALKS

Department seminars

University of Maryland, College Park, MD, April 1, 2019

University of Maryland, College Park, MD, Feb 25, 2019

University of Maryland, College Park, MD, May 8, 2017

Copenhagen University, Denmark, July 12, 2016

Aarhus University, Denmark, June 27, 2016

Georgia Institute of Technology, Atlanta, GA, June 6, 2016

Columbia University, New York, NY, November 20, 2015

Georgia Institute of Technology, Atlanta, GA, October 26, 2015

George Mason University, Fairfax, Virginia, VA, October 9, 2015

Pohang University of Science and Technology, Pohang, Korea, September 21, 2015

Stanford University, Palo Alto, November 14, 2014

University of Maryland, College Park, MD, October 27, 2014

Georgia Institute of Technology, Atlanta, GA, April 11, 2014

Institut de Mathématiques de Jussieu, Paris, France, January 8, 2014

Georgia Institute of Technology, Atlanta, GA, March 18, 2013

Rutgers University, New Brunswick, NJ, January 22, 2013

Columbia University, New York, NY, October 12, 2012

University of Maryland, College Park, MD, April 9, 2012

Copenhagen University, Denmark, March 20, 2012

Brown University, Providence, RI, February 29, 2012

Georgia Institute of Technology, Atlanta, GA, February 24, 2012

Cornell University, Ithaca, NY, October 18, 2011

University of Maryland, College Park, MD, October 3, 2011

University of Maryland, College Park, MD, September 26, 2011

University of California, Berkeley, CA, February 02, 2011

University of Maryland, College Park, MD, January 31, 2011

Boston College, MA, January 20, 2011

University of Texas, Austin, TX, December 7, 2010

University of California, Davis, CA, October 13, 2010

Waseda University, Tokyo, Japan, October 5, 2010

Stanford University, Palo Alto, CA, September 28, 2010

Copenhagen University, Denmark, July 20, 2010

Stanford University, Palo Alto, CA, October 6, 2009

Georgia Institute of Technology, Atlanta, GA, September 14, 2009

Aarhus University, Denmark, May 27, 2009

Max Planck Institute for Mathematics, Bonn, Germany, May 25, 2009

Copenhagen University, Denmark, May 11, 2009

University of California, Berkeley, CA, October 1, 2008 (two talks)

Aarhus University, Denmark, May 13, 2008

Rutgers University, New Brunswick, NJ, March 11, 2008

Columbia University, New York, NY, February 22, 2008

Copenhagen University, Denmark, January 14, 2008

Georgia Institute of Technology, Atlanta, GA, February 19, 2007

Georgia Institute of Technology, Atlanta, GA, October 31, 2005

Columbia University, New York, NY, September 16, 2005

Aarhus University, Denmark, February 22, 2005

TEACHING
EXPERIENCE

University of Maryland, College Park

Spring 2019

- Differential equations for scientist and engineers

Fall 2018

- Introduction to abstract algebra
- Differential equations for scientist and engineers

Spring 2018

- Algebraic Topology 2 (graduate course)

Fall 2017

- Scissors congruence and invariants of 3-manifolds (topics course)
- Introduction to probability theory

Spring 2017

- Parental leave, no teaching

Fall 2016

- Differential equations for scientists and engineers
- Introduction to topology

Spring 2016

- Scissors congruence, group homology and characteristic classes (topics course)

Fall 2015

- Fundamental concepts of topology (graduate course)
- Introduction to probability theory

Spring 2015

- Algebraic Topology 2 (graduate course)
- Scissors congruence, group homology and characteristic classes (reading course)

Fall 2014

- Introduction to abstract algebra
- Differential equations for scientists and engineers

Spring 2014

- Field theory

Fall 2013

- Differential equations for scientists and engineers
- Introduction to topology

Spring 2013

- Introduction to probability theory

Fall 2012

- Fundamental concepts of topology (graduate course)

Spring 2012

- Introduction to number theory

Fall 2011

- Introduction to number theory

University of California, Berkeley

Spring 2011

- Elementary differential topology
- Second course in abstract algebra

Fall 2010

- Algebraic topology (graduate course)

Spring 2010

- Introduction to abstract algebra
- Introduction to complex analysis

Fall 2009

- Algebraic topology (graduate course)

Fall 2008

- Linear algebra
- Algebraic topology (graduate course)

OTHER
EDUCATIONAL
SERVICE

Polygons, polyhedra and scissors congruence, undergraduate seminar, Stanford University, November 13, 2014

Teaching assistant for the minicourse “*Invariants of Hyperbolic 3-Manifolds*” given by Walter Neumann, Geometry and topology down under (workshop and conference in honor of Hyam Rubinstein), July 11-15, 2011

Lecturer and teaching assistant in the spring school “*Scissors congruences*” for graduate students at the universities of Bonn, Bochum and Düsseldorf, Technische Universität Dortmund, Germany, May 1-4, 2009