Markus Röser

Personal Details

Date of Birth	04.12.1984
Place of Birth	Vaihingen an der Enz, Germany
Work address	Universität Hamburg Fachbereich Mathematik Bereich AD Bundesstraße 55 (Geomatikum) 20146 Hamburg
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Research Interests

Differential geometry, in particular hyperkähler and hypersymplectic structures and their relation to gauge theory and Lie theory.
Moduli spaces of Nahm's equations, Higgs bundles, harmonic maps from Riemann surfaces into homogeneous spaces, Nahm-Schmid equations.

Academic Employment

09/2022 –	Teaching/Research Fellow (permanent), Universität Hamburg
10/2018 – 09/2022	Postdoctoral Research Fellow (on parental leave 09/2021 – 09/2022), Universität Hamburg, Germany
04/2014 – 09/2018	Postdoctoral Research Fellow, Leibniz Universität Hannover, Germany Associated member DFG Research Training Group 1463 "Analysis, Geometry, and String Theory" (2015 – 2017)
10/2012 – 03/2014	Postdoctoral Research Fellow, SFB 878 "Groups, Geometry and Actions", Universität Münster, Germany
10/2010 – 06/2012	Retained Lecturer in Pure Mathematics, Jesus College, Oxford.

Education

10/2009 – 09/2012	DPhil in Mathematics, New College, University of Oxford Thesis: "The ASD Equations in Split Signature and Hypersymplectic Geometry" , Supervisor: Andrew Dancer
10/2008 – 07/2009	Master of Advanced Study in Mathematics, with Distinction, Girton College, University of Cambridge
10/2006 – 09/2008	Mathematics, Eberhard-Karls-Universität Tübingen, Vordiplom
10/2005 – 09/2008	Physics, Eberhard-Karls-Universität Tübingen, Vordiplom

Prizes and Awards

2009	EPSRC 3-year "fees-only" DPhil-Studentship, University of Oxford
2009	M.T. Meyer Scholarship for mathematics, Girton College, Cambridge
2009	Getrude Mather Jackson prize for mathematics, Girton College, Cambridge
2008	European Student Bursary, Cambridge European Trust
2008	Scholarship from the DAAD (German Academic Exchange Service) to support my studies at Cambridge

Written Work

Preprints

[14] "Complete quaternionic Kähler manifolds with finite volume ends"
(with Vicente Cortés and Daniel Thung), preprint arXiv:2105.00727

[13] "Geometry of the space of sections of twistor spaces with circle action"
(with Florian Beck, Indranil Biswas and Sebastian Heller), preprint arXiv:2102.10853

[12] "Hessenberg varieties and Poisson slices"
(with Peter Crooks), preprint arXiv:2005.00874

[11] "Slodowy slices and the complete integrability of Mishchenko-Fomenko subalgebras on regular adjoint orbits"
(with Peter Crooks and Stefan Rosemann), preprint arxiv:1803.04942

Publications

[10] "On the singularities of Mishchenko–Fomenko systems"
(with Peter Crooks), Transformation Groups (2022)

[9] "The log symplectic geometry of Poisson slices"
(with Peter Crooks), accepted for publication in The Journal of Symplectic Geometry, preprint arxiv:2008.06172

[8] "On the fibres of Mishchenko-Fomenko systems"
(with Peter Crooks), Documenta Mathematica 25, 1195-1239 (2020)

[7] "Energy of sections of the Deligne-Hitchin twistor space"
(with Florian Beck and Sebastian Heller), Mathematische Annalen 380 , no. 3-4, 1169–1214, (2021)

[6] "Real holomorphic sections of the Deligne-Hitchin Twistor space"
(with Indranil Biswas and Sebastian Heller), Communications in Mathematical Physics, 366(3), 1099–1133, (2019)

[5] "Irreducibility of the Laplacian Eigenspaces of some Homogeneous Spaces"
(with David Petrecca), Mathematische Zeitschrift 291, 395–419, (2019)

[4] "The Nahm-Schmid Equations and Hypersymplectic Geometry"
(with Roger Bielawski and Nuno Romao), The Quarterly Journal of Mathematics, Volume 69, Issue 4, 1253–1286, (2018)

[3] "Hyperkähler Implosion and Nahm's Equations"
(with Andrew Dancer and Frances Kirwan), Communications in Mathematical Physics, 342(1), 251–301, (2016)

[2] "Harmonic Maps and Hypersymplectic Geometry"
Journal of Geometry and Physics 78 (2014), 111–126.

Thesis

[1] "The ASD Equations in Split Signature and Hypersymplectic Geometry"
DPhil Thesis, Oxford (2012)

Research Visits

06/2019 Northeastern University, Boston (Peter Crooks), 4 days

06/2019 "Geometry and Physics of Hitchin Systems", Simons Center for Geometry and Physics, Stony Brook, 10 days.

10/2016 Waseda University, Tokyo (Martin Guest), two weeks

09/2015 Universität Stuttgart (Frederik Witt), four days

06/2014 University of Oxford (Andrew Dancer, Frances Kirwan), four days

Invited Talks

Mini-Courses

10/2018 – 11/2018 "Hyperkähler geometry of Nahm moduli spaces" (6 talks), Gauge Theory Seminar, University of Göttingen

10/2017 "The Classical Simpson Correspondence" (4 talks on non-abelian Hodge Theory), Research Seminar Arithmetic Geometry, FU Berlin

Colloquium Talks

02/2022 "Harmonic Maps and the Deligne–Hitchin Twistor Space", Institutskolloquium, Mathematisches Institut, Universität Potsdam

01/2019 "Higgs Bundles, Harmonic Maps and Twistor Lines", Mathematische Gesellschaft, Universität Göttingen

Research Talks

04/2021 "Geometry of the Space of Sections of the Deligne?Hitchin Twistor Space", Differential Geometry Seminar, University of California, Riverside

11/2020 "Hitchin's equations, harmonic maps and twistor lines", Edinburgh Mathematical Physics Group Seminar, Maxwell Institute for Mathematical Sciences, Edingburgh

06/2020 "Hessenberg varieties and Poisson slices", Lie Theory and integrable systems in symplectic and Poisson geometry, Fields Institute

05/2020 "Holomorphic sections of the Deligne–Hitchin Twistor space", Higgs bundles and related topics, University of Toronto

01/2019 "Real holomorphic sections of the Deligne-Hitchin Twistor space", Gauge Theory Seminar, Universität Göttingen

10/2018 "Real holomorphic sections of the Deligne-Hitchin Twistor space", Research Seminar Differential Geometry, Universität Hamburg

07/2018 "Real holomorphic sections of the Deligne-Hitchin Twistor space", BIRS-CMO Workshop "Higgs bundles and Harmonic Maps from Riemann Surfaces", Oaxaca, Mexico

06/2018 "Real holomorphic sections of the Deligne-Hitchin Twistor space", Oberseminar Geometrie, LMU München

06/2018 "Irreducibility of the Laplacian Eigenspaces of some Homogeneous Spaces", Oberseminar Global Analysis, Universität Regensburg

08/2017 "The Nahm–Schmid Equations and Hypersymplectic Geometry", Conference "Higgs Bundles, Harmonic Maps and Integrable Systems" in honour of Franz Pedit's 60th birthday, Leibniz Universität Hannover

10/2016 "Schmid's Equations and Hypersymplectic Geometry", Waseda University, Tokyo

03/2016 "Hyperkähler Implosion and Nahm's Equations", Workshop "Lie Theory and Geometry", Schloss Rauischholzhausen

11/2015 "Symplectic and Hyperkähler Implosion", Workshop "Hyperkähler and Related Structures in Differential and Algebraic Geometry", Levico Terme, Italy

06/2015 "Hyperkähler Implosion", 6th Northern German Differential Geometry Day, Christian-Albrechts-Universität zu Kiel

12/2014 "Hyperkähler Implosion and Nahm's Equations", Gauge Theory Seminar, Georg-Ausgust-Universität Göttingen

11/2014 "Hyperkähler Implosion and Nahm's Equations", Geometry and Analysis Seminar, University of Oxford

10/2014 "Hyperkähler Implosion and Nahm's Equations", Oberseminar Differentialgeometrie, Leibniz Universität Hannover

09/2014 "Hyperkähler Implosion", Mini-Symposium "Quaternion-Kähler manifolds and elated structures in Riemannian and Algebraic Geometry", DMV-PTM meeting, Poznan

05/2014 "Hypersymplectic Manifolds", Oberseminar Differentialgeometrie, Leibniz Universität Hannover

07/2012 "Harmonic Maps and Hypersymplectic Geometry" Forschungsseminar Mathematische Physik, Philipps Universität Marburg

01/2012 "Hypersymplectic Geometry and Gauge Theory" Oberseminar Differentialgeometrie, Westfälische Wilhelms-Universität Münster

01/2012 "Hypersymplektische Geometrie" Oberseminar Geometrie, Universität Stuttgart

10/2010 "Mirror Symmetry for K3 Surfaces" String Theory Lunchtime Seminar, Mathematical Instiute, University of Oxford

Events and Seminars organised

04/2021 – 07/2021 Seminar "Stability Conditions" (with Tobias Dyckerhoff) Center for Mathematical Physics, Univeristät Hamburg

12/2017 "GRK Final Colloquium" 15.12.2017 (with Klaus Hulek und Elmar Schrohe), DFG Research Training Group 1463, Leibniz Universität Hannover

01/2017 – 07/2017 PhD student seminar "The Geometry of the Nilpotent Variety", DFG Research Training Group 1463, Leibniz Universität Hannover

05/2016 Workshop on "Geometric Structures related to Hermitian and Almost Hermitian Manifolds", Leibniz Universität Hannover (with Roger Bielawski, David Petrecca, Lars Schäfer)

04/2015 – 04/2017 Reading Seminar, Institute of Differential Geometry, Leibniz Universität Hannover

10/2011 – 06/2012 Junior Geometry and Topology Seminar, Mathematical Institute, University of Oxford

Other Activities

10/2017 – Member of two appointment committee (W2 positions) and two habilitation committees, Leibniz Universität Hannover and University of Hamburg

04/2017 – 09/2018 Postdoctoral representative on the faculty committee (Fakultätsrat), Faculty of Mathematics and Physics, Leibniz Universität Hannover

09/2014 – 06/2015 Participant in the higher education programme "Pro Lehre", Leibniz Universität Hannover, Germany.

2013 – Reviewer for "Mathematische Annalen", "Journal of Physics A", "Annals of Global Analysis and Geometry", "Mathematical Reviews", "Mathematische Zeitschrift"

Teaching Experience

Lecture Courses taught at Universität Hamburg

SS 2021 Graduate lecture course "Elliptic Operators with Applications in Gauge Theory"

Tutorials given at Universität Hamburg

WS 2022/23 "Mathematics 1 LASek"
"Mathematics 3 LASek"

SS 2021 "Mathematics for Physicists IV"

WS 2020/21 "Mathematics for Physicists I"
"Mathematics for Physicists III"

SS 2020 "Mathematics for Physicists IV"

WS 2019/20 "Mathematics for Physicists III"

SS 2019 "Differential Geometry I"
"Mathematics for Physicists II"

WS 2018/19 "Mathematics for Physicists I"

Lecture Courses taught at Leibniz Universität Hannover

SS 2018 Graduate lecture course (with exercises) "Yang-Mills theory and stable bundles over Kähler manifolds"

SS 2016 Undergraduate lecture course "Manifolds"

Tutorials given at Leibniz Universität Hannover

WS 2017/18 "Riemannian Geometry"
"Mathematics for Physicists I"

SS 2017 "Manifolds"
"Analysis II"

WS 2016/17 "Riemannian Geometry"
"Analysis I"

WS 2015/16 "Analysis I"

SS 2015 "Schulgeometrie vom höheren Standpunkt" (Axiomatic Euclidean Geometry for highschool teachers)
"Classical Differential Geometry"

WS 2014/15 "Riemannian Geometry",
"Complex Differential Geometry"

SS 2014 "Schulgeometrie vom höheren Standpunkt" (Axiomatic Euclidean Geometry for highschool teachers)
"Mathematics II for Engineers"

Tutorials given at the University of Oxford

10/2010 – 06/2012 Retained Lecturer in Pure Mathematics, Jesus College, Oxford.
Tutorials for first and second year undergraduates in pure mathematics (Analysis, Geometry, Linear Algebra, Algebra, Topology, Measure Theory)

01/2010 – 03/2010 Assistant for the course "C 3.2b: Differentiable Manifolds"

Tutorials given at Eberhard-Karls-Universität Tübingen

SS 2008 "Linear Algebra II"

WS 2007/08 "Physics I, Classical Mechanics"

Theses

Universität Hamburg

06/2020 – I have acted as second examiners for 1 BA thesis (first examiner: Prof. Dr. Janko Latschev) and 1 MA thesis (first examiner: Prof. Dr. Vicente Cortés) on topics in differential geometry

Leibniz Universität Hannover

06/2015 – 09/2018 I have acted as second examiner for 15 BA theses by prospective highschool teachers on topics related to elementary/axiomatic geometry (first examiner: PD Dr. Lutz Habermann)

Conferences Attended

06/2020 "Lie Theory and integrable systems in symplectic and Poisson geometry", Fields Institute

05/2020 "Higgs bundles and related topics", University of Toronto

07/2019 "Metric and Analytic Aspects of Moduli Spaces", Leibniz Universität Hannover

07/2018 BIRS-CMO Workshop "Higgs bundles and Harmonic Maps from Riemann Surfaces", Oaxaca, Mexico

10/2017 "Lie Theory, Geometry and Differential Equations", Schloss Rauischholzhausen

08/2017 "Higgs Bundles, Harmonic Maps and Integrable Systems", Leibniz Universität Hannover

05/2016 "Geometric Structures related to Hermitian and Almost Hermitian Manifolds", Leibniz Universität Hannover

03/2016 "Lie Theory and Geometry", Schloss Rauischholzhausen

11/2015 "Hyperkähler and Related Structures in Differential and Algebraic Geometry", Levico Terme, Italy

09/2015 "New Methods in Geometric Invariant Theory", Freie Universität Berlin

09/2014 "DMV-PTM", joint meeting of the Polish and German mathematical societies, Poznan, Poland

09/2014 "Special Geometric Structures in Mathematics and Physics", Universität Hamburg

08/2014 "Gauge Theory in higher dimensions", Leibniz Universität Hannover

07/2013 "Curvature and Global Shape", Westfälische Wilhelms-Universität Münster

12/2012 "Geometry of the Vortex Equations", Hausdorff Institute, Bonn

07/2012 "Poisson 2012", University of Utrecht, Netherlands

07/2012 "Geometric Structures on Manifolds and their Applications", Castle Rauischholzhausen, Germany

03/2012 "International school on Geometry and Physics, Geometry and Quantization of Moduli Spaces", Centre de Recerca Mathematica, Barcelona, Spain

08/2011 "Gauge Theory Workshop" Centre for Quantum Geometry of Moduli Spaces, Aarhus University, Denmark

07/2011 "Gauge Theory and Complex Geometry" University of Leeds, UK

03/2011 "Higgs Bundles and Representations of Surface Groups" University of Oxford, UK

01/2011 "Winter School on Moduli Spaces" Isaac Newton Institute Cambridge, UK

03/2010 "Young Researchers in Mathematics" University of Cambridge, UK

References

Prof. Dr. Roger Bielawski, Leibniz Universität Hannover,
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Prof. Andrew Dancer, University of Oxford,
dancer@maths.ox.ac.uk

Prof. Franz Pedit, University of Massachusetts,
pedit@math.umass.edu