Sebastian Heller

Curriculum Vitae

Beijing Institute of Mathematical Sciences And Applications
Yanqi Island
Huairou District
Beijing101408
✉ *sheller@bimsa.cn*

Personal Details

Date of Birth	February 22, 1981
Nationality	German
Marital status	Married, 3 children

Research Interests

Harmonic maps, minimal and CMC surfaces
Geometric and analytic aspects of moduli spaces
Higgs bundles and Hitchin systems
Integrable systems

Education

2014 **Habilitation**, *Eberhard Karls University Tübingen*.
Thesis title: Integrable system methods for higher genus CMC surfaces in the 3-sphere

2005–2008 **Ph.D. in Mathematics**, *Humboldt Universität zu Berlin*.
Thesis title: Conformal Submersions of S^3
Advisors: Prof. Dr. Thomas Friedrich and Prof. Dr. Ulrich Pinkall

2000–2004 **Diploma (MSc equivalent) in Mathematics**, *Technische Universität Berlin*.
Thesis title: On the Classification of Willmore Spheres
Advisors: Prof. Dr. Ulrich Pinkall

Employment

since 09/2022 **Professor** at the Beijing Institute of Mathematical Sciences and Applications
10/2020-08/2022 **Researcher** at Leibniz University Hannover
04/2020-09/2020 **Substitute Professor** at the University of Heidelberg
10/2019-04/2020 **Research Associate** at Leibniz University Hannover
10/2017-09/2019 **PostDoc** at RTG1670 at the University of Hamburg
04/2017-09/2017 **Research Associate** at Leibniz University Hannover
02/2013-08/2013 parental leave
10/2007-03/2017 **Research Associate** at Eberhard Karls University Tübingen
10/2002–03/2005 **Teaching assistant**, TU Berlin

Grants

2023-2025 **BJNSF International Scientists Program**, PI in the project *Loop group methods for minimal Lagrangian surfaces* ($\sim$ 200.000 Yuan)

2020-2023 **DFG research grants programme**

Principal Investigator in the DFG priority programme *Geometry at Infinity* ($\sim$222.000 Euro)

2016-2017 **DFG research grants programme**

Principal Investigator in the DFG programme *Constant mean curvature surfaces of higher genus* ($\sim$65.000 Euro together with Dr. Nicholas Schmitt)

2016-2017 **DFG research grants programme**

Principal Investigator in the DFG programme *Constant mean curvature surfaces with non-abelian fundamental groups: theory and experiments* ($\sim$70.000 Euro)

Conferences Organized

2023 Willmore Workshop, Beijing

2022 Organizer of the *11th Northern German Day of Differential Geometry*, Hannover

05/2022 Organizer of the workshop *Higgs bundles at Infinity II*, Hannover

12/2021 Organizer of the workshop *Higgs bundles at infinity*, Kiel

10/2018 Co-organizer of the summer school *Higgs bundles in Mathematics and Physics*, Hamburg

08/2017 Co-organizer of the conference *Higgs bundles, harmonic maps and integrable systems*, Hannover

2012 Co-organizer of the workshop *Integrable surfaces and Whitham deformations*, Tübingen

2010 Co-organizer of the workshop *Progress in higher genus surface geometry*, Tübingen

Publications

Accepted and published

34. I. Biswas, S. Dumitrescu, L. Heller, S. Heller, J.Pedro dos Santos. *On the monodromy of holomorphic differential systems,* accepted for publication in **Int. Jour. Math.**, special volume in honor of Oscar Garcia-Prada 60th birthday, preprint: arXiv:2310.16330.

33. S. Heller, F. Pedit, Ch. Ouyang, Higgs bundles and SYZ geometry, accepted for publication in **Journal of Differential Geometry**, preprint: arXiv:2203.04224.

32. I. Biswas, S. Heller, L. Schaposnik, *Real slices of SL(r,C)-opers*, **SIGMA** 19 (2023), 067, 23 pages, https://www.emis.de/journals/SIGMA/2023/067/.

31. L. Heller, S. Heller. *Fuchsian DPW potentials for Lawson surfaces*, **Geom. Dedicata**, 217, (2023) https://doi.org/10.1007/s10711-023-00840-9.

30. L. Heller, S. Heller, M. Traizet. *Area estimates for high genus Lawson surfaces via DPW,* **Journal of Differential Geometry**, 124 (1), 1–35, (May 2023).

29. I. Biswas, S. Dumitrescu, S. Heller. *Branched $SL(r,C)$-opers,* **International Mathematics Research Notices**, Volume 2023, Issue 10, May 2023, Pages 8311–8355.

28. I. Biswas, N. Borne, S. Dumitrescu, S. Heller. *Parabolic opers and differential operators*, **J. Geom. Phys.**, Volume 187, (May 2023), DOI

27. S. Heller, *Real projective structures on Riemann surfaces and new hyper-Kähler manifolds,* **Manuscripta Mathematica**, 171, No. 1-2, 241–262 (2023).

26. M. Aprodu, I. Biswas, S. Dumitrescu, S. Heller *On the monodromy map for the logarithmic differential systems,* **Bull. Soc. Math. France** 150 (3), 2022, p. 543–568.

25. I. Biswas, S. Bradlow, S. Dumitrescu, S. Heller. *Uniformization of branched surfaces and Higgs bundles,* **Int. J. of Mathematics**, Vol. 32, No. 13 (2021)

24. I. Biswas, S. Heller, L. Schaposnik. *Branes and moduli spaces of Higgs bundles on smooth projective varieties,* **Research in the Mathematical Sciences**, 8 (2021), no. 3, Paper No. 52.

23. L. Heller, S. Heller, Ch. B. Ndiaye. *Stability properties of 2-lobed Delaunay tori in the 3-sphere,* **Diff. Geom. Appl.**, Volume 79, 2021, doi.org/10.1016/j.difgeo.2021.101805.

22. A. Bobenko, S. Heller, N. Schmitt. *Constant mean curvature surfaces based on fundamental quadrilaterals,* **Math. Physics, Analysis and Geometry** 24, 37 (2021)

21. L. Heller, S. Heller, Ch. B. Ndiaye. *Isothermic constrained Willmore tori in 3-space,* **Annals of Global Analysis and Geometry**, 60 (2021), no. 2, 231-251.

20. I. Biswas, S. Dumitrescu, S. Heller, J. Dos Santos. *On certain Tannakian categories of integrable connections over Kaehler manifolds,* **Canadian Journal of Mathematics**, 1-28. https://www.doi.org/10.4153/S0008414X21000201.

19. S. Heller. *Willmore spheres in the 3-sphere revisited,* accepted for publication in **Communications in Analysis and Geometry**, preprint: arXiv:2003.06922.

18. I. Biswas, S. Dumitrescu, S. Heller. *Irreducible flat $SL(2,R)$-connections on the trivial holomorphic bundle,* **Journal de Mathematiques Pures et Appliquees** (9) 149 (2021), 28-46.

17. L. Heller, S. Heller. *Higher solutions of Hitchin's self-duality equations,* **Journal of Integrable Systems** Volume 5, Issue 1, 2020, xyaa006.

16. F. Beck, S. Heller, M. Röser. *Energy of sections of the Deligne-Hitchin twistor space,* **Math. Annalen** 380 (2021), no. 3-4, 1169-1214.

15. A. Bobenko, S. Heller, N. Schmitt. *Minimal n-noids in hyperbolic and anti-de Sitter 3-space,* **Proceedings of the Royal Society A**, DOI: 10.1098/rspa.2019.0173.

14. I. Biswas, S. Heller, M. Röser. *Real Holomorphic Sections of the Deligne-Hitchin Twistor space,* **Comm. Math. Phys.**, Volume 366, Issue 3 (2019), pages 1099-1133.

13. S. Heller, L. Schaposnik. *Branes through finite group actions,* **J. Geom. Phys.**, Volume 129, July 2018, Pages 279-293.

12. L. Heller, S. Heller, N. Schmitt. *Navigating the Space of Symmetric CMC Surfaces,* **Journal of Differential Geometry**, vol. 110, no. 3 (2018), pp. 413-455.

11. I. Biswas, S. Heller. *Automorphisms of a rank one Deligne-Hitchin moduli space,* **SIGMA** 13 (2017), 072, 19 pages.

10. S. Heller. *The asymptotic behavior of the monodromy representation of the associated family of a compact CMC surface,* **Bull. Lond. Math. Soc.** 2016; doi: 10.1112/blms/bdw036.

9. L. Heller, S. Heller, N. Schmitt. *Spectral curve theory for (k,l)-Symmetric CMC Surfaces of Higher Genus,* **J. Geom. Phys.**, vol 98, pp 201–213, 2015.
8. L. Heller, S. Heller. *Abelianization of Fuchsian systems on a 4-punctured sphere and applications,* **Journal of Symplectic Geometry**, vol. 14, no. 4, pp. 1059–1088, 2016.
7. S. Heller. *Conformally flat circle bundles over surfaces,* **Diff. Geom. Appl.** 40 (2015), 103-110.
6. S. Heller, N. Schmitt. *Deformations of symmetric CMC surfaces in the 3-sphere,* **Experimental Mathematics**, Volume 24, Issue 1 (2015), pp 65-75.
5. S. Heller. *A spectral curve approach to Lawson symmetric CMC surfaces of genus 2,* **Math. Annalen**, Volume 360, Issue 3 (2014), pp 607-652.
4. S. Heller. *Lawson's genus two minimal surface and meromorphic connections,* **Math. Z.**, Volume 274 (2013), pp 745-760.
3. S. Heller. *Higher genus minimal surfaces in S^3 and stable bundles,* **J. Reine Angew. Math. (Crelle's Journal)**, Volume 685 (2013), pp 105-122.
2. S. Heller. *Conformal fibrations of S^3 by circles,* Harmonic maps and differential geometry, **Contemp. Math.**, Amer. Math. Soc., Providence, RI, Volume 542 (2011), pp 195-202.
1. S. Heller. *Harmonic morphisms on conformally flat 3-spheres,* **Bull. Lond. Math. Soc.**, Volume 43 (2011), no. 1, 137-150.

Preprints

8. I. Biswas, L. Heller, S. Heller. *Holomorphic Higgs bundles over the Teichmüller space,* preprint: arXiv:2308.13860.
7. L. Heller, S. Heller, M. Traizet. *Loop group methods for the non-abelian Hodge correspondence on a 4-punctured sphere,* preprint: arXiv:2205.12106.
6. I. Biswas, S. Dumitrescu, S. Heller., Ch. Pauly *Infinitesimal deformations of parabolic connections and parabolic opers,* preprint: arXiv:2202.09125 .
5. I. Biswas, S. Dumitrescu, L. Heller, S. Heller. *On the existence of holomorphic curves in compact quotients of $SL(2,C)$,* preprint: arXiv:2112.03131.
4. L. Heller, S. Heller, M. Traizet. *Complete families of embedded high genus CMC surfaces in the 3-sphere,* preprint: arXiv:2108.10214.
3. I. Biswas, S. Dumitrescu, L. Heller, S. Heller. *Holomorphic sl(2,C)-systems with Fuchsian monodromy (with an appendix by Takuro Mochizuki),* preprint: arXiv:2104.04818.
2. F. Beck, I. Biswas, S. Heller, M. Röser. *Geometry of the space of sections of twistor spaces with circle action,* preprint: arXiv:2102.10853.
1. L. Heller, S. Heller, N. Schmitt, *Exploring the Space of Compact Symmetric CMC Surfaces,* preprint: arXiv:1503.07838.

Conference Proceedings

S. Heller. *Higher genus CMC surfaces via integrable systems,* Abresch U, Pedit F, Umehara M.: Progress in Surface Theory. Oberwolfach Rep. Volume 10 (2013), pp 1253-1312.

A. Gerding, S. Heller, F. Pedit and N. Schmitt. *Global aspects of integrable surface geometry,* in Systemes integrables et theorie des champs quantiques, eds: P. Baird, F. Helein, J. Kouneiher, F. Pedit, V. Roubtsov, collection Travaux en Cours en Physique-Mathematiques, no 75, Hermann (2009)

Selected Talks

07/2023 *New minimal Lagrangian surfaces in* $\mathbb{C}P^2$, ICBS, Beijing

11/2022 *Complete families of CMC surfaces in the 3-sphere*, Tsinghua University, Beijing

11/2021 *Complete families of CMC surfaces in the 3-sphere*, SFB Colloquium, TU Berlin

02/2020 *Harmonic maps, integrable systems and moduli spaces*, GRK 1670 closing event, Hamburg

07/2019 *Real projective structures and new hyper-Kähler metrics*, Geometric and analytic aspects of moduli spaces, Hannover, Germany

05/2019 *Deligne-Hitchin moduli spaces and harmonic maps*, Variational problems and the geometry of submanifolds, CIRM, France

03/2018 *Deformations of Deligne-Hitchin moduli spaces*, Complex Analytic Geometry, Tata Institute, Mumbai

03/2018 *Higher solutions of Hitchins self-duality equations*, Analytic and Algebraic Geometry, ICTS, Bengaluru

12/2017 *Higher solutions of Hitchins self-duality equations*, Differential Geometry and Differential Equations: the influence of Mirror Symmetry and Physics , Waseda University, Tokyo

06/2016 *Deformation theory for CMC surfaces*, Workshop "Higgs bundles, branes and quanization", Simons Center for Geometry and Physics

03/2016 *Deformation theory for CMC surfaces*, Workshop "Higgs bundles in Geometry and Physics", Heidelberg

02/2016 *CMC surfaces and moduli spaces of flat connections*, Joint International Workshop on "Differential Geometry and Integrable Systems", Osaka City University and Kobe University

01/2016 *Deformation theory for CMC surfaces*, Tsinghua University, Beijing

04/2015 *Navigating the space of symmetric CMC surfaces*, SFB Colloquium, TU Berlin

06/2013 *Minimal surfaces in the 3-sphere and meromorphic connections*, Aspects algebriques et analytiques des equations differentielles et aux differences, Lille

06/2013 *Deformations of genus 2 CMC surfaces - Experiments and Theory*, Variational problems and Geometric PDEs, Granada

06/2013 *Higher genus CMC surfaces in the 3-sphere via integrable systems*, Workshop on Advances in Surface Theory, Leicester

06/2013 *Higher genus CMC surfaces via Integrable systems*, Progress in Surface Theory, Mathematisches Forschungsinstitut Oberwolfach

03/2012 *Integrable system methods for higher genus minimal surfaces*, Workshop: Navigating the Space of Surfaces, HIM, Bonn

11/2011 *Integrable system methods for higher genus minimal surfaces*, Workshop on Geometric Analysis and Partial Differential Equations, Granada

09/2009 *Harmonic morphisms on conformally flat 3-spheres*, A Harmonic Map Fest, Cagliari

Teaching

2023	Riemann surfaces, Integrable PDEs
2022	Minimal surfaces
2021	Manifolds
2020	Differential Geometry
2019	Mathematics for engineers 1
2016	Riemann surfaces
	Harmonic maps
2015/16	Mathematics for Physicists II - III
2014	Advanced topics in Differential Geometry
2013	Manifolds
2010	Riemann surfaces
	Analysis IV
2008	Riemannian Geometry

PostDocs

2022-2023	Jacob Kryczka

Students

2023-2026	PhD student Linlin Wang
2015-2019	PhD student Benedetto Manca (joint with Stefano Montaldo)
2015-2016	Master students Max Heydel and Matthias Nowara
2014-2015	Bachelor students Sebastian Künkele and Lena Lörcher
2011-2012	Diploma student Florian Beck
2009-2010	Co-advisor of Diploma student Benjamin Volk

Languages

German	Mother tongue
English	Fluent
Chinese	not fluent yet

November 28, 2023