Lynn Heller

Curriculum Vitae

Yanqi Lake Beijing Institute of Mathematical Sciences and Applications
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Personal Details

Date of Birth	October 31st, 1985 in Wuhan.
Nationality	German.
Marital status	Married, 3 children.

Research Interests

I aim at answering differential geometric questions arising in the study of minimal and constant mean curvature surfaces as well as (constrained) Willmore surfaces (in 3−dimensional space forms) by combining techniques from geometric analysis, integrable systems (e.g., Hitchin system) and algebraic geometry (e.g.,Higgs bundles and moduli spaces). Recently, we discovered a surprising connection to number theory, when alternating multiple zeta values naturally appeared in our computations.

Employment

Since 09/2022	**Professor** at Yanqi Lake Beijing Institute of Mathematical Sciences and Applications.
04/2017–08/2022	**Juniorprofessor in Pure Mathematics** at Leibniz Universität Hannover.
04/2014–03/2017	**Margarete von Wrangell fellow** at Eberhard Karls University Tübingen.
01/2013–03/2014	**PostDoc** at Eberhard Karls University Tübingen.
01/2009–06/2012	**PhD student** at Eberhard Karls University Tübingen.

Education

2020	**Positive interims evaluation of the Juniorprofessorship**, *equivalent to the German Habilitation, Leibniz Universität Hannover.*
2009–2012	**PhD in Mathematics**, *Eberhard Karls University Tübingen.* Thesis title: Equivariant Constrained Willmore Tori in S^3. Advisor: Prof. Dr. Franz Pedit.
2003–2008	**Diplom (MSc equivalent) in Mathematics**, *TU Berlin.* Diplom thesis advisor: Prof. Dr. Ulrich Pinkall.
2003–2007	**Diplom (MSc equivalent) in Business Administration**, *FU Berlin.*

Awards and Grants

05/2023 **Organizer of the BIRS-IMAG workshop** "Minimal surfaces in symmetric spaces" joint with Francesco Martin (Granada), Rafael Montezuma (Fortaleza), Franz Pedit (UMass, Amherst), and Mike Wolf (Georgia Tech)

07/2021 **Organizer and speaker at the MSRI Summer Graduate School** "Gauge Theory in Geometry and Topology" joint with Francesco Lin (Columbia), Laura Starkston (UC Davis) und Boyu Zhang (Princeton)

Since 2017 **Member and project leader** within the DFG priority programm "Geometry at Infinity" with the project *Minimizers of the Willmore energy with prescribed rectangular conformal class* (11.000 Euro) and with the project *Large Genus Limit of Energy Minimizing Compact Minimal Surfaces in the 3-Sphere* ($\sim$ 150.000 Euro)

2015-2017 **Research grant** within the "Eliteprogramm für PostdoktorandInnen" (PI) of the state Baden-Württemberg. (125.000 Euro)

2014–2017 **Margarete von Wrangell fellowship** of the state Baden-Würtemberg and the European Social Fund. ($\sim$ 200.000 Euro)

2014 Participant of the second Heidelberg Laureates Forum.

2013–2014 **Research grant** "Projektförderung für NachwuchswissenschaftlerInnen" (PI) within the excellence Initiative of the Eberhard Karls University Tübingen. ($\sim$ 35.000 Euro)

Publications

Accepted and published

The five most important publications are highlighted in green.

1. L. Heller, S. Heller. *Fuchsian DPW potentials for Lawson surfaces.* **Geom Dedicata**, volume 217, paper no. 101, 21 pages, 2023.
2. L. Heller, S. Heller, M. Traizet. *Area estimates for high genus Lawson surfaces via DPW.* ***J. Differ. Geom.,*** *volume 124, no. 1, pp 1–35, 2023*
3. L. Heller, C. B. Ndiaye. *First explicit constrained Willmore minimizers of non-rectangular conformal class.* ***Adv. Math.*** *volume 386, paper no. 107804, 47 pages, 2021.*
4. L. Heller, Ch. B. Ndiaye. *Candidates for non-rectangular constrained Willmore minimizers.* **J. Geom. Phys.** volume 165, paper no. 104221, 35 pages, 2021.
5. L. Heller, S. Heller, Ch. B. Ndiaye. *Stability properties of 2-lobed Delaunay tori in the 3-sphere.* **Differ. Geom. Appl.** volume 79, paper no. 101805, 2021.
6. L. Heller, S. Heller, Ch. B. Ndiaye. *Isothermic constrained Willmore tori in 3-space.* **Ann. Glob. Anal. Geom.** volume 60, pp 231–251, 2021.
7. L. Heller, *Generalized Whitham Flow and its Applications.* Minimal surfaces: Integrable Systems and Visualisation, Springer Proceedings in Mathematics & Statistics 349, pp 131–146, 2021.
8. L. Heller, S. Heller, Higher solutions of Hitchin's self-duality equations. **J. Int. Syst.** volume 5, no. 1, xyaa006, 42 pages, 2020.
9. L. Heller, F. Pedit, *Towards a constrained Willmore conjecture.* Willmore energy and Willmore conjecture, pp 119–138, Monogr. Res. Notes Math., CRC Press, Boca Raton, FL, 2018.

10. L. Heller, S. Heller, N. Schmitt *Navigating the Space of Symmetric CMC Surfaces.* **J. Differ. Geom.** volume 110, no. 3, pp 413–455, 2018.
11. L. Heller. *Dirac Tori.* **Differ. Geom. Appl.** volume 54, Part A, pp 122–128, 2017.
12. L. Heller, S. Heller. *Abelianization of Fuchsian systems on a 4-punctured sphere and applications.* **J. Symplect. Geom.** volume 14, no. 4, pp 1059–1088, 2016.
13. L. Heller, S. Heller, N. Schmitt. *Spectral curve theory for (k,l)-Symmetric CMC Surfaces of Higher Genus.* **J. Geom. Phys.** volume 98, pp 201–213, 2015.
14. L. Heller. *Constrained Willmore and CMC Tori in the 3-Sphere.* **Differ. Geom. Appl.** volume 40, pp 232–242, 2015.
15. L. Heller. *Equivariant Constrained Willmore Tori in the 3-Sphere.* **Math. Z.** volume 278, no. 3, pp 955-977, 2014.
16. L. Heller, *Constrained Willmore Tori and Elastic Curves in 2-Dimensional Space Forms.* **Comm. Anal. Geom.** volume 22, no. 2, pp 343–369, 2014.
17. L. Heller. *Constrained Willmore Hopf tori.* **Oberwolfach Reports**, voume 10, no. 2, 2013.
18. L. Heller. *Equivariant Constrained Willmore Tori in S^3.* PhD Thesis, Eberhard Karls University Tübingen, 2012.

Preprints

19. L. Heller, S. Heller, N. Schmitt, *Exploring the Space of Compact Symmetric CMC Surfaces.* Preprint: arXiv: 1503.07838.
20. I. Biswas, S. Dumitrescu, L. Heller, S. Heller. Holomorphic systems with Fuchsian monodromy (with an appendix by Takuro Mochizuki). **38 pages**, preprint: arXiv:2104.04818.
21. L. Heller, S. Heller, M. Traizet. *Complete families of embedded high genus CMC surfaces in the 3-sphere (with an appendix by Steven Charlton).* **42 pages**, preprint: arXiv:2108.10214.
22. I. Biswas, S. Dumitrescu, L. Heller, S. Heller, *On the existence of holomorphic curves in compact quotients of $SL(2,C)$.* **33 pages**, preprint: arXiv:2112.03131.
23. L. Heller, S. Heller, M. Traizet. *Loop group methods for the non-abelian Hodge correspondence on a 4-punctured sphere.* **45 pages**, preprint: arXiv:2205.12106.
24. I. Biswas, L. Heller, S. Heller. *Holomorphic Higgs bundles over the Teichmüller space.* **14 pages**, preprint: arXiv:2308.13860.

Selected Invited Talks

08/2023 "Lawson surfaces and multiple zeta values", Matrix Workshop on "Spectrum and Symmetry for Group Actions in Differential Geometry II", Creswick, Australia.

07/2023 "Lawon surfaces and multiple zeta values", International Congress of Basic Science, Beijing, China.

03/2022 Lecture series at the 13th MSJ-SI 2021 "Differential Geometry and Integrable Systems". 3 lectures at the school and 1 lecture at the international conference at the 3 weeks event about "Complete families of high genus CMC surfaces in the 3-sphere".

07/2021 Lecture series at the (online) MSRI Summer Graduate School “Gauge theory in Geometry and Topology”. 5 lectures about “Harmonic maps into 3-dimensional space forms”.

06/2020 *Area estimates of high genus Lawson surfaces via DPW.* Online-Seminar “Geometric Analysis".

05/2020 *Higher solutions to Hitchin's self-duality equations and Willmore surfaces.* Online-lectureat the joint seminar: Bochum - Essen - Köln - Wuppertal: “Complex Algebraic Geometry and Complex Analysis”.

01/2020 *Area estimates of high genus Lawson surfaces via DPW.* "Topics in Geometric Analysis", FU Berlin.

12/2019 Isothermic constrained Willmore tori in the 3-sphere. Three talks at the workshop “Geometry of Submanifolds and Integrable Systems”, Osaka, Japan.

03/2019 *Higher solutions to Hitchin's self-duality equations and Willmore surfaces.* Workshop on Challenges at the Interface of Hitchin Systems and String Theory, Simons Center for Geometry and Physics, Stony Brook, USA

07/2018 *Higher solutions to Hitchin's self-duality equations.* BIRS-CMO Workshop, “Higgs Bundles and Harmonic Maps of Riemann Surfaces”, Oaxaca, Mexico.

03/2018 *Recent progress in integrable surface theory.* Workshop: Geometry of Submanifolds and Integrable Systems, Osaka City University, Japan.

01/2018 *Willmore surfaces and higher solutions of Hitchin's self-duality equations.* Minimal Surfaces and related topics, University of Granada, Spain.

05/2017 *Constrained Willmore Minimizers.* LMS Workshop on Variational Methods in Submanifold Theory, York, England.

04/2017 *Constrained Willmore Minimizers.* Analysis seminar, UMass, Amherst, USA.

06/2016 *Constrained Willmore Minimizer.* 38th Southern-German Differential Geometry Colloquium, Mainz.

04/2016 *An integrable systems approach to surface theory.* Loughborough University.

02/2016 *Deformation theory of spectral data.* OCAMI-KOBE-WASEDA Joint International Workshop on Differential Geometry and Integrable Systems, Osaka City University, Japan.

12/2015 *Abelianization of Fuchsian Systems and Applications.* Tsinghua University, Beijing, China.

11/2015 *Higher genus constant mean curvature surfaces in the* $3-$*sphere.* Yorkshire Durham Geometry Days, University of York.

08/2015 *Navigating the space of symmetric CMC surfaces.* George Boole Mathematical Sciences Conference, Theme 4: Geometry and Visualization, University College Cork.

05/2015 *Moduli spaces, integrable systems and applications to surface theory.* Meeting of the German chapter of European Women in Mathematics, Rauischholzhausen.

12/2014 *Abelianization of Fuchsian Systems and its Application to Surface Theory.* Oberseminar Differentialgeometrie, WWU Münster.

06/2014 *Constrained Willmore Minimizers - Theory and Experiments.* KiS Seminar, TU Berlin.

11/2013 *Constrained Willmore Hopf tori.* Pure mathematics seminar, University of Leicester.

05/2013 *Constrained Willmore Tori and Elastic Curves.* Workshop on Progress in Surface Theory, MFO Oberwolfach.

03/2012 *Equivariant Constrained Willmore Tori in the* $3-$*Sphere.* Hausdorff Trimester Programm: Integrability in Geometry and Mathematical Physics, HIM Bonn.

Teaching experience

Courses as instructor of record

SS 21 Geometrie für Sonderpädagogen (elementary geometry for teachers), Reading Seminar Differential Geometrie (topic: h-principle)

WS 20/21 Riemannsche Geomtrie (Riemannian Geometry)

SS 20 Mathematik für Physiker 2 (Complex Analysis and Laplace equations), Complex Analysis, Geometrie für Sonderpädagogen (elementary Geometry for teachers)

WS 19/20 Mathematik für Physiker I (integration theory)

SS 19 Riemann surfaces and complex differential geometry

WS 18/19 Riemannsche Geomtrie (Riemannian geometry)

SS 18 Analysis B (multivariate calculus for computer science students), Harmonische Abbildungen (harmonic maps)

WS 17/18 Riemannsche Flächen (Riemann surfaces)

SS 17 Klassische Differentialgeometrie (classical differential geometry)

SS 16 Gewöhnliche Differentialgleichungen (ordinary differential equations)

WS 15/16 Quaternionische Flächentheorie (quaternionic surface theory)

SS 15 Klassifikation kompakter Flächen (classification of compact surfaces)

WS 14/15 Proseminar: Kurven (curves)

WS 13/14 Proseminar: Projektive Geometrie

PhD Students

since 09/2023 Bochuan Liu

since 10/2021 Balázs Márk Békési

since 04/2018 Daniel Holzwart

04/2017–05/2021 Max Heydel

PostDocs

9/2020–082022 Thomas Raujouan

03/2016–08/2017 Nicholas Schmitt

01/2016–06/2016 Cheikh Birahim Ndiaye

Miscellanea

Since 11/2022 Managing editor of the ICCM Notices

01/2020–07/2022 Equal opportunity officer of the faculty for Mathematics and Physics, Leibniz Universität Hannover

08/2017 Organization of the Workshop “Higgs bundles, harmonic maps and integrable systems”, Leibniz Universität Hannover

2011-2017 Equal opportunity officer of the mathematics institute in Tübingen.

2014 Participation in the NIMS-IMAGINARY exhibition at the ICM in Seoul.

2013/2014 Organization of mathematics workshops for children within the “Kinder-Uni-Forschertag” in Tübingen.

2013 Participation in the exhibition “Wie Schönes Wissen Schafft” at the Museum of the University of Tübingen.

September 16, 2023