

Curriculum Vitae of Chenchang Zhu

Office Address:

Mathematisches Institut
Georg-August-Universität Göttingen
Bunsenstr. 3-5
D-37073 Göttingen Germany

Tel: +49 (551) 39-27799
Fax: +49 (551) 39-22985
czhu@gwdg.de
<https://www.uni-math.gwdg.de/zhu/>

Positions	GÖTTINGEN UNIVERSITY Professorin (tenured W2) in Mathematics, since August 2013	Göttingen, Germany
	GÖTTINGEN UNIVERSITY Juniorprofessorin (tenure-track) in Mathematics, September 2008–August 2013	Göttingen, Germany
	INSTITUT FOURIER Maître de conférences (Assistant professor) in Mathematics, since November 2006–August 2008	Grenoble, France
	ETH: EIDGENÖSSISCHE TECHNISCHE HOCHSCHULE ZÜRICH Post-doc position in Mathematics, June 2004–October 2006	Zürich, Switzerland
Education	UNIVERSITY OF CALIFORNIA AT BERKELEY Ph.D. in Mathematics, in May 2004 Advisor: Alan Weinstein	Berkeley, CA, 94720
	PEKING UNIVERSITY B.S. in Mathematics, June 1999	Beijing, P. R. China

Research Interests

Higher structures in differential geometry, Poisson geometry, Symplectic geometry,

Publications

Publications in journals (with peer review)

- Shifted symplectic higher Lie groupoids and classifying spaces:** Miquel Cueva Ten, Chenchang Zhu; with Appendix E by Florian Dorsch, preprint 2021, arXiv:2112.01417, Adv. Math. 413 (2023), Paper No. 108829. 53D17 (18N65 22E67 57T10).
- The controlling L_∞ -algebra, cohomology and homotopy of embedding tensors and Lie-Leibniz triples:** Yunhe Sheng, Rong Tang, Chenchang Zhu, arXiv:2009.11096, Comm. Math. Phys. 386 (2021), no. 1, 269304.
- On the homotopy theory for Lie ∞ -groupoids, with an application to integrating L_∞ -algebras:** Christopher L. Rogers, Chenchang Zhu, preprint 2016; arXiv:1609.01394, *Algebraic and Geometric Topology* 20 (2020), no. 3, 11271219.
- Topological non-linear -model, higher gauge theory, and a realization of all 3+1D topological orders for boson systems:** Chenchang Zhu, Tian Lan, Xiao-Gang Wen, preprint 2018, arXiv:1808.09394, Phys. Rev. B 100, 045105 (2019)
- Fermion decoration construction of symmetry protected trivial orders for fermion systems with any symmetries G_f and in any dimensions:** Tian Lan, Chenchang Zhu, Xiao-Gang Wen, preprint 2018, arXiv:1809.01112, Phys. Rev. B 100, 235141 (2019)

6. **Courant algebroids and String principal bundles:** Yunhe Sheng, Xiaomeng Xu, Chenchang Zhu, preprint 2017, arXiv:1701.00959, *International Mathematics Research Notices*, 2019, rnz017, <https://doi.org/10.1093/imrn/rnz017IMRN>.
7. **Principal actions of stacky Lie groupoids:** Henrique Bursztyn, Francesco Nosedà, Chenchang Zhu, preprint 2015; arXiv:1510.09208, *International Mathematics Research Notices*, 2018, rny142, <https://doi.org/10.1093/imrn/rny142>
8. **Chern-Simons, Wess-Zumino and other cocycles from Kashiwara-Vergne and associators:** Anton Alekseev, Florian Naef, Xiaomeng Xu, Chenchang Zhu, preprint 2017; arXiv:1702.08857, *Lett. Math. Phys.* 108 (2018), no. 3, 757778.
9. **Higher Extensions of Lie Algebroids:** Yunhe Sheng, Chenchang Zhu, preprint 2011; arXiv:1103.5920, *Communications in Contemporary Mathematics* 19 (2017), no. 3, 1650034, 41, doi: 10.1142/S0219199716500346. MR3631929
10. **Integrating central extensions of Lie algebras via Lie 2-groups:** Christoph Wockel, Chenchang Zhu, preprint 2012; arXiv:1204.5583, *Journal of the European Mathematical Society (JEMS)*, 18 (2016), no. 6, 1273-1320.
11. **Some remarks on representations up to homotopy:** Giorgio Trentinaglia, Chenchang Zhu, preprint 2015; arXiv:1511.02686, *Int. J. Geom. Methods Mod. Phys.* 13 (2016), no. 3, 1650024, 15 pp.
12. **Groupoids in categories with pretopology:** Ralf Meyer, Chenchang Zhu, preprint 2014; arXiv:1408.5220, *Theory Appl. Categ.* 30 (2015), Paper No. 55, 1906-1998.
13. **Lie 2-bialgebras:** Chengming Bai, Yunhe Sheng, Chenchang Zhu, preprint 2011; arXiv:1109.1344, *Comm. Math. Phys.* 320 (2013), no. 1, 149172.
14. **A higher category approach to twisted actions on C*-algebras:** Alcides Buss, Chenchang Zhu, Ralf Meyer, preprint 2009; arXiv:0908.0455, *Proceedings of the Edinburgh Mathematical Society* (2) 56 (2013), no.2, 387-426.
15. **Higher Lie algebra actions on Lie algebroids:** Marco Zambon, Chenchang Zhu, preprint 2010; arXiv:1012.0428, *J. Geom. Phys.* 64 (2013), 155173.
16. **Distributions and quotients on degree 1 NQ-manifolds and Lie algebroids:** Marco Zambon, Chenchang Zhu, preprint 2012; arXiv:1202.1378, *J. Geom. Mech.* 4 (2012), no. 4, 469485.
17. **Integration of Lie 2-algebras and their morphism:** Yunhe Sheng, Chenchang Zhu, preprint 2011; arXiv:1109.4002, *Lett. Math. Phys.* 102 (2), (2012), 223-244.
18. **Integration of semidirect product Lie 2-algebras:** Yunhe Sheng, Chenchang Zhu, preprint 2010; arXiv:1003.1348, *International Journal of Geometric Methods in Modern Physics (IJGMMP)* 9 (2012), no. 5, 1250043, 31 pp.
19. **Semidirect products of representations up to homotopy:** Yunhe Sheng, Chenchang Zhu, 2009; arXiv:0910.2147, *Pacific Journal of Mathematics* 249-1 (2011), 211-236. DOI 10.2140/pjm.2011.249.211.
20. **Omni-Lie 2-algebras and their Dirac structures:** Yunhe Sheng, Zhangju Liu, Chenchang Zhu, 2010; arXiv:1007.4896, *Journal of Geometry and Physics* 61 (2011), pp. 560-575, DOI:10.1016/j.geomphys.2010.11.005
21. **Lie algebroid Fibrations :** O. Brahic, Chenchang Zhu, preprint, 2010; *Advances in Mathematics* Volume 226, Issue 4, 1 March 2011, Pages 3105-3135; arXiv:1001.4904.
22. **Non-Hausdorff Symmetries of C*-algebras:** Alcides Buss, Chenchang Zhu, Ralf Meyer, arXiv:0907.0339, *Math. Annal.* DOI: 10.1007/s00208-010-0630-3.
23. **Strictification of étale stacky Lie groups:** Giorgio Trentinaglia, Chenchang Zhu, preprint 2010, arXiv:1006.1262; *Compositio Mathematica* 2011, doi:10.1112/S0010437X11007020;
24. **Kan replacement of simplicial manifolds:** C. Zhu, preprint, 2008, *Letters in Mathematical Physics:* Volume 90, Issue 1 (2009), Page 383; arXiv:0812.4150.

25. **Lie n -groupoids and stacky Lie groupoids:** C. Zhu, preprint 2008, arXiv:0801.2057 *International Mathematics Research Notices* (2009) 2009:4087-4141; DOI: 10.1093/imrn/rnp080.
26. **A gerbe of Gamma functions:** G. Felder, A. Henriques, C.A. Rossi, C. Zhu, preprint math.QA/0601337 (2006), *Duke Mathematical Journal* **141-1** (2008).
27. **On the geometry of prequantization spaces:** M. Zambon and C. Zhu, *Journal of Geometry and Physics* **57** (2007), 2372–2397.
28. **Hopfish algebras:** A. Weinstein, X. Tang and C. Zhu, *Pacific Journal of Mathematics* **231-1** (2007), 193-216.
29. **Integrability of Jacobi and Poisson structures:** M. Crainic and C. Zhu, *Annales de l'institut Fourier* **57-4** (2007), 1181-1216.
30. **Contact Reduction and groupoid actions:** M. Zambon and C. Zhu, *Trans. AMS.* **358** (2006), 1365–1401.
31. **Integration Lie algebroids via stacks:** H. Tseng and C. Zhu, *Compositio Mathematica* **142** (2006), no. 1, 251–270.
32. **Integration of twisted Dirac brackets:** H. Bursztyn, M. Crainic, A. Weinstein and C. Zhu, *Duke Mathematical Journal* **123** (2004), no. 3, 549–607.

Book/article contributions and conference proceedings

1. **Stacky Hamiltonian actions and symplectic reduction:** Benjamin Hoffman, Reyer Sjamaar, preprint 2018, arXiv:1808.01003, appendix by Chenchang Zhu, *Int. Math. Res. Not. IMRN* 2021, no. 20, 1520915300.
2. **Lie II theorem for Lie algebroids:** Chenchang Zhu. Mathematisches Institut, Georg-August-Universitt Gttingen: Seminars Winter Term 2007/2008. Lecture notes from the "Courant Colloquia" held at the University of Gttingen, Gttingen, 2004–2005. Edited by Yuri Tschinkel. Universittdrucke Gttingen, Gttingen.
3. **Elliptic gamma functions, triptic curves and $SL_3(Z)$:** G. Felder, A. Henriques, C.A. Rossi and C. Zhu, preprint math.QA/0601337, *Oberwolfach Reports*.
4. **Morita equivalence of Poisson manifolds via stacky groupoids:** H. Bursztyn and C. Zhu, preprint axiv:0707.2575, *Oberwolfach Reports*.
5. **Integration Poisson manifolds via stacks:** H. Tseng and C. Zhu, *Travaux mathematiques* **15** (2005), 285–297.

Submitted

1. **Lie theory and cohomology of relative Rota-Baxter operators:** Jun Jiang, Yunhe Sheng, Chenchang Zhu, preprint 2021, arXiv:2108.02627, review process with J. London Math. Soc.
2. **Differentiating L_∞ groupoids – Part I:** Du Li, Leonid Ryvkin, Arne Wessel, Chenchang Zhu, preprint arXiv:2309.00901, submitted.

Honors, Grants, and Fundings

Gold Medal (Full score), in **IMO: International Mathematical Olympiad**, 1995 (Top 3% from 73 countries).

Liftoff Fellow of Clay Mathematics Institute, June 2004.

Funding from ANR (L'Agence Nationale de la Recherche), 2006.

Funding from CCCI: Commission des colloques et congrès internationaux, to provide myself the travel expense for the thematic program “Geometric Applications of Homotopy Theory” in Fields Institute, Toronto, 400 euros, 30.03.2007.

Funding from DFG (German Science Foundation), Ralf Meyer and Chenchang Zhu; project title: “Actions of 2-groupoids on C^* -algebras”, Individual Grant (ME 3248/1-1; 2009-2011), with total amount granted: 24 month full E 13 position and 6.000 euros for material expenses and travel expenses; date of approval: 04.03.2009; project duration in months: 01.09.2009 - 31.08.2011.

Extension of ME 3248/1-1, with total amount 124.900 euros granted; date of approval: 20.04.2011; extension length: additional 24 months.

Funding from DFG (German Science Foundation), Chenchang Zhu and Chris Rogers; project title: “Homotopy Lie Theory ”, Individual Grant (ZH 274/1-1), with total amount granted: 36 Mon. 50% E 13 position and 9.000 euros for material expenses and travel expenses; date of approval, 16.03.2015; project duration in months: 01.09.2016-31.08.2019.

Funding from DFG (German Science Foundation), Chenchang Zhu; project title “Van Est integration in höherer Lie Theorie”, Individual Grant (ZHU 274/3-1), with total amount granted: 36 Mon. 87.200 Euro with additional 19.200 Euro for for material expenses and travel expenses; date of approval, 09.06.2020.

2020, Funding for the 2-month program “Higher Structures in Field Theory”, Erwin Schrödinger Institute, Wien

2019 –2023, DFG funding on RTG 2491 “Fourier Analysis and Spectral Theory”, Göttingen, PI.

2018, Funding for 2-week summer school “Derived and Higher Geometry in mathematics and physics”, Fields Institute, Toronto

Teaching Experience

The most recent courses I taught are in German. I had a sabbatical semester in Beijing during the winter semester 2010-2011, and a sabbatical during the summer semester 2021. Thus my teaching in Göttingen is absent during these two semesters.

Moreover, let me emphasize that, with the course “Problem Solving”, we selected every time 3-4 students at the end of the semester to attend **IMC** (International Mathematics Competition for university students). In IMC 2016, we obtained three first prizes and one of the students is ranking no. 10 among more than three hundred participants. Moreover, as a team we achieved no. 6 among 72 teams around the world. Later Christain Bernert achieved grand 1st prize (top 0.5 percent). This year (2023), in particular, Male Hesse obtained grand 1st prize as the (only) top female. I plan to continue this course in the future.

For people who are not familiar with IMC, I quote the following information below: “The competition (IMC) is planned for students completing their first, second, third or fourth year of university education and will consist of 2 Sessions of 5 hours each. Problems will be from the fields of Algebra, Analysis (Real and Complex), Geometry and Combinatorics. The working language will be English. Over the previous sixteen competitions we have had participants from over 193 institutions in 44 countries.”

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

Göttingen, Germany

Seminar: higher structures, every semester.

Differential Geometry I — Category theory, Winter semester 2023-2024: Lectureship

Modern Geometry, Summer semester 2023: Lectureship

Problem Solving, Summer semester 2023: Lectureship

Algebra, Winter semester 2022-2023: Lectureship

Linear Algebra, Winter semester 2021-2022: Lectureship

Differential Geometry IV, Summer semester 2021: Lectureship

Seminar: universe and ourselves, semester Pause (spring) 2021.

Differential Geometry III, Winter semester 2020-2021: Lectureship

Seminar: universe and ourselves, Winter semester 2020-2021.

Differential Geometry II, Summer semester 2020: Lectureship

Differential Geometry I, Winter semester 2019-2020: Lectureship

Stacks and Lie groupoids, Winter semester 2019-2020: GRK (half)

Modern Geometry, Summer semester 2019: Lectureship

Problem Solving, Summer semester 2019: Lectureship

Abstract Algebra, Winter semester 2018-2019: Lectureship

Linear Algebra, Summer semester 2018: Lectureship
Problem Solving, Summer semester 2018: Lectureship
Linear Algebra, Winter semester 2017-2018: Lectureship
Problem Solving, Summer semester 2017: Lectureship
Discrete Math, Winter semester 2016-2017: Lectureship
Symplectic Geometry, Summer semester 2016: Lectureship
Discrete Math, Winter semester 2015-2016: Lectureship
Problem Solving, Summer semester 2015; Lectureship
Discrete Math, Winter semester 2014-2015: Lectureship
Problem Solving, Summer semester 2014: Lectureship
Discrete Math, Winter semester 2013-2014: Lectureship
Problem Solving, Summer semester 2013: Lectureship
Discrete Math, Winter semester 2012-2013: Lectureship
Problem Solving, Summer semester 2012: Lectureship
Poisson Geometry, Summer semester 2011-2012: Lectureship
Differential Geometry II–Lie group, Summer semester 2010: Lectureship
Differential Geometry I, Winter semester 2009-2010: Lectureship
Lie groupoids, Summer semester 2009: Lectureship
symplectic geometry, Winter semester 2008-2009: Lectureship

UNIVERSITÉ DE GRENOBLE

Grenoble, France

Differential calculus, Spring 2007: Teaching assistant

Bilinear algebra, Spring 2007: Teaching assistant

ETH

Zürich, Switzerland

Generalized complex geometry (undergraduate seminar), Spring 2006: Teaching assistant

MMP(Undergraduate course) *Mathematical method in physics*, Fall 2005 and Spring 2006:
Teaching Assistant and organizer of the exercise section.

Problem solving seminar, Fall 2004: Teaching assistant

U.C. BERKELEY

Berkeley, CA, U.S.A.

Math53(Undergraduate course) *Multivariable Calculus*, Fall 2003: Graduate Student In-
structor

Math241(Graduate course) *Complex Manifolds*, Spring 2003: Graduate Student Instructor

Math202B(Graduate course) *Real Analysis*, Spring 2002: Graduate Student Instructor

Math1B(Undergraduate course) *Calculus II*, Spring 2000: Graduate Student Instructor

Activities

Organization , as the chair of the scientific committee, of the bi-year big conference in Poisson Geometry: Poisson 2022.

Organization of the conference series of *Higher Structures in Geometry and Physics* in Goettingen, Newton Institute, Geneva, MPIM Bonn, Fields Institute, ESI (this is the most recent happened in summer 2022).

Organization of the workshop series of *Higher Structures in Topology and Geometry I, II, III, IV, V, VI* in Göttingen/Hamburg from 2008 to 2013.

Organization of the conference series of *Higher Structures in China I, II, III, IV, V* in China from 2009 to 2019.

Organization of *Graduate Colloquium* in Zürich from October 2005 to June 2006.

Organization of *Journée autour des Groupoïdes* in Fourier Institute at Grenoble March 2007.

Mitglieder der Prüfungskommission von (thesis committee member of) various students (in average 3-4 per year) since 2009.

Hiring committee for various universities and national foundations (in average 1-2 per year)

Referee for peer reviewed journals.

Reviewer for mathscinet.

**A categorized list of students, fellows, or postdocs supervised/mentored,
including Diploma, Bachelor and Master students**

Miquel Cueva-Ten (Postdoc since 9/2018): we work on shifted symplectic higher Lie groupoids.

Leonid Ryvkin (Postdoc supported by GRK, 9/2019-8/2022): we work on differentiation of higher Lie groupoids. He is now a Matre de confrence in University of Lyon.

Dennis Borisov (Postdoc 10/2014-2018): we plan to establish a correspondence between higher Lie groupoids and dg manifolds. He is now an assistant Professor in the University of Windsor, Canada.

Xiaoyi Cui (Postdoc under Dorothea Schl"ozer Program, 10/2014-9/2017) works on factorization algebras and quantum field theory. We held a series of seminars on factorization algebras together with the group of mathematical physicists of Dorothea Bahns and the group of topologists of Thomas Schick. She then found a tenured associate professorship in Zhongshan University in China.

Dmitri Pavlov (Postdoc 07/2014-03/2015) works on field theory and higher differential/algebraic geometry. Also a major input of the above joint seminar. He then found a postdoc position in Regensburg.

Chris Rogers (Postdoc 09/2011-06/2014): we are establishing a convenient category of fibrant objects for L_∞ -groupoids. He then found a postdoc position, and now tenure-track position in University of Nevada, Reno.

Lucio Cirio (Postdoc 2014): we plan to study a categorified version of Drinfeld twist. It will bring the connection of Cirio's categorification of virtual knots to our categorification of Lie bialgebras. He found a job in industry.

Giorgio Trentinaglia (Postdoc 10/2008-10/2011): we studied local property of Lie 2-groups and their strictification. This result was published in *Comp. Math.* He found a position in Lisbon.

Yunhe Sheng (Postdoc 12/2008-07/2009): we have a long-term and still ongoing collaboration on various projects. These projects are very fruitful and result in a series of publications, including some in top journals. He is now a full Professor in Jilin University, China.

Iakovos Androulidakis (Postdoc since 09/2009-08/2011) joined our group as a postdoc fellow in our DFG project "Actions of 2-groupoids on C^* -algebras", Individual Grant (ME 3248/1-1; 2009-2011). We plan to develop some higher algebroid theory on singular foliations. He is now a full Professor in Athens.

Weiwei Pan (Postdoc under Dorothea Schl"ozer Program, 01/2011-08/2012) works on higher representation theory of higher group(oid)s. We have held a series of seminars to learn about higher knot invariants which built much connection to Prof. Schick's group.

Nikolay Ivankov (Postdoc 09/2011-09/2014) joined our group as a postdoc fellow in our DFG project "Actions of 2-groupoids on C^* -algebras", Individual Grant (ME 3248/1-1; 2011-2013).

—————Ph.D. students—————

Du Li (PhD student 01/2010-07/2014) works on higher morphisms between higher Lie groupoids. Lurie views all sorts of higher morphisms between Kan complicies as certain

Kan fibrations over various simplicial simplices. Here he applies this idea to differential geometry (or other sorts of topologies) and realize higher morphisms between higher Lie groupoids (or topological groupoids, groupoid schemes) using Kan fibration since higher Lie groupoids can be viewed as certain Kan complices. He also produces differentiation of higher Lie groupoids to higher Lie algebroids (i.e. some sort of dg manifolds).

Malte Dehling (Master student 2010-2011, then Ph.D. student 10.2011-11.2020, with advisorship joined with Bruno Vallette): Malte Dehling's Masterarbeit is on the theory of homotopy extensions of Lie bialgebras. This topic is closely related to categorification of Lie bialgebras. Lie bialgebras are semi-classical limits of Drinfeld's quantum groups. Notice that there is much recent interest (e.g. the series of works of Khovanov-Lauda) in categorification of quantum groups motivated by knot theory and representation theory, for example, the series of work of Khovanov and Lauda. This work might have potential application when considering the classical limit of the above categorification. Then in Malte's Ph.D. thesis, he plans to study operad theory and build an operad as an algebra of a colored operad. He studies Koszul duality theory for colored operad. One application will be yet another model for E_∞ -algebras, which is convenient to be extended to number fields.

Giorgi Arabidze (2015-2018, Ph.D.) works on pretopology of categories with application to higher groupoid theory, cosupervision with Ralf Meyer.

Lada Peksová: (2016-2020, Ph.D.) Noncommutative structures in quantum field theory, cosupervision with Dorothea Bahns and Branislav Jurco.

Geoffrey-Desmond Busche (2020-2023, Ph.D.) Lie algebroids and representations (GRK 2491, cosupervision with Ralf Meyer and Madeleine Jotz)

David Kern (2019-2023, Ph.D.) Geometric Quantisation through C^* -hulls and representations (GRK 2491, cosupervision with Ralf Meyer and Madeleine Jotz)

Stefano Ronchi (2020-, Ph.D.) Higher structures and Lie algebroids (DFG ZHU 274/3-1 cosupervision with Madeleine Jotz)

Hao Xu (2021-, Ph.D.) Higher representation theory and topological orders (DAAD)

Kalin Krishna (2022-, Ph.D.) Higher category of higher Lie groupoids (DAAD)

Florian Dorsch (2022-, Ph.D.) Representation of Lie 2-groups via C^* -algebras (GRK 2491, cosupervision with Ralf Meyer and Thomas Schick)

—————Diploma Students—————

Jean Helemann (Diplomarbeit finished Sept. 2017) works on Kaprekar numbers. The Diplom thesis studies the so called Kaprekar constant. The story starts with an interesting observation of Kaprekar: Let n_1 be a four-digit number. We apply the following operation (Kaprekar transformation) K to n_1 , that is, we resemble n_1 to $b(n_1)$ which is the biggest number with exactly the same digits as n_1 (counting multiplicities), and similarly the smallest number $s(n_1)$; then $K(n_1) := b(n_1) - s(n_1)$. Then except for trivial examples, e.g. things like $K(1111) = 0$, all other meaningful cases lead to the same number 6174 after at most 8 times of applying the Kaprekar transformation K . Isn't it mysterious? People then later call this number or its generalization Kaprekar constant. The thesis is then devoted to survey several interesting and natural questions in various cases (4-digit, 5-digit, general cases, 10 basis, 2 basis, and general basis) and their answers around this mysterious number. Some computer simulation is also made to demonstrate interesting examples.

—————Bachelor and Master students—————

Darius-Alexander Burr (Master Student, summer semester 2023): Nahms Equations and Hyperkähler Manifolds

Paul Borck (Bachelor student, summer semester 2023): An Explicit Construction of Higher Groups

Salvador Jose Quezada Mejia (Bachelor student, summer semester 2023): Symplectic Reduction of the 3-Dimensional Chern Simons Theory

Boris Bilich (Master student, winter semester 2022-2023): Ideal structure of Nica-Toeplitz algebras

Abel Henri Guillaume Milor (Master Student, winter semester 2022-2023): Classification Theory

Malte Wolpers (Bachelor Student, summer semester 2022): Categorification via Internal Categories

Cristhian Balta (Master Student, summer semester 2022): Bicategories in partial actions on C^* -algebras

Tom Bauer (Master student, summer semester 2022): Integrating 2-term L_∞ -algebras

Tae Young Lee (Master Student, winter semester 2021-2022): Examples of Covariance Rings

Anne Milena Weiershausen (Bachelor Student, winter semester 2021-22): An embedding tensor and corresponding Lie 2-algebra for the exceptional Lie group E_7

Markus Obendrauf (Master Student, winter semester 2021-22): A Classification of 2-groups.

Florian Dorsch (Master student, winter semester 2021-22): Lie 2-groups and symplectic Lie n -groupoids.

Rönsch, Jannik (Master student, summer semester 2021): Monodromy and holonomy groupoids of a foliated Lie groupoid

Joanna Ko (Master student, summer semester 2021): groupoid models for diagrams of groupoid correspondences.

Daniel Missal (Master student, summer semester 2021): A TQFT-inspired explicit construction of higher groups

Sonja Maria Farr (Bachelor Student, summer semester 2021): Duality between Tensor Categories and Affine Supergroups and its Implications for Quantum Field Theory

Nayoon Kim (Master student, winter semester 2020-2021): differentiable stacks and Lie groupoids

Ben Reinhold (Master student, winter semester 2020-2021): \mathbb{Z} -Graded frame bundles and connections up to homotopy

Nico Garbers (Master student, winter semester 2020-2021): Moduli spaces of flat connections through symplectic reduction.

Carolin Leili (Bachelor student, summer semester 2020): Elemente der Darstellungstheorie

Markus Obendrauf (Bachelor Student, summer semester 2020): 2-groups.

Abel Henri Guillaume Milor (Bachelor Student, summer semester 2020): Formal Calculous and Grothendieck connection.

Geeske Marie Dehling (Bachelor student 2010) works on higher Yang-Mills equations. She is close to an end of her thesis. She read through the paper of Atiyah-Bott on Yang-Mills equations on Riemann surfaces, which is rather difficult for a third-year student. She managed to understand the main problems studied by Atiyah and Bott. She also raised the corresponding questions that one should study in higher geometry of the parallel problem with the help of Baez's paper in this topic. All this not only enriched her knowledge on a must-read topic in modern geometry, but also trained her ability of independent research, which is really important for her future study.

Selected Conferences/Program Invited

CIRM, CAT 7, Toen's 50th Birthday Conference, Oct. 2023

Amherst, Gone Fishing, March 2023

Poisson 2022, July 2022

Poisson 2016, July 2016

Porto, AMS-EMS-SPM meeting, June 2015

Greifswald, String geometry and loop spaces, July 2014

Chern Institute, XXIXth International Colloquium on Group-Theoretical Methods in Physics, August, 2012.

Zurich University, Zurich, *Higher Structures*, November 2009

ESI, Vienna, *Poisson sigma models, Lie algebroids, deformations, and higher analogues*, August 2007

Fields Institute, Toronto, Canada, *workshop on stacks in geometry and topology*, May 2007

Oberwolfach, Germany, *workshop on Poisson geometry*, May 2007

IAS, Park City, *String Theory and Stacks*, July 2002

Selected Talks *Shifted symplectic higher Lie groupoids and higher cotangent bundles*, CAT 7, Luminy, 2023.

Higher symplectic stacks in differential geometry, minicourse in HMI (Hamilton Mathematics Institute) online, 2022.

Shifted symplectic higher Lie groupoids and classifying spaces, Global Poisson, 2021.

Shifted symplectic higher Lie groupoids and classifying spaces, MPI Leibniz, 2021.

Courant algebroids and String Principal bundles, Geneva, October 2016.

Courant algebroids and String Principal bundles, ETH Zurich, July 2016.

Courant algebroids and String Principal bundles, Chern's Institute, Jan. 2016.

A convenient higher category for L_∞ -groupoids, Paris, June 2015.

String Principal bundles and Courant algebroids, Berkeley, Feb. 2015.

A convenient category for L_∞ -groupoids, Greifswald, July 2014.

Central extension of Lie 2-groups, Huanan University of Science and Technology, March 2014.

Higher structures in differential geometry, HUST, Wuhan, Feb. 2014.

Integration of Courant algebroids, Higher Lie Theory, Luxembourg, Dec. 2013.

Integration of Courant algebroids, Sheffield, April 2013.

Proper actions of topological 2-groupoids, XXIXth International Colloquium on Group-Theoretical Methods in Physics, **invited 30 minutes lecture**, at Chern Institute of Mathematics (China), August 20-26, 2012.

Proper actions of topological 2-groupoids, CATS4, Luminy (France), July 2012.

Homotopy 'groups' of Lie algebroids and obstruction of integration, Higher Geometric Structures along the Lower Rhine, Max Plante institute for Mathematics (Bonn), January, 2012.

Integration of Courant algebroids, Utrecht, September 2011.

Integration of Courant algebroids, Higher Structure in China II, August 2011.

Higher structures, Chinese academy of sciences, Beijing, Dec. 2010.

Higher structures, Beijing Normal University, Beijing, Dec. 2010.

Gerbes and its application, Huanan University of Technology, GuangZhou, Dec. 2010.

Higher Lie algebras, Chern Institute of Mathematics, Tianjin, Nov. 2010.

Higher Lie algebroids and Lie groupoids, , Tsinghua University, Beijing, Nov. 2010.

Lie algebroid fibration, in the biyear major conference in Poisson geometry **Poisson 2010**, IMPA, Rio, Brazil, July 2010.

Differentiable stacks and Lie groupoids, **invited lectures** of a mini course in the **conference "Higher Structures"**, Jilin University, Changchun, China, Oct. 2010.

Lie algebroid homotopy theory, , ETH Zurich, May 2010.

Semidirect product of representation up to homotopies, Higher Structure Conference in Zurich, November 2009.

Stacky Lie groups, geometry seminar in IST, Lisbon, May 2009.

Kan replacement, colloquium in University of Hamburg, December 2008.

From local to global, Poisson 2008, Lausanne, July 2008.

Integration of Lie algebroids via higher structures, geometry and topology seminar, University of Fribourg, February 2008.

Integration of Lie algebroids via higher structures, Mathematics departement, University of Göttingen, January 2008.

Integration of Lie algebroids via higher structures, Mathematical physics seminar, ETH Zurich, October 2007.

Principal bundles and Morita equivalence of stacky Lie groupoids, Workshop on Poisson sigma models, Lie algebroids, deformations, and higher analogues, ESI Vienna, August 2007.

Integration of Lie algebroids via higher structures, Mathematical physics seminar, University of Freiburg Germany, July 2007.

A gerbe for elliptic Gamma function, Symplectic seminar, University of Toronto, May 2007.

Integration of Lie algebroids via higher structures, Workshop on stacks in geometry and topology, Fields Institute, May 2007.

Morita equivalence in the category of all Poisson manifolds, Workshop on Poisson geometry, Oberwolfach, May 2007.

Integration of Lie algebroids via higher structures, Geometry seminar, Ecole Polytechnique, April 2007.

Integration of Lie algebroids via higher structures, Geometry seminar, Université de Lyon 1, April 2007.

Integration of Lie algebroids via higher structures, Geometry seminar, Université de Poitiers, March 2007.

Lie n -groupoids and stacky Lie groupoids, Trimester on groupoids and stacks in physics and geometry, IHP, January 2007.

Stacky Lie groupoids and Lie 2-groupoids, Geometry seminar, EPFL, Switzerland, December 2006

Intégration des algèbroïdes de Lie par l'intermédiaire des champs, Algèbre et Géométries, Institut Fourier, France, December 2006

Symplectic stacky groupoids for poisson manifolds, Aspects géométriques et algébriques des structures (ou algèbres) de Poisson, Université de Haute Alsace Faculté des Sciences et Technique Laboratoire de Mathématiques, Informatique et Applications, France, November 2006

Gerbe de gamma et son cocycle, Week-end de rentrée de l'Institut Fourier, France, September 2006

A gerbe of the elliptic gamma function, Poisson 2006, Tokyo, June 2006

A gerbe of elliptic gamma functions, Symplectic geometry seminar, University of California at Berkeley, March 2006

A gerbe of elliptic gamma functions, Groupe de travail "Systèmes non holonomes", Institut de Mathématiques de Toulouse, France, March 2006

Symplectic and contact groupoids, Geometry seminar, Chinese Academy, Wuhan, China, September 2005

Principal bundles of stacky groupoids and application in Poisson geometry, GAP-3 (The Séminaire Itinérant Geometry and Physics), *Dipartimento di Matematica e Informatica in Perugia, Italy*, July 2005

Prequantization and Reduction, Summer School and Conference on Poisson Geometry, *Triest, Italy*, July 2005

Integrating Lie algebroid via stacks, Symplectic geometry seminar, *Toronto University*, February, 2005

Weinstein groupoid is a 2-groupoid, Symplectic geometry seminar, *University of California at Berkeley*, February 14, 2005

Integrating Poisson manifolds via stacks, Geometry seminar, *Arizona University, Tucson*, February 10, 2005

Integrating Poisson manifolds via stacks, Mini-conference—Journées de Physique Mathématique, *Université LYON 1*, January 28, 2005

Weinstein groupoid is a 2-groupoid, Geometry seminar, *Geneva University, Switzerland*, January 7, 2005

Integrating Poisson manifolds via stacks, Symplectic geometry seminar, *ETH Zürich, Switzerland*, November 22, 2004

Differentiable stacks and its application in Lie theory, Graduate Colloquium, *ETH Zürich, Switzerland*, October 25, 2004

Poisson sigma model and differentiable stacks, Mathematical and Physical Aspects of String Theory, *Ascona, Switzerland*, July 18-23, 2004

Integrating Lie algebroids via stacks, Groupoids and Stacks in Physics and Geometry, *CIRM-Luminy, France*, June 28 - July 2, 2004

Integrating Poisson manifolds via stacks, Poisson 2004, *University of Luxembourg*, in the poster section, June 7-11, 2004

Integrating Lie algebroids via stacks, Department seminar, *Northwestern University*, May 2004

Integrating Lie algebroids via stacks—II, Symplectic geometry seminar, *University of California at Berkeley*, May 2004

Integrating Lie algebroids via stacks—I, North California symplectic geometry seminar, *University of California at Berkeley*, May 2004

Prequantization of coadjoint orbits and contact (groupoid) reductions, Geometric quantization seminar, *University of California at Berkeley*, October 2003

Contact reduction via groupoids, Symplectic geometry seminar, *University of California at Berkeley*, May 2003

Jacobi manifolds, contact groupoids and prequantizations, Symplectic geometry seminar, *University of California at Berkeley*, November 2002

Jacobi manifolds and their contact groupoids, Research seminar, *Women's program, IAS*, May 2002.

Dissertation **Integrating Lie algebroids via stacks and applications to Jacobi manifolds**

Unlike a finite dimensional Lie algebra, a Lie algebroid does not always come from a Lie groupoid. Non-integrability already shows up in the case of infinite dimensional Lie algebras. I found that a Lie algebroid can nevertheless always be integrated into an étale stack with a groupoid structure, which I call a *Weinstein groupoid*. The converse is true too; hence the Lie algebroid version of the 1-1 correspondence between Lie algebras and Lie groups is fully established.

Applying the above to Jacobi manifolds, I prove that the integrating objects of Jacobi manifolds are contact Weinstein groupoids. I also determine when a Jacobi manifold can be integrated by a contact Lie groupoid.

Dissertation Committee: Alan Weinstein (Chair), Allen Knutson, Hitoshi Murayama (outside member)

Biographical Born: May 21st, 1977 in Wuhan, HuBei, China, Citizenship: P. R. China.

Language English (very good, 5 years teaching and research experience in U.S.)

French (good, can teach in French.)

German (good, can teach in German.)

Chinese (native)

References **Prof. Anton Alekseev**, Section de mathématiques 2-4 rue du Lièvre, Bureau: 14 , Case postale 64, CH-1211 Genève 4, Suisse tel. +41 22 37 91178, fax +41 22 37 91176, Email: Anton.Alekseev@unige.ch

Prof. Alan Weinstein (advisor), Mathematics Department, U.C. Berkeley, Berkeley, CA 94720, U.S.A. Tel: +1 (510) 642-3518, Fax: +1 (510) 642-8204, alanw@math.berkeley.edu

Prof. Giovanni Felder, Mathematics Department, ETH, Rämistr. 101, 8092 Zürich, Switzerland. Tel: +41 (44) 632 3409, Fax: +41 (44) 632 1085, felder@math.ethz.ch

Prof. Rui Fenandes, Departamento de Matemática Instituto, Superior Técnico, Av. Rovisco Pais, 1049-001 LISBOA, Portugal. Tel:+351 (21) 841 7113 and +351 (21) 423 3219, Fax: +351 (21) 841 7035, rfern@math.ist.utl.pt

Prof. Marius Crainic, Mathematical institute, Utrecht University, P.O. Box 80.010, 3508 TA Utrecht, The Netherlands. Tel: +31 (30) 2531429, Fax: +31 (30) 2518394, crainic@math.uu.nl

Prof. Christoph Schweigert, Fachbereich Mathematik, Bereich Algebra und Zahlentheorie, Zentrum für mathematische Physik, Bundesstrasse 55, 20146 Hamburg, Germany, Tel.: +49 40 42838-5170 Secr.Tel.: +49 40 42838-5171 (Ms. A. Dörhöfer, Mo-Fr 9-15) Fax: +49 40 42838-5190 Email: christoph.schweigert@math.uni-hamburg.de