CURRICULUM VITAE

January 19, 2024

Alexander Stoimenow

Dongguk University, WISE campus,
Department of Mathematics Education,
123, Dongdae-ro, Gyeongju-si,
Gyeongsangbuk-do 38066, Republic of Korea
e-mail: stoimeno@stoimenov.net,
WWW: http://stoimenov.net/stoimeno/homepage
+82-10-4491-4241 (cell phone)

20. 05. 1974	Born in Sofia, Bulgaria (Bulgarian citizenship);
08. 1985	Resettlement to Berlin, (former) GDR
30. 06. 1990	Abitur (school-leaving examination) at the Carl-von-Ossietzky-EOS, Berlin
09. 1990 – 09. 1995	Mathematics studies at Humboldt University Berlin (specialization "Geometry" under supervision of Prof Thomas Friedrich), thesis "On Harrison cohomology and the Drinfel'd conjecture"
11. 07. 1997	B.Sc. degree in Computer science at Humboldt University
10. 1995 – 05. 1998	Promotion (Dr. rer. nat. degree) at Freie Universität Berlin under the supervision of Prof. Elmar Vogt. The thesis "On enumeration of chord diagrams and asymptotics of Vassiliev invariants" has been given the note *magna cum laude*.
06. 1998 – 03. 1999	Postdoc position at the Mathematics Institute of the Ludwig-Maximilians-University Munich
04. 1999 – 02. 2003	Visitor position at Max-Planck-Institut für Mathematik, Bonn, including
10. 2004 – 04. 2006	JSPS Postdoc fellowship, University of Tokyo
04. 2006 – 11. 2007	COE Program Researcher, Research Institute for Mathematical Sciences, Kyoto University
12. 2007 – 05. 2008	Researcher, Osaka City University Advanced Mathematical Institute
06. 2008 – 02. 2010	BK21 Project Researcher, Department of Mathematical Sciences, KAIST,

	Daejeon, Korea
06. 2008 – 02. 2009	Part-time Lecturer, School of Engineering, Information and Communications University, Daejeon, Korea
03. 2010 – 01. 2014	Assistant Professor, Department of Mathematics, Keimyung University, Daegu, Korea
02. 2014 – 02. 2017	Assistant Professor (teaching track), GIST College, Gwangju Institute of Science and Technology, Gwangju, Korea
03. 2017 – 02. 2020	Associate Professor, GIST College, Gwangju, Korea
08. 2020 – 02. 2022	Research Consultant "Computational Knot Theory", School of Computing, KAIST, Daejeon, Korea
03. 2023 – 02. 2028	Dongguk University, WISE campus, Department of Mathematics Education, visiting research professor

Conferences and talks (incl. scheduled)

July 1995	Ph.D. Summer School on “Geometry and Physics”, Odense, Denmark
April 1997	Knot theory workshop in Narbonne, France (talk given)
June 1998	Workshop “Rencontres Dijonnaises autour des nœuds et des tresses”, Dijon, France
August 7-15, 1998	International Knot Theory Meeting “Knots in Hellas, 98”, Delphi, Greece (talk given)
June 18-24, 1999	Arbeitstagung MPI Bonn ’99
May 24-25, 2000	Clay Institute Millenium Event, Paris, France
June 5-8, 2000	Workshop “Journées Toulousaines autour des tresses et des nœuds” in Toulouse, France
June 18-24, 2000	“Perspectives of Mathematics”, Goslar, Germany
March 26 - April 7, 2001	“Symplectic and Contact Topology, Quantum Cohomology, Symplectic Field Theory and Higher-Dimensional Gauge Theory”, The Fields Institute, Toronto and the Centre de recherches mathématiques, Montréal
June 15-17, 2002	Canadian Mathematical Society Summer Meeting 2002, Université Laval, Quebec City, Quebec
August 12-16, 2002	Geometric Topology, Satellite Conference of ICM 2002 Beijing, Shaanxi Normal University, Xi’an, China (invited speaker, but could not attend because of lack of travel funding)
July 8-14, 2004	KOOK Seminar International for Knot Theory and Related Topics, International Conference Center in Awaji-Shima, Japan (talk ‘On mutations and Vassiliev invariants (not) contained in knot polynomials’)
October 25-27, 2004	Intelligence of Low Dimensional Topology 2004, Osaka City University (talk ‘The second coefficient of the Jones polynomial’)

December 23-26, 2004	Topology of Knots, Tokyo Woman's Christian University
February 12-14, 2005	Tohoku Knot Seminar in Akita, ALVE, Akita-shi, Japan (talk 'Burau representation and braid index')
August 1-6, 2005	The Second East Asian School of Knots and Related Topics in Geometric Topology, Dalian University of Technology, Dalian, China (talk 'The existence of achiral knot diagrams')
August 28 - September 1, 2005	"Geometry and Algebra of Knots and manifolds", Konan University, Kobe city, Japan
October 12-14, 2005	Knot Seminar (-in Zao-), Yamagata Zao, International Zaokoegen Hotel (talk 'Concordance and Thurston-Bennequin invariants of positive/negative knots and links')
December 23-26, 2005	Topology of Knots VIII, Waseda University, Tokyo (talk 'Weight systems of trivalent graphs and hyperbolic volume of alternating knots by genus')
February 17-20, 2006	Hiroshima Topology Conference (Celebrating Prof. Takao Matumoto's 60th birthday), Hiroshima University, Higashi-Hiroshima city, Japan
July 22-27, 2006	Intelligence of Low Dimensional Topology 2006, Hiroshima University, Higashi-Hiroshima city, Japan (talk 'Mutation and the colored Jones polynomial')
September 13-15, 2006	Groups of Diffeomorphisms 2006 (Celebrating Prof. Shigeyuki Morita's 60th birthday), University of Tokyo, Japan
February 5-8, 2007	The Third East Asia School of Knots and Related Topics, Osaka City University (talk 'Alexander polynomials, minimal genus, and fibering of arborescent links')
May 10-25, 2007	Workshop "Link homology and categorification", Department of Mathematics and RIMS, Kyoto University
July 6-8, 2007	Jubilee International Conference "New Trends in Mathematics and Informatics", 60 years Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (talk 'Hecke algebra representations of braid groups and a conjecture of Jones')
September 5-7, 2007	Topology and Computer 2007, Akita University (talk 'Genus minimality of canonical surfaces and Alexander polynomial of canonical fiber surfaces')
September 11-14, 2007	Workshop "Low Dimensional Topology and infinite Dimensional Geomerty", University of Tokyo, Tanbara House
December 22-25, 2007	Topology of Knots X, Tokyo Woman's Christian University (talk 'Hecke algebra representations of braid groups and a conjecture of Jones')
January 23, 2008	The Fourth East Asia School of Knots and Related Topics, University of Tokyo, Japan (talk 'Determinants of knots and Diophantine equations')
August 12 -14, 2008	The First Topology Workshop KAIST (talk 'Lie groups, Burau representation, and non-conjugate braids with the same closure link')

January 12-15, 2009	The Fifth East Asia School of Knots and Related Topics, Gyeongju, Korea (talk 'Lie groups, Burau representation, and non-conjugate braids with the same closure link')
March 19 - 21, 2009	Low dimensional topology and knot theory workshop, "Swiss Knots 2009", Fribourg, Switzerland
April 25, 2009	KMS Meeting, Aju University, Suwon, Korea (talk 'The Satellite crossing number conjecture for cables of knots')
August 17 -19, 2009	The Second Topology Workshop KAIST
September 5 - 10, 2009	9th International Conference on Geometry and Applications, Varna, Bulgaria (talk 'Non-conjugate braids with the same closure link')
December 16 - 20, 2009	Joint Meeting of the Korean Mathematical Society (KMS) and the American Mathematical Society (AMS), Special Session on Knot Theory and Related Topics, Ewha Womans University, Seoul, Korea (talk 'On non-conjugate braids with the same closure link')
January 11 - 13, 2010	8th Geometric topology fair, KAIST, Mathematics department (talk 'Around Bennequin's inequality')
April 24, 2010	Spring Meeting of the Korean Mathematical Society, Chungnam National University, Daejeon, Korea
June 19, 2010	Annual meeting of Yeungnam Mathematical Society, Yeungnam University, Kyungsan, Korea (talk 'On non-conjugate braids with the same closure link')
March 18, 2011	Knots and Spatial Graphs 2011 Workshop, KAIST, Mathematics department
March 20-25, 2011	Spring School in Geometry and Quantum Topology, Les Diablerets, Switzerland
April 28, 2012	Spring Meeting of the Korean Mathematical Society, Seokmyeong Womans University, Seoul, Korea (talk 'Roots of the Alexander polynomial and Hoste's conjecture')
July 27, 2012	2012 TAPU Workshop on Knot Theory and Related Topics, Pusan National University, Busan, Korea (talk 'Diagram genus, generators and applications')
August 17, 2012	Knots and Spatial Graphs 2012 Workshop, KAIST, Mathematics department (talk 'Everywhere Equivalent and Everywhere Different Knot Diagrams')
October 25, 2013	2013 KMS Annual Meeting, The University of Seoul
November 9, 2013	60th KPPY Combinatorics Workshop, Kyungpook National University, Daegu (talk 'On dual triangulations of surfaces')
February 10-14, 2014	China-Korea Workshop on Low Dimensional Topology in Shanghai, East China Normal University, Shanghai, China (talk 'On dual triangulations of surfaces')
July 7-10, 2014	International Conference "Mathematics Days in Sofia", Bulgarian

	Academy of Sciences, Sofia, Bulgaria
August 13-21, 2014	ICM 2014, Coex, Seoul
August 22-24, 2014	Knots and Low Dimensional Manifolds, Satellite Conference of Seoul ICM 2014, BEXCO Convention & Exhibition Center, Busan, Korea, talk "Concordance of positive knots"
October 31, 2014	GIST Foreign Faculty Workshop, GIST College, talk "Academic (Written) Communication"
December 6, 2014	67th KPPY Combinatorics Workshop, Kyungpook National University, Daegu (talk 'On dual triangulations of surfaces II')
April 24-26, 2015	Spring meeting of Korean Mathematical Society, Pusan National University, Korea
May 2, 2015	Topology Workshop in Honor of Prof. Gyo Taek Jin's 60th birthday, KAIST, Daejeon, Korea
November 5-7, 2015	Knots and Spatial Graphs 2015 Workshop, Dept. of Mathematical Sciences, KAIST (talk 'Roots of the Alexander polynomial and Hoste's conjecture')
June 25-27, 2016	Workshop on Graphs and Knots, School of Mathematical Sciences, Xiamen University, China (talk 'Coefficients and non-triviality of the Jones polynomial')
July 16-23, 2016	International Conference on Low-Dimensional Topology Knots in Hellas 2016, International Olympic Academy, Ancient Olympia, Greece (talk 'On coefficients and roots of the Alexander-Conway polynomial')
October 20-23, 2016	International Conference for the 70th Anniversary of the Korean Mathematical Society, Seoul National University, Korea
May 15-19, 2017	Quantum Topology and Geometry in Toulouse, Université Paul Sabatier, Toulouse, France
July 10-14, 2017	"Mathematics Days in Sofia, 2017", Bulgarian Academy of Sciences, Sofia, Bulgaria
April 21, 2018	KMS Meeting, Kyeonghee University, Seoul, Korea
June 7-8, 2019	4th Mini Workshop on Knot Theory, Dongguk University Gyeongju, Korea (talk 'Exchange moves and non-conjugate braid representatives of links')
July 15, 2019	Geometry and Mathematical Physics, Workshop dedicated to the memory of Vasil Tsanov, held at University of Architecture, Civil Engineering and Geodesy (UACEG), Sofia, Bulgaria
October 24-27, 2019	KMS Fall Meeting, Hongik University, Seoul, Korea
November 8-11, 2019	The Third Pan Pacific International Conference on Topology and Applications (PPICTA), Sichuan University, Chengdu, China (talk 'Exchange moves and non-conjugate braid representatives of links')
February 17-18, 2020	Knots and Spatial Graphs 2020, A workshop in memory of Choonbae Jeon, KAIST

February 1-3, 2021	Knots and Spatial Graphs 2021, online workshop, organized by Gyongju Gongkuk Uni. (talk 'Knot polynomial computation and application to braid index')
June 25-27, 2021	KSIAM (The Korean Society for Industrial and Applied Mathematics) 2021 Spring conference, Gangneung TopsTen Hotel (Online Participation)
June 27-July 1, 2022	Computing in topological structures: Foundations and implementations, Sirius Mathematics Center, Sochi, Russia (Online talk 'Odd crossing number amphicheiral knots') https://sites.google.com/view/cts-2022/home/invited-speakers
February 6-9, 2023	East Asian Conference on Geometric Topology 2023, Online Hosted by Soochow University, China (Online talk 'Strong quasipositivity of links')
June 15-17, 2023	"Knots and Spatial Graphs 2023" Workshop, KAIST, Department of Mathematical Sciences (talk 'Strong quasipositivity of links').
September 25-29, 2023	CCC 2023 "Continuity, Computability, Constructivity: From Logic to Algorithms", RIMS, Kyoto University, Japan (online participation)
October 27-28, 2023	2023 Fall Workshop on Algorithms & Computation, Postech, https://algo.postech.ac.kr/workshops/fwac23/
December 11-15, 2023	Winter School on Low-dimensional Topology and Related Topics IBS POSTECH Campus Bldg. #301, (talk 'Burau representation, stabilization and exchange moves of braids' December 12, 2023)

Seminar talks (outside conferences)

"Some applications of link polynomial evaluations" (Vortrag am Graduiertenkolleg University Bonn, 11/6/1999)

"Wheel graphs, Lucas numbers and the determinant of a knot" (MPI-Oberseminar, 30/3/2000)

"On the number of links and link polynomials" (Oberseminar Topologie, MPI, 11/12/2000)

"Canonical genus and the signature" (Kobe Topology Seminar, Kobe University, Novenber 24, 2001)

"Special diagrams and the positivity of the signature" (Nara Topology Seminar, Nara Women's University, November 29, 2001)

"On the signature of positive links" (Mathematics Institute Seminar, University Bonn, 19/4/2002, and Oberseminar Topologie, MPI, 13/1/2003, Topology Seminar Université Lille, 14/11/2003)

"On some relations between hyperbolic volume and combinatorial knot invariants" (Topology seminar, University of Toronto, 26/3/2003)

"Square Fibonacci numbers and linear recurrence sequences" (Graduate seminar, University of Toronto, 17/4/2003)

"Four Color Theorem, Lie Algebras, hyperbolic volume and enumeration of alternating knots by genus" (Topology Seminar, Tokyo Institute of Technology, 3/3/2004)

"On mutations and Vassiliev invariants (not) contained in knot polynomials" (Friday seminar on Knot Theory, Osaka City University, 11/6/2004)

"Properties of closed 3-braids" (Topology Seminar, University of Tokyo, 30/11/2004)

"Properties of closed 3-braids" (KOOK Seminar, Osaka City University, 2/4/2005)

"Applications of braiding sequences" (Research Institute for Mathematical Sciences, Topology Seminar, 17/11/2005)

"Braiding sequences and Thurston-Bennequin invariants" (Hokkaido University, Department of Mathematics Colloquium 21/12/2005)

"Knots and their crossing numbers" (Research Institute for Mathematical Sciences, Colloquium, 10/5/2006)

"Estimation of crossing numbers of knots" (Research Institute for Mathematical Sciences, Topology Seminar, 13/7/2006)

"Bennequin surfaces and braid index of alternating knots" (Friday Seminar on Knot Theory, Osaka City University, 13/10/2006)

"Hecke algebra representations of braid groups and a conjecture of Jones" (Topology Seminar, University of Geneva, 18/10/2007)

"Determinants of knots and Diophantine equations" (Topology Seminar, ETH Zurich, 22/10/2007)

"Knots and crossing numbers" (Kyoto University International Researchers Monthly Seminar, Kyoto University International Office, January 11, 2008)

"Vassiliev invariants, Seifert matrix, and hyperbolic volume of knots" (Friday seminar on knot theory, Osaka City University, February 22, 2008)

"Mutation and the colored Jones polynomial" (Topology Seminar, University of Geneva, 22/5/2008; Topology Seminar, KAIST, 16/6/2008)

"Computing cabled knot polynomials and deciding mutation", "Computing link polynomials with the Millett-Ewing programs" (Topology Seminar, KAIST, 30/6/2008, 8/7/2008)

"Tait's Conjectures and odd crossing number amphicheiral knots" (BK21 Seminar, KAIST, 16/3/2009)

"Around Bennequin's inequality" (Korea University, Seoul, 15/5/2009)

"Distinguishing polygonal knots" (Korea Science Academy KSA of KAIST Undergrad student Seminar, KAIST, 28/7/2009)

"Signature and concordance of positive links" (POSTECH, Pohang, Korea, 26/8/2009)

"On roots of the Alexander polynomial" (NRF grant Research Seminar, Keimyung University, 23/9/2011 and KAIST, 28/10/2011)

"Diagram genus, generators and applications" (Topology Seminar, Durham University, 19/1/2012)

"Roots of the Alexander polynomial and Hoste's conjecture" (Topology Seminar, University of Glasgow, 23/1/2012)

"Diagram genus, generators and applications II" (Algebra Seminar, Newcastle University, 24/1/2012)

"Roots of the Alexander polynomial and Hoste's conjecture" (Topology Seminar, Pusan National University, 22/5/2012)

"Everywhere equivalent and everywhere different knot diagrams" (NRF grant Research Seminar, KAIST, 8/6/2012)

"Minimal genus and fibering of canonical surfaces" (NRF grant Research Seminar, KAIST, 24/11/2012)

"Hyperbolicity of the canonical genus two knots" (NRF grant Research Seminar, Andong, 6/4/2013)

"On roots and coefficients of the Alexander polynomial" (Topology Seminar, University of Geneva, 11/7/2016)

"Coefficients and Non-Triviality of the Jones Polynomial", "On dual triangulations of surfaces" (Topology Seminar, KIAS, Seoul, 25/9/2016)

"Solved and unsolved mysteries of numbers", GIST GIP (Global Intern Program) exchange student seminar, 4/8/2017

"Exchange moves and non-conjugate braid representatives of links" (Topology Seminar, University of Melbourne, 27/9/2018, and Topology Seminar, Monash University, 4/10/2018)

"Exchange moves and non-conjugate braid representatives of links" (Topology Seminar, Pusan National University, 5/4/2019)

"Exchange moves and non-conjugate braid representatives of links" (TU Berlin, Discrete Mathematics / Geometry, online seminar, 11/24/2021) https://www.tu-berlin.de/?id=138801

"Exchange moves and non-conjugate braid representatives of links" (NU Singapore Topology and Geometry, online seminar, 8/11/2022)

"Burau Representation and Application to Reducibility and Exchangeability of Braids" (General seminar of the section "Analysis, Geometry and Topology" and seminar of the section "Algebra and Logic" Institute of Mathematics and Informatics - Bulgarian Academy of Sciences 26 September 2023)

"Diagram genus, generators and applications" (CGP Seminar IBS POSTECH, 10/25/2023)

Trustworthy AI

"Software Engineering for Machine Learning" (joint with M. Ziegler, SNU Trustworthy AI Lab meeting, 1/9/2023), https://www.youtube.com/watch?v=HvGCaRmFUIQ

Lectures (incl. series of talks and minicourses)

"Non-associative tangles" (following a paper of D. Bar-Natan, "Geometric topology, Proceedings of the Georgia international topology conference", W. H. Kazez, ed., 139-183, Amer. Math. Soc. and International Press, Providence, 1997), Lecture series, knot theory seminar, Humboldt University Berlin, 1993/1994.

"Algebraic structures on modules of diagrams" (following P. Vogel's preprint, published far later in Journal of Pure and Applied Algebra, **215(6)** (2011), 1292–1339), Lecture series, knot theory seminar, Humboldt University Berlin, 1994/1995.

"Some applications of braiding sequences", series of 4 talks: "A bound for the number of restricted Vassiliev invariants", "The canonical genus" (2 talks), "On the crossing number of semiadequate

links", Low dimensional topology Seminar, Research Institute for Mathematical Sciences, Kyoto University, November 16, 17, 30, 2001.

"Mathematical English" (rules of writing mathematical papers in English), Osaka City University, June 10, 17, 24, July 1, 2004

Computing school seminar Prof. Ziegler, KAIST "Introduction to Computational Knot Theory" (9/14/2020), https://www.youtube.com/watch?v=jSn30jBA3R8,
"Knotscape and knot tables" (11/12/2020), https://www.youtube.com/watch?v=2_33U4Rdx5c

Teaching

(All courses 3 credit hours / week, recitation 1 credit hour / week)

Summer 2008

Ordinary Differential Equations, School of Engineering, Information and Communications University

Fall 2008

Calculus II, ibid.

Spring 2010

Mathematical English, Department of Mathematics, Keimyung University

Linear Algebra (4th grade), Department of Game and Mobile Technology, Keimyung University

Fall 2010

Mathematical English, Department of Mathematics, Keimyung University

Linear Algebra (1st grade), Department of Game and Mobile Technology, Keimyung University

Discrete Mathematics, Department of Microsoft IT, Keimyung University

Calculus and Applications (Pre-calculus), Department of Mathematics, Keimyung University

Spring 2011

Calculus and Applications (Pre-calculus), Department of Mathematics, Keimyung University

Vector Analysis, Department of Mathematics, Keimyung University

Fall 2011

Calculus (1st grade), Department of Mathematics, Keimyung University

Mathematical English, Department of Mathematics, Keimyung University

Teaching Practice, Department of Mathematics Education, Keimyung University

Calculus (2nd grade), Keimyung Adams College, Keimyung University

Spring 2012

Calculus and Applications (4th grade), Department of Mathematics, Keimyung University

Linear Algebra (2nd grade), Department of Mathematics, Keimyung University

Vector Analysis (4th grade), Department of Mathematics, Keimyung University

Fall 2012

Vector Analysis II (2nd grade), Department of Game and Mobile Technology, Keimyung University

Mathematical English, Department of Mathematics, Keimyung University

Calculus (2nd grade), Keimyung Adams College, Keimyung University

Spring 2013

Vector Analysis I (2nd grade), Department of Game and Mobile Technology, Keimyung University

Mathematical English, Department of Mathematics, Keimyung University

Calculus and Applications (4th grade), Department of Mathematics, Keimyung University

Fall 2013

Vector Analysis II (2nd grade), Department of Game and Mobile Technology, Keimyung University

Calculus (2nd grade), Keimyung Adams College, Keimyung University

Spring 2014

Single Variable Calculus and Applications (1st grade), GIST College (2 sections + 2 recitations)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (1 section + recitation)

Fall 2014

Multivariable Calculus and Applications (1st grade), GIST College (2 sections + 2 recitations)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (1 section + recitation)

Spring 2015

Single Variable Calculus and Applications (1st grade), GIST College (2 sections + 2 recitations)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (1 section + recitation)

Fall 2015

Multivariable Calculus and Applications (1st grade), GIST College (2 sections + 2 recitations)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (1 section + recitation)

Spring 2016

Single Variable Calculus and Applications - Honors (1st grade), GIST College (2 sections + 2 recitations)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (1 section + recitation)

Fall 2016

Multivariable Calculus and Applications (1st grade), GIST College (2 sections)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (2 sections)

Spring 2017

Single Variable Calculus and Applications - Honors (1st grade), GIST College (2 sections)

Introduction to Linear Algebra & Applications (2nd grade), GIST College (2 sections)

Fall 2017

Multivariable Calculus and Applications (1st grade), GIST College (2 sections + 2 recitations)

Introduction to Topology (4th grade), GIST College

Spring 2018

Single Variable Calculus and Applications - Honors (first grade), GIST College (1 section + recitation)

Introduction to Linear Algebra & Applications (second grade), GIST College (2 sections + 2 recitations)

Fall 2018

Introduction to Linear Algebra & Applications (2nd grade), GIST College (2 sections + 2 recitations)

Introduction to Topology (4th grade), GIST College

Spring 2019

Single Variable Calculus and Applications (first grade), GIST College (1 section + recitation)

Introduction to Differential Equations & Applications (second grade), GIST College (2 sections + 2 recitations)

Fall 2019

Introduction to Linear Algebra & Applications (2nd grade), GIST College (2 sections + 2 recitations)

Introduction to Topology (4th grade), GIST College

Spring 2021

CS300 Introduction to Algorithms (Chapter 2a-c 3a-b), School of Computing, KAIST
https://www.youtube.com/watch?v=Nkwy7jhyLkQ (2a)
http://youtu.be/qLuryM2OZz4/ (2b)

Fall 2021

CS300 Introduction to Algorithms (Chapter 2, 3), School of Computing, KAIST
https://www.youtube.com/playlist?list=PLvcvykdwsGNF9nmJpwXJklSCzstnFlNik

Supervision

1-year research project: Jihoon Hyun (School of Computing, KAIST)

Invitations and Working visits

April 1996	Strassbourg (France), C. Kassel
June 1996	Toulouse (France), T. Fiedler
March 1999	Toulouse, T. Fiedler
June 1999	Zurich, V. Chernov
November 1999	Institut des Hautes Études Scientifiques in Bures-sur-Yvette (France)

January-July 2001	University of Toronto, Kunio Murasugi
November 2001	Research Institute for Mathematical Sciences, Kyoto University (Japan), Hitoshi Murakami
May 2003	Toulouse, T. Fiedler
October 2003	Waterloo (Canada), L. Kauffman
November 2003	Lille (France), S. Kallel; Toulouse, T. Fiedler
February-March 2004	Tokyo Institute of Technology, Hitoshi Murakami
June-July 2004	Osaka City University, Akio Kawauchi
October 2007	ETH Zurich, Sebastian Baader; University of Geneva, Van Quach
May 2008	University of Geneva, Van Quach
January 2012	Newcastle University, Alina Vdovina
January-February 2015	Mebourne University, Hyam Rubinstein
July 2015	University of Geneva, Van Quach and University of Bern, Sebastian Baader
July 2016	University of Geneva, Van Quach and University of Bern, Sebastian Baader
September/October 2018	University of Melbourne, Hyam Rubinstein and Monash University, Jessica Purcell

Research grants

4/2007-3/2009	2-year individual research grant from Ministry of Science and Education, "Polynomial invariants of knots and related theory", Japan (managed by RIMS, Kyoto and Osaka City University), 若手研究(B), Nr. 19740035, JPY 1,510,000
9/2011-8/2014	3-year group research project from NRF, Korea (managed by KAIST), "Computational approach toward geometric and combinatorial properties of knots", NRF-2011-0027989, 600,000,000KRW
6/2013-5/2014	1-year individual research grant from NRF, Korea (managed by Keimyung University), "Combinatorial knot theory related to polynomial invariants", Nr. 2013-0366, 19,350,000원
3/2021-12/2021	1-year International Collaboration Signature Project in 2021 "Computational Knot/Braid Theory" (managed by Prof. Ziegler's KAIST lab.) 5,000,000 KRW
3/2023-2/2028	5-year group research project from NRF, Korea (managed by Dongkuk University), "Strongly quasipositive knots and arc index", 2023R1A2C1003749, 600,000,000 KRW

Awards

Excellent Research Achievement Award, Keimyung University, May 2012

Administrative matters

Organizer: Graduate Student Seminar, Mathematics Institute, Ludwig-Maximilians-University Munich, 06. 1998 – 03. 1999

Co-Organizer: International Faculty Workshop, GIST College, October 31-November 1, 2014

Session Chairman:
International Graduate Course Student Workshop for Knot Theory and Related Topics, Osaka City University, Media Center, July 5-7, 2004;
Tohoku Knot Seminar in Akita, ALVE, Akita-shi, Japan, February 12-14, 2005.
Workshop on Graphs and Knots, School of Mathematical Sciences, Xiamen University, China, June 25-27, 2016

Organizer: Online workshop on "Computational Knot Theory", KAIST, May 26-June 2, 2021,
http://www.stoimenov.net/stoimeno/homepage/ckt/

Mini-Workshop "Knots + More", KAIST, August 18th-25th, 2021,
http://www.stoimenov.net/stoimeno/homepage/kam/

list of talk recordings[1]:
https://www.youtube.com/playlist?list=PLvcvykdwsGNH-mc9e6WLSIVYkxslUQ8TO

Co-Organizer: "Knots and Spatial Graphs 2023" Workshop, KAIST, June 15th-17th, 2023

Memberships in Professional Societies

Korean Mathematical Society KMS (2009-present), German Mathematical Society DMV (2023-)

Other academic activities

Contributing Visitor, Trustworthy AI Lab, Graduate School of Data Science, Seoul National University, https://trustworthyailab.snu.ac.kr/

Refereeing

Journals (a substantiated, but not entirely complete list of those having directed evaluation queries to me, regardless of what or how detailed comments I have provided)

Topology, Compositio Mathematica, Documenta Mathematica, J. of Knot Theory and Its Ramifications, Algebr. Geom. Topol., Pacific J. Math., Topology and its Applications, Math. Proc. Camb. Phil. Soc., International Mathematics Research Notices, Geometriae Dedicata, SIGMA (Symmetry, Integrability and Geometry: Methods and Applications), Discrete Mathematics, Indiana University

[1] In agreement with the speakers, please use this resource for internal evaluative purposes only.

Mathematics Journal, Mathematische Annalen, Abstract and Applied Analysis, Journal of Symbolic Computation, Proceedings of Amer. Math. Soc., Bull. London Math. Soc., Proc. London Math. Soc., Electronic Journal of Combinatorics, European Journal of Combinatorics, Journal of Topology, Journal of Applied Analysis, Internat. J. Math., Revista Matemática Iberoamericana

Social sci.: Aslib Journal of Information Management, International Journal of Science Education Part B: Communication and Public Engagement, Journal of Academic Ethics

General sci.: Heliyon

Organizations and Services

Online Review: AMS Math Reviews, Zentralblatt,

Grant Proposals: National Science Foundation (US), United Arab Emirates University (UAE)

Others

Inclusion in Marquis "Who's Who in the World" 2010 Edition

Supervision of English Study Groups (K-Circle), Fall semester 2010, spring and fall semester 2011, Keimyung University

3rd Prize, Photography contest, Keimyung University, May 2012

Language skills

Russian (Intermediate), English (Fluent), German (Fluent), Korean (Advanced) (2014.02.17 TOPIK 33 회 2급합격, 자격증번호 0120120028, 취득기관 TOPIK KOREA), Japanese (Intermediate)

Publications

Degree theses

[St1] *Über Harrison-Kohomologie und die Drinfel'd-Vermutung*, diploma thesis, Humboldt University, Berlin, 1995

[St2] *On enumeration of chord diagrams and asymptotics of Vassiliev invariants*, Doctor thesis, Freie University Berlin, 1998.

Articles in scientific journals and refereed conference proceedings
(ordered chronologically by approximate time of writing, not of publication)

[BS] *The Fundamental Theorem of Vassiliev invariants*, joint with D. Bar-Natan, "Geometry and Physics", Lecture Notes in Pure & Appl. Math. **184**, M. Dekker, New York, 1996, 101–134.

[St3] *Enumeration of chord diagrams and an upper bound for Vassiliev invariants*, J. Of Knot Theory and Its Ram. **7(1)** (1998), 93–114.

[St4] *Stirling numbers, Eulerian idempotents and a diagram complex*, J. Of Knot Theory and Its Ram. **7(2)** (1998), 231–256.

[St5] *Gauß sum invariants, Vassiliev invariants and braiding sequences*, J. Of Knot Theory and Its Ram. **9(2)** (2000), 221–269.

[St6] *On finiteness of Vassiliev invariants and a proof of the Lin-Wang conjecture via braiding polynomials*, J. Of Knot Theory and Its Ram. **10(5)** (2001), special volume for the proceedings of the International Conference on Knot Theory "Knots in Hellas, 98", 769–780.

[St7] *Vassiliev invariants on fibered and mutually obverse knots*, J. Of Knot Theory and Its Ram. **8(4)** (1999), 511–519.

[St8] *The braid index and the growth of Vassiliev invariants*, J. Of Knot Theory and Its Ram. **8(6)** (1999), 799–813.

[St9] *On the number of chord diagrams*, Discr. Math. **218** (2000), 209–233.

[St10] *Genera of knots and Vassiliev invariants*, J. Of Knot Theory and Its Ram. **8(2)** (1999), 253–259.

[St11] *On some restrictions to the values of the Jones polynomial*, Indiana Univ. Math. J. **54 (2)** (2005), 557–574.

[St12] *Positive knots, closed braids and the Jones polynomial*, math/9805078, Ann. Scuola Norm. Sup. Pisa Cl. Sci. **2(2)** (2003), 237–285.

[St13] *Some minimal degree Vassiliev invariants not realizable by the HOMFLY and Kauffman polynomial*, C. R. Acad. Bulgare Sci. **54(4)** (2001), 9–14.

[St14] *Mutant links distinguished by degree 3 Gauss sums*, Proceedings of the International Conference on Knot Theory "Knots in Hellas, 98", Series on Knots and Everything **24**, World Scientific, 2000.

[FS] *New knot and link invariants*, joint with T. Fiedler, Proceedings of the International Conference on Knot Theory "Knots in Hellas, 98", Series on Knots and Everything **24**, World Scientific, 2000.

[St15] *Gauss sums on almost positive knots*, Compositio Mathematica **140(1)** (2004), 228–254.

[St16] *The granny and the square tangle and the unknotting number*, Topol. Appl. **117** (2002), 59–75.

[St17] *Knots of genus one*, Proc. Amer. Math. Soc. **129(7)** (2001), 2141–2156.

[St18] *The Conway Vassiliev invariants on twist knots*, Kobe J. Math. **16(2)** (1999), 189–193.

[St19] *Vassiliev invariants and rational knots of unknotting number one*, math/9909050, Topology **42(1)** (2003), 227–241.

[St20] *Knots of (canonical) genus two*, math.GT/0303012, Fund. Math. **200(1)** (2008), 1–67.

[St21] *The crossing number and maximal bridge length of a knot diagram*, with an appendix by M. Kidwell, Pacific J. Math. **210(1)** (2003), 189–199.

[St22] *Polynomial values, the linking form and unknotting numbers*, math.GT/0405076, Math. Res. Lett. **11(5-6)** (2004), 755–769.

[St23] *Determinants of Knots and Diophantine equations*, Acta Arithmetica **129(4)** (2007), 363–387.

[St24] *Square numbers, spanning trees and invariants of achiral knots*, math.GT/0003172, Comm. Anal. Geom. **13(3)** (2005), 591–631.

[St25] *The Jones polynomial, genus and weak genus of a knot*, Ann. Fac. Sci. Toulouse **VIII(4)** (1999), 677–693.

[St26] *On Unknotting Numbers and Knot Trivadjency*, joint with N. Askitas, Math. Scand. **94(2)** (2004), 227–248.

[St27] *A property of the skein polynomial with an application to contact geometry*, math.GT/0008126, J. Differential Geom. **77(3)** (2007), 555–566.

[St28] *On the unknotting number of minimal diagrams*, Mathematics of Computation **72(244)** (2003), 2043–2057.

[St29] *Branched cover homology and Q evaluations*, Osaka J. Math. **39(1)** (2002), 13–21.

[St30] *Rational knots and a theorem of Kanenobu*, Exper. Math. **9(3)** (2000), 473–478.

[St31] *Fibonacci numbers and the 'fibered' Bleiler conjecture*, Int. Math. Res. Notices **23** (2000), 1207–1212.

[St32] *The signature of 2-almost positive knots*, J. Of Knot Theory and Its Ram. **9(6)** (2000), 813–845.

[St33] *Some examples related to 4-genera, unknotting numbers, and knot polynomials*, Jour. London Math. Soc. **63(2)** (2001), 487–500.

[St34] *On the coefficients of the link polynomials*, Manuscr. Math. **110(2)** (2003), 203–236.

[St35] *Some inequalities between knot invariants*, Internat. J. Math. **13(4)** (2002), 373–393.

[St36] *On the crossing number of positive knots and braids and braid index criteria of Jones and Morton-Williams-Franks*, Trans. Amer. Math. Soc. **354(10)** (2002), 3927–3954.

[St37] *Applications of braiding sequences II: polynomial invariants of positive knots*, Proceedings of the Edinburgh Mathematical Society (PEMS) **59(4)** (2016), 1037–1064.

[St38] *Some applications of Tristram-Levine signatures*, Adv. Math. **194(2)** (2005), 463-484.

[KS] *Examples Relating to the Crossing Number, Writhe, and Maximal Bridge Length of Knot Diagrams*, joint with M. Kidwell, Mich. Math. J. **51(1)** (2003), 3–12.

[STV] *The canonical genus of a classical and virtual knot*, joint with V. Tchernov and A. Vdovina, Geometriae Dedicata **95(1)** (2002), 215–225.

[St39] *On the number of links and link polynomials*, Quart. J. Math. Oxford **55(1)** (2004), 87–98.

[St40] *The skein polynomial of closed 3-braids*, J. Reine Angew. Math. (Crelle's J.) **564** (2003), 167–180.

[HS] *Examples of knots without minimal string Bennequin surfaces*, joint with M. Hirasawa, Asian Journal Math. **7(3)** (2003), 435-446.

[St41] *On the Polyak-Viro Vassiliev invariant of degree 4*, Canad. Math. Bull. **49(4)** (2006), 609–623.

[SV] *Counting alternating knots by genus*, joint with A. Vdovina, Math. Ann. **333** (2005), 1–27.

[St42] *Graphs, determinants of knots and hyperbolic volume*, Pacific J. Math. **232(2)** (2007), 423–451.

[St43] *On polynomials and surfaces of variously positive links*, Jour. Europ. Math. Soc. **7(4)** (2005), 477–509.

[MS] *The Alexander polynomial of planar even valence graphs*, joint with K. Murasugi, Adv. Appl. Math. **31(2)** (2003), 440–462.

[St44] *Newton-like polynomials of links*, Enseign. Math. (2) **51(3-4)** (2005), 211–230.

[SSW] *Euclidean Mahler measure and twisted links*, joint with D. S. Silver and S. G. Williams, Algebr. Geom. Topol. **6** (2006), 581–602.

[St45] *Minimal genus of links and fibering of canonical surfaces*, Illinois J. Math. **59(2)** (2015), 399–448.

[St46] *Exchange moves and non-conjugate braid representatives of knots*, joint with R. Shinjo, Nagoya Math. J. **240** (2020), 298–321, DOI: https://doi.org/10.1017/nmj.2019.10

[St47] *On cabled knots and Vassiliev invariants (not) contained in knot polynomials*, Canad. J. Math. **59(2)** (2007), 418–448.

[St48] *Hard to identify (non-)mutations*, Math. Proc. Cambridge Philos. Soc. **141(2)** (2006), 281–285.

[St49] *Square numbers and polynomial invariants of achiral knots*, Math. Z. **255(4)** (2007), 703–719.

[St50] *Genus generators and the positivity of the signature*, Algebr. Geom. Topol. **6** (2006), 2351–2393.

[ST] *Mutation and the colored Jones polynomial*, joint with Toshifumi Tanaka, Journal of Gökova Geometry & Topology **3** (2009), 44–78.

[St51] *Hyperbolicity of the canonical genus two knots*, Journal of Symbolic Computation **101(6)** (2020), 242–269, DOI: https://doi.org/10.1016/j.jsc.2019.08.003

[St52] *Some examples related to knot sliceness*, J. Pure Applied Algebra **210(1)** (2007), 161–175.

[St53] *Generating functions, Fibonacci numbers, and rational knots*, J. Algebra **310(2)** (2007), 491–525.

[St54] *Bennequin's inequality and the positivity of the signature*, Trans. Amer. Math. Soc. **360(10)** (2008), 5173–5199.

[St55] *Minimal genus and fibering of canonical surfaces via disk decomposition*, LMS J. of Comp. and Math. **17(1)** (2014), 77–108.

[St56] *Coefficients and non-triviality of the Jones polynomial*, J. Reine Angew. Math. (Crelle's J.) **657** (2011), 1–55.

[St57] *On the crossing number of semiadequate links*, Forum Math. **26(4)** (2014), 1187–1246.

[St58] *5-moves and Montesinos links*, J. Math. Soc. Japan **59(3)** (2007), 729–749.

[St59] *On non-conjugate braids with the same closure link*, Journal of Geometry **96(1)** (2010), 179–186.

[St60] *Tait's conjectures and odd crossing number amphicheiral knots*, Bull. Amer. Math. Soc. **45** (2008), 285–291.

[ST2] *On Tabulation of Mutants*, joint with Toshifumi Tanaka, Proceedings of the International Conference "Intelligence of Low Dimensional Topology 2006" (Hiroshima University), Ser. Knots Everything **40**, World Sci. Publ., Hackensack, NJ, 2007, 299–306.

[St61] *On the definition of graph index*, J. Austral. Math. Society **94(3)** (2013), 417–429.

[St62] *On the Satellite crossing number conjecture*, Journal of Topology and Analysis **3(2)** (2011), 109–143.

[St63] *Vassiliev invariants, Seifert matrix, and hyperbolic volume of knots*, Int. Math. Res. Not., Art. ID **rnn119** (2008).

[St64] *Application of braiding sequences I: On the characterization of Vassiliev and polynomial link invariants*, Comm. Contemp. Math. **12(5)** (2010), 681–726.

[St65] *Realizing Alexander Polynomials by Hyperbolic Links*, Expo. Math. **28(2)** (2010), 133–178.

[St66] *The classification of partially symmetric 3-braid links*, Open Mathematics **13(1)** (2015), 444–470.

[St67] *Non-mutants with equal colored Jones polynomial*, C. R. Acad. Sci. Paris, Ser. I **347** (2009), 809–811.

[St68] *Application of braiding sequences III: Concordance of Positive Knots*, Internat. J. Math. **26(7)** (2015) 1550050 1–36, DOI: 10.1142/S0129167X15500500

[St69] *Application of braiding sequences IV: link polynomials and geometric invariants*, Annales de l'Institut Fourier **70(4)** (2020), 1431–1475, DOI: https://doi.org/10.5802/aif.3371

[St70] *Tabulating and distinguishing mutants*, Internat. Jour. Algebra Comput. **20(4)** (2010), 525–559, DOI: 10.1142/S0218196710005789

[St71] *Non-conjugate braids with the same closure link from density of representations*, Jour. Math. Pures Appl. **94(5)** (2010), 470–496.

[St72] *Computing the girth of knots*, Acta Math. Sin. (Engl. Ser.) **28(3)** (2012), 515–528.

[St73] *Hoste's conjecture and roots of Link polynomials*, Annals of Combinatorics **22(2)** (2018), 393–431.

[St74] *Log-concavity and zeros of the Alexander polynomial*, Bulletin of the Korean Mathematical Society **51(2)** (2014), 539–545.

[St75] *A theorem on graph embedding with a relation to hyperbolic volume*, Combinatorica **36(5)** (2016), 557–589.

[St76] *Everywhere Equivalent and Everywhere Different Knot Diagrams*, Asian J. Math. **17(1)** (2013), 95–137.

[St77] *Everywhere Equivalent 3-Braids*, Symmetry, Integrability and Geometry: Methods and Applications (SIGMA) **10** (2014), 105–126, DOI: 10.3842/SIGMA.2014.105.

[St78] *Everywhere Equivalent 2-Component Links*, Symmetry **7** (2015), Special Issue "Diagrams, Topology, Categories and Logic", 365–375, DOI: 10.3390/sym7020365.

[St79] *Independence polynomials and Alexander-Conway polynomials of plumbing links*, Journal of Combinatorial Theory, Series A 183 (2021), 105487, DOI: doi.org/10.1016/j.jcta.2021.105487.

[St80] *Hoste's Conjecture for Generalized Fibonacci Polynomials*, Communications in Algebra **47(1)** (2019), 362–406, DOI: 10.1080/00927872.2018.1477946.

[St81] *Hoste's conjecture and roots of the Alexander polynomial*, Knots, Low-Dimensional Topology and Applications: Knots in Hellas, International Olympic Academy, Greece, July 2016 (Springer Proceedings in Mathematics & Statistics), 191–206.

[St82] *Sublinks of strongly quasipositive links*, J. Math. Sci. (Series B), **275(1)** (2023), 38–54, DOI: 10.1007/s10958-023-06658-w.

[St83] *Exchangeability and non-conjugacy of braid representatives*, International Journal of Computational Geometry and Applications **31(1)** (2021), 39–73.

[St84] *Subsymmetric exchanged Braids and the Burau matrix*, Proceedings Roy. Soc. Edinburgh, Section A **154(1)** (2024), 154–187. https://www.doi.org/10.1017/prm.2023.1

Book chapters

[CS] *Vassiliev/Finite Type Invariants*, joint with S. Chmutov, to appear in "A Concise Encyclopedia of Knot Theory", CRC Press. ISBN 9781138297845,
https://www.routledge.com/Encyclopedia-of-Knot-Theory/Adams-Flapan-Henrich-Kauffman-Ludwig-Nelson/p/book/9781138297845

Professional and Ethical matters

[St85] *Honesty in Mathematical Writing*, Letters to the Editor, Notices of the AMS **57(6)** (June/July 2010), 703.

[St86] *Conduct and Correctness in Mathematical Publishing*, in press by Publishing Research Quarterly **38** (2022), 586–598, https://doi.org/10.1007/s12109-022-09895-0.

[St87] *Reliability or Liability in the Contemporary Mathematics Publishing Process? An Ethical and Technological Case Study*, Cogent Social Sciences OASS **9(2)** (2023), 2244259, https://doi.org/10.1080/23311886.2023.2244259 technological case study, Alexander Stoimenov, Cogent Social Sciences (2023), 9: 2244259.

Monographs

[St88] *Diagram genus, generators and applications*, T&F/CRC Press Monographs and Research Notes in Mathematics (2016), ISBN 9781498733809.

[St89] *Properties of Closed 3-Braids and Braid Representations of Links*, Springer Briefs in Mathematics (2017), ISBN 978-3-319-68148-1

Some unrefereed conference proceedings

[St90] *A Survey on Vassiliev Invariants for knots*, "Mathematics and Education in Mathematics", Proceedings of the XXVII. Spring Conference of the Union of Bulgarian Mathematicians, 1998, 37–47.

[St91] *The existence of achiral knot diagrams*, Proceedings of The Second East Asian School of Knots and Related Topics in Geometric Topology, Dalian, China, 2005, 15–26.

[St92] *Lie Groups, Burau Representation, and Non-conjugate Braids with the Same Closure Link*, Proceedings of the First Topology Workshop KAIST, 2008, Trends in mathematics - New Series **11(1)** (2009), 103–106.

Translated work

[St93] *Tait*猜想和奇交义数双手征纽结, 数学译林 第**35**卷**(**第**2**期**)** (2016), 115–120. (Chinese translation of [St60].)

Papers and monographs with partial contributions

[Fi] Th. Fiedler, *Gauss Diagram Invariants for Knots and Links*, Kluwer Academic Publishers, Mathematics and Its Applications Vol **532** (2001).

[Fi2] ——— " ———, *Gauss diagram invariants for knots which are not closed braids*, Math. Proc. Cambridge Philos. Soc. **135(2)** (2003), 335–348.

[Mo] H. R. Morton (ed.), *Problems*, Ser. Knots Everything **24** (Knots in Hellas '98, Delphi), World Sci. Publishing 2000, 547–559.

[Oh] T. Ohtsuki (ed.), *Problems on invariants of knots and 3-manifolds*, Geometry and Topology Monographs **4** (2002) (Invariants of knots and 3-manifolds, Kyoto 2001), 377–572.

[Za] D. Zagier, *Vassiliev invariants and a strange identity related to the Dedekind eta-function*, Topology **40(5)** (2001), 945–960.

References (some mathematicians who can be consulted about my work/my teaching*)

Gwang Song Park*
Department of Mathematics,
Keimyung University
Dalseo-Gu, Sindang-Dong 1000,
Daegu 704-701, Korea
Phone: +82-53-580-5174
Fax: +82-53-580-5164
kparkm@kmu.ac.kr

Hugh Morton
43 Embankment Road
Kingsbridge
Devon
TQ7 1LA
United Kingdom
Phone: +44 154 885 4757
su14@liverpool.ac.uk

Thomas Fiedler
Laboratoire E. Picard
Universite P. Sabatier
118, Route de Narbonne
31062 Toulouse Cedex, France
Tel : (+33) (0)5 6155 8312
Fax : (+33) (0)5 6155 8200
thomas.fiedler@math.univ-toulouse.fr

Toshitake Kohno
Graduate School of Mathematical Sciences,
University of Tokyo
Komaba, Tokyo 153-8914,
Japan
Tel +81-3-5465-7001
Fax +81-3-5465-7011
kohno@ms.u-tokyo.ac.jp

Louis H. Kauffman
Department of Math.
Univ. of Illinois at Chicago
851 South Morgan Street
Chicago, Illinois 60607-7045
USA
Phone: (312)-996-3066
Fax: (312) 996-1491
kauffman@uic.edu

Gyo Taek Jin
Department of Mathematics
Korea Advanced Institute of
Science and Technology (KAIST)
4404 Natural Sciences Building
Daejeon, 305-701, Korea
Phone: +82-42-869-2724, 2764 (Office)
+82-10-6570-5808 (Mobile)
Fax: +82-42-869-2710
gyotaek@gmail.com

Ludmil Katzarkov
Institut für Mathematik
Universität Wien
Oskar-Morgenstern-Platz 1, 1090 Wien
Austria
Phone: +43 1 4277 50452
Fax: +43 1 4277 850452
ludmil.katzarkov@univie.ac.at
l.katzarkov@math.miami.edu

Martin Ziegler*
School of Computing,
Korean Advanced Institute of
Science and Technology (KAIST),
Daejeon 34141, Korea
Phone: +82-10-3428-2509
+82-42-350-3568
ziegler@theoryofcomputation.asia

Joachim Hyam Rubinstein
University of Melbourne,
Honorary Mathematics and Statistics
01, 175, Peter Hall Building,
Monash Road, Parkville, VIC 3010
Australia
Phone: +61 3 83445548
Mobile: +61 425 787 861
joachim@unimelb.edu.au

Yongjin Song
Inha University, College of Natural Sciences
Department of Mathematics
100 Inha-ro, Michuhol-gu, Incheon 22212, Korea
Laboratory : 5N221
Tel : 032-860-7631, +82-10-5477-9294,
yjsong@inha.ac.kr

Morwen Thistlethwaite,
Department of Mathematics
University of Tennessee
Knoxville, Tennessee 37996
USA
mthistle@utk.edu

Cam Van Quach Hongler
Section de mathématiques
UNI DUFOUR
24, rue du Général Dufour
Case postale 64
1211 Genève 4, Suisse

Tel:+41 22 364 57 73
Cam.Quach@unige.ch

Sergei Chmutov
The Ohio State University, Mansfield Campus,
1760 University Drive
Mansfield, OH 44906
USA
Phone: (419)-755-4287
FAX: (419)-755-4367
chmutov@math.ohio-state.edu

Wontaek Song 송원택*
서울과학고등학교 수학과
서울특별시 종로구 혜화로 63
Phone: +82-10-7419-1257, 02-740-6374
wontaek.song@gmail.com

Se-Goo Kim
Department of Mathematics
Kyung Hee University
26, Kyungheedae-ro, Dongdaemun-gu,
Seoul, 02447, Republic of Korea
College of Science Room 511
+82-2-961-0381
sgkim@khu.ac.kr

Sebastian Baader
Mathematisches Institut
Sidlerstrasse 5
3012 Bern

+41 31 684 88 35
sebastian.baader@unibe.ch

1 Subject and Achievement of past Research

My research covers several areas of knot theory, with relations to combinatorics, number theory and algebra, which are outlined below (and by no means unrelated). The following explains some key topics, with reference to *published or accepted* papers (cf. the bibliography in "Publications") when available.

1.1 Vassiliev invariants

My first work was to improve the upper bound on the dimension of Vassiliev invariants of degree D. The best known previous upper bound was $(D-2)!/2$ due to Ng. It was known that Vassiliev invariants can be understood combinatorially in terms of chord diagrams modulo the $4T$ relation. I introduced a certain type of chord diagrams and showed that they generate modulo $4T$ relations the space of Vassiliev invariants. Then I estimated from above the number of such chord diagrams to $D!/1.1^D$ [St3]. Later, Zagier [Za] showed that the generating series of the numbers of such chord diagrams occurs in a strange identity related to the Dedekind eta-function. He found the exact asymptotical behaviour of these numbers, improving the number 1.1 to $\pi^2/6$, thus establishing the currently best upper bound.

My later work were constructions of knots with Vassiliev invariants of bounded degree and specific properties, like given unknotting numbers, signatures and 4-genera [St19]. I showed the nonexistence of Vassiliev invariants that depend on any finite number of link polynomial coefficients (except the Conway/Alexander polynomial) [St64].

1.2 Legendrian knots

Legendrian knots are called knots embedded in the standard contact space. There are inequalities relating the Thurston-Bennequin invariant and Maslov number of Legendrian knots and the degrees of the polynomial invariants of the underlying topological knots. Using these inequalities I gave estimates of the invariants of Legendrian negative knots [St15, St27]. This result can be considered as a generalization of Kanda's determination of the maximal Thurston- Bennequin invariant of the negative trefoil.

1.3 Gauss diagram formulas

Fiedler and Polyak-Viro introduced a new approach to defining Vassiliev invariants by explicit formulas. Such formulas involve sums over specific tuples of crossings of a knot or link diagram of functions involving writhes of the crossings (similarly to linking numbers). These formulas proved useful in the study of positive knots (knots with diagrams all of whose crossings are positive). Positive knots and links have been studied, beside because of their intrinsic knot-theoretical interest, with different motivations and in a variety of contexts, including singularity theory, algebraic curves, dynamical systems, and (in some vague and yet-to-be understood way) in 4-dimensional QFTs. Using the Fiedler-Polyak-Viro formulas, I found several inequalities between Vassiliev invariants of positive knots, allowing to exclude certain knots from having this property [St12]. Later I sought generalizations of some criteria to almost positive knots [St15].

1.4 Canonical Seifert surfaces

The set of knot diagrams whose canonical Seifert surfaces (that is, surfaces obtained by Seifert's algorithm) of given (canonical) genus admits a structure of generating series. One of the first insights was, for example, that the number of alternating knots of fixed genus grows polynomially in the crossing number [SV, St17].

This approach allows one to prove much more, and has developed into a quite large body of work. Centrally, it is described in my book [St88]. While it is meant as a research monograph, it can be approached on a rather non-exprert level. It contains a general introduction, then the presentation and proof of several results (mainly the description of genus 4 generating series and its application), and concludes with a summary of further directions of related research. There is a series of further articles; for example, see [St68] for an application to concordance.

1.5 Non-trivial Jones polynomial problem

In 1985 Jones discovered the famous polynomial invariant named after him and asked if it distinguishes all non-trivial knots from the trivial one. His question remains unanswered despite the recent (negative) solution for links. I showed that semiadequate links, as defined by Lickorish-Thistlethwaite, have non-trivial Jones polynomial. Montesinos links are semiadequate, and then I showed that so are 3-braid links, so the non-triviality result applies to these classes (see [St60]).

1.6 Mutation and the colored Jones polynomial

In joint work with Toshifumi Tanaka [ST], we found examples of knots with the same polynomial invariants and hyperbolic volume, with variously coinciding 2-cable polynomials and colored Jones polynomials, which are not mutants. In particular, we show that there exists an infinite family of pairs of hyperbolic knots with equal colored Jones polynomial, which are not mutants. This answers a question of Przytycki.

1.7 Closed 3-braids

I classified among closed 3-braid links the alternating [St40], braid positive, strongly quasipositive and fibered ones. Then I showed that 3-braid links with given (non-zero) Alexander or Jones polynomial are finitely many, and can be effectively determined. In recent joint work with M. Hirasawa and M. Ishiwata we showed that 3-braid links have a unique incompressible Seifert surface.

1.8 Roots of the Alexander polynomial and Hoste's conjecture

The Alexander polynomial remains one of the most fundamental invariants of knots and links in 3-space. It topological understanding has led a long time ago to the insight what (Laurent) polynomials occur as Alexander polynomial of an arbitrary knot. Ironically, the question to characterize the Alexander polynomials of alternating knots turns out to be far more difficult, even although in general alternating knots are much better understood. Hoste, based on computer verification, made the following conjecture about 10 years ago: If z is a complex root of the Alexander polynomial of an alternatingknot, then $\Re e\, z > -1$. In [St73] I obtain some results toward this conjecture, about 2-bridge (rational) knots or links, 3-braid alternating links, and Montesinos knots. For its re-

lation to (or rather, independence from) other properties of the Alexander polynomial of alternating links, see [St74].

1.9 Knot tables

For some time I have been interested in using knot tables, compiled by Hoste, Thistlethwaite, and Weeks, to seek knots with interesting properties, and so to provide examples and counterexamples to problems that have remained inaccessible using (entirely) manual reasoning (see e.g. [St33]).

1.10 Other topics

I have also done some work on unknotting numbers [St22], link polynomials [St43], number theoretic properties of knot invariants [St23, St24], enumeration problems of links [SV, St53], and everywhere equivalent links [St76, St77, St78].

2 Present and future Research

Knot theory attracts with a variety of problems, many of which are easy to formulate but nonetheless difficult to resolve. One such outstanding problem, around since the origin of knot tables by Tait and Little at the end of the 19th century, is the additivity of the crossing number under connected sum.

I will list now some main topics of research I was interested in at various points. My choice of problems is not fixed, and will also depend on my interaction with other mathematicians. Thus priorities shift with the time, and the below selection is not uniformly relevant (and neither is it complete), but it will outline some main directions of work in the visible future. At every topic I will also briefly explain the expected results of its investigation.

2.1 Hyperbolic volume

There have been so far several situations, in which the hyperbolic volume exhibits a relation to a combinatorily defined knot invariant. The most important one is Kashaev's conjecture on values of colored Jones polynomials, popularized by H. Murakami.

Another correspondence was observed by Brittenham, namely that the volume is bounded on alternating knots of given genus. His bound can be improved by inequalities of Lackenby-Agol-Thurston involving an invariant of knot diagrams called twist number. These bounds are also related to conjectures of Dunfield, namely that the volume linearly approximates a logarithm of the determinant of alternating knots. I'm currently interested in obtaining and improving such inequalities.

2.2 Trivalent graphs and enumeration of knots by genus

There is also a relation between the Brittenham approach and the enumeration problems of knots of given genus, and the sl_N weight system of trivalent graphs known from the theory of Vassiliev invariants.

One can express the maximal volume of knots of given canonical genus by links L_G associated to planar trivalent graphs G similarly to Habiro's claspers. The sl_N weight system of G then is related to both the hyperbolic volume and the enumeration of knots by genus, and also to the enumeration of 1-vertex triangulations of oriented surfaces carried out by my collaborator A. Vdovina.

2.3 Weight system-volume-conjectures

The form of the relation between the sl_N weight system W_N of G and volume of L_G is not yet clear, but calculations suggest that definitely something is going on beyond accidental coincidences. (A brief outline of this phenomenon can be found in the last section of my book [St88], as well as in the preparatory article [St75].) I hope in the future to deepen my understanding of hyperbolic volumes, in particular to understand better these relations. I hope also to find out whether and what is a relation of these coincidences to the Volume conjecture. For example, can one calculate the colored Jones polynomials of L_G, and establish the relation modulo the Volume conjecture? Can one gain insight into the Volume conjecture from these relations? This is also linked to understanding the, in particular multiplicative, structure of the sl_N weight systems of G. Few facts are known, including the multiplicative character of Vogel's algebra and Bar-Natan's version of the 4-Color-Theorem. A new observation from the work of Bacher and Vdovina on 1-vertex triangulations is that the linear term of the sl_N weight systems vanishes in Euler characteristic < -1. Their work also implies bounds on the number of linear monomials in the calculation of W_N, that in turn bound the asymptotical growth of the number of alternating knots of given genus, which I seek to improve. I hope to progress on at least some of these many interrelated problems in the future.

2.4 Non-trivial Jones polynomial problem

I seek further generalizations of the non-triviality result for the Jones polynomial, for example to arborescent knots. I also try to prove that there are achiral knots of any odd crossing number at least 15.

2.5 Braids

I'm also working on some problems of braids, for example the question of Rudolph whether (strongly) quasipositive knots have (strongly) quasipositive braid representations of minimal strand number. I expect counterexamples but they are not easy to construct. (I had in the past some counterexamples for positive braid representations and, jointly with M. Hirasawa, minimal genus band representations [HS].)

With R. Shinjo, we prove that under fairly general conditions an iterated exchange move, as introduced by Birman and Menasco, gives infinitely many non-conjugate braid representatives. As a consequence, every knot has infinitely many conjugacy classes of n-braid representatives if and only if it has one admitting an exchange move. This work is related in result to [St71], but the approach is entirely different. We are finalizing a paper on this topic, and seek in how far one can generalize this statement to links.

2.6 Number theoretic properties of knot invariants

One of my original mathematical interests was number theory (my specialization turned into a different direction by the influence I experienced during my studies). I'm interested in situations in

which knot invariants can be studied from the point of view of some elementary number theoretic properties. A series of problems I intend to work on is related to determinants of achiral knots with particular properties, for example unknotting number one. These determinants are sums of two squares. It would be interesting to study which such numbers occur in which situations. Number theoretic properties of the determinant have also applications to unknotting numbers and knot distance, and maybe I can find more such applications.

2.7 Gauss sum invariants

There are still opportunities left in the application of Gauss sum invariants to positive knots and related knot classes, most naturally, to improve the existing inequalities. More importantly, there is a (long-term and long-postponed) computational project is to implement some of Fiedler's new character Gauss sum invariants (which take as input not a single diagram, but a sequence of diagrams of knots in the solid torus), and see what they distinguish. Ideally, one hopes to distinguish knot orientation with them, after the success on braids. This will obviously give a huge impetus on the theory of Gauss sum invariants.

2.8 Other topics

Much progress remains to be done on Hoste's conjecture, notably the proof even for simple classes like 2-bridge links, alternating 3-braid links, etc.

There is a conjectured classification of everywhere equivalent links [St76], and it would be interesting to verify its completeness in special cases. This was done for 3-braids in [St77] and 2 components in [St78]. The 3-component case at least looks feasible.

Extending work of Ishiwata, I determined the 5-move equivalence classes of Montesinos links up to mutation; one obtains from this a Jones and Kauffman polynomial test for a Montesinos link [St58]. A minor problem has remained to remove 'up to mutation'. A 5-move preserves the 5-Burnside group of the link group, and maps 1-to-1 the homomorphisms to a fixed 5-group, so I may explore group theoretic ways to accomplish this.