

# Katharina Neusser

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## Education

- Undergraduate studies of Mathematics and Philosophy at the University of Vienna 2002-2007
- Undergraduate studies of Mathematics and Philosophy, at École Normale Supérieure, Paris 2004-2005
- Master (Mag. rer. nat.) with highest distinction, Faculty of Mathematics, University of Vienna 2007
- PhD (Dr. rer. nat.) was awarded in a special ceremony by the Austrian President for outstanding performance (Promotio sub auspiciis praesidentis rei publicae), Faculty of Mathematics, University of Vienna 2011

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## Employment

- Assistant Professor at Masaryk University since Sep. 2018
- Simons Junior Professor at Simons Semester *Symmetries and Geometric Structures* at the Banach Center of the Mathematical Institute of the Polish Academy of Sciences (IMPAN) Sep.–Nov. 2017
- Postdoctoral fellow at the Mathematical Institute of Charles University financed by the Eduard Čech Institute 09/2015–09/2018
- Postdoctoral fellow at the Mathematical Sciences Institute (MSI) of the Australian National University (ANU) 07/2010-07/2015
- Research assistant employed by the project *Parabolic geometries II* (19500-N13) of Fonds zur Förderung der wissenschaftlichen Forschung 12/2009-06/2010
- Research assistant employed by the doctoral college *Differential geometry and Lie groups* (Initiativkolleg IK 1008-N funded by the University of Vienna) 03/2007-11/2009

## Visiting Positions and Research Stays

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- Focused Research Period - *Parabolic geometry, PDE and prolonged systems*, University of Auckland, New Zealand. August 2008
- Research Institute for Mathematical Sciences (RIMS), Kyoto, Japan March 2009
- Institute of Mathematics and its Applications, University of Auckland, New Zealand June 2011  
June 2013  
July 2017
- Erwin Schrödinger Institut (ESI), Vienna, Austria Aug.-Sept. 2012  
Aug.-Sept. 2013
- Department of Mathematics, University of Maryland, USA Sept.-Oct. 2012
- Mathematisches Institut, Friedrich-Schiller Universität, Jena, Germany April 2013  
May 2014
- Mathematical Institute, Charles University, Prague, Czech Republic. June 2014
- Department of Mathematical Sciences, University of Bath, England June/July 2015
- Max-Planck Institute, Bonn, Germany March 2016  
Oct. 2018
- Mathematical Institute, University of Heidelberg, Germany May 2017
- Junior Simons Professor at IMPAN, Warsaw, Poland Aug.-Nov. 2017
- Korea Institute for Advanced Study (KIAS), Seoul, South Korea May, Nov./Dec 2018  
May/June 2019  
February 2020

## Awards and Research Grants

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### Awards

- Award of the Austrian Ministry of Education and Research (Würdigungspreis) for study performance and Master thesis 2008
- Award of the Austrian Ministry of Education and Research (Würdigungspreis) for study performance and PhD thesis 2010
- Promotio sub auspiciis praesidentis rei publicae (highest possible distinction for study performance at the University of Vienna) 2011

### Grants

- KWA-Grant of the University of Vienna for a research stay at RIMS (Kyoto) 2009
- Two MSRVP-Grants of the Mathematical Sciences Institute (MSI) of ANU to support the visit of Karin Melnick and Rod Gover to MSI 2014
- Member of the project *Geometric Structures, Differential operators and Symmetry* funded by a Standard Grant of the Czech Science Foundation (GAČR) GA19-06357S 2019–2021

- Member of the project *Homotopy and Homology Methods and Tools Related to Mathematical Physics*, funded by an EXPRO-Grant of the Czech Science Foundation (GAČR) GX19-28628X 2019–2023
- Leader of the project *Variationalisation of distinguished curves in Cartan geometry*, funded by the ministry of Education, Youth and Sports of the Czech Republic, 8J20DE004. 2020-2022

## **Publications, Preprints and Work in Progress**

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### **Published and Accepted Articles**

- *On automorphisms groups of some types of generic distributions* (joint with A. Čap), *Differential Geometry and its Applications* **27** (2009), 769–779.
- *Universal prolongation of linear partial differential equations on filtered manifolds*, *Archivum Math.* **45**, issue 4. (2009), 289–300.
- *Prolongation on regular infinitesimal flag manifolds*. *International J. Math.* **23** (2012), 1–41.
- *Some differential complexes within and beyond parabolic geometry* (joint with R.L. Bryant, M.G. Eastwood and A.R. Gover), *Advanced Studies in Pure Math.* **82**, *Differential Geometry and Tanaka Theory–Differential system and Hypersurface Theory*, T. Shoda and K. Shibuya eds., (2019), 13–40;
- *Strongly essential flows on irreducible parabolic geometries* (joint with K. Melnick), *Transactions of Amer. Math. Soc.* **368**, no. 11 (2016), 8079–8110.
- *C-projective geometry* (joint with D.M.J. Calderbank, M.G. Eastwood and V.S. Matveev), *Memoirs of Amer. Math. Soc.* (2021) **267**, no. 1299, (137 pages).
- *A canonical connection on sub-Riemannian contact manifolds* (joint with M.G. Eastwood), *Archivum Math.* **52** (2016), 2003–2015.
- *On the groups of c-projective transformations of complete Kähler manifolds* (joint with V.S. Matveev), *Annals of Global Analysis and Geometry* **54**, no. 3 (2018), 329–352.
- *Projective geometry of Sasaki–Einstein structures and their compactification* (joint with A. R. Gover and T. Willse), *Dissertationes Mathematicae* **546** (2019), 1–64.
- *Cone structures and parabolic geometries* (joint with J.-M. Hwang), *Mathematische Annalen*, to appear; preprint available at arXiv:2010.14958 (39 pages).

## Preprints and Work in Progress

- *Projective Geometry of 3-Sasaki structures* (joint with A.R. Gover and T. Willse), in preparation.
- *Automorphism groups of parabolic geometries and their representations on the solutions spaces of BGG-equations—working title* (joint with K. Melnick), in preparation.
- *Symmetry and Geometric Rigidity*, in preparation; lectures notes based on a 10-hours course given at the Simons Semester *Symmetry and Geometric Structures* at IMPAN and at the Korea Institute for Advanced Study (KIAS).

## Invited and Contributed Talks at Conferences and Seminars

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### Talks at Conferences

- *On automorphism groups of generic distributions of rank  $n$  on manifolds of dimension  $\frac{n(n+1)}{2}$* , 28th Winterschool - Geometry and Physics, Srni, Czech Rep., 2008.
- *Weighted jets and prolongation of overdetermined systems of PDE's*, Workshop: *Parabolic Geometry and PDE*, University of Auckland, New Zealand, 2008 (**invited speaker**).
- *Weighted jets and prolongation of overdetermined systems of PDE's*, Workshop and School: *Geometry of ODE's and vector distributions*, Banach Center, Poland, 2009 (**invited speaker**).
- *Weighted jets and prolongation of overdetermined systems of PDE's*, 29th Winterschool - Geometry and Physics, Srni, Czech Rep., 2009.
- *Universal prolongation of linear differential equations on filtered manifolds*, Eduard Čech Center Meeting, Mikulov, Czech Rep., 2009.
- *Prolongation of differential equations on filtered manifolds*, Annual Meeting of the Australian Mathematical Society, Brisbane, Australia, 2010 (**invited speaker**).
- *On automorphism groups of certain types of vector distributions*, Workshop on *Cartan connections, geometry of homogenous spaces and dynamics*, at ESI in Vienna, Austria, 2011.
- *On some generic distributions and their automorphism groups*, Annual Meeting of the Australian Mathematical Society, Wollongong, Australia 2011.
- *Some complexes of differential operators*, Workshop on *Conformal and CR geometry*, at BIRS in Banff, Canada 2012 (**invited speaker**).
- *Some complexes of differential operators*, Workshop on *The interaction of Geometry and Representation Theory. Exploring New Frontiers*, at ESI in Vienna, Austria, 2012.
- *Almost  $H$ -projective structures and their description as parabolic geometries*, Workshop on  *$H$ -projective geometry*, ANU campus in Kioloa, Australia, 2013.
- *Strongly essential Killing fields of  $|1|$ -graded parabolic geometries*, Conference *Vector Distributions and Related Geometries*, Banach Center, Poland, 2014 (**invited speaker**).

- *Strongly essential flows on irreducible parabolic geometries*, 35th Winterschool-Geometry and Physics, Srni, Czech Rep., 2015.
- *On c-projective structures of degree of mobility at least 2*, 36th Winterschool-Geometry and Physics, Srni, Czech Rep., 2016.
- *On c-projective structures of degree of mobility at least 2*, DGA conference, Czech Rep., 2016.
- *On c-projective structures of degree of mobility at least 2*, Conference on *New Horizons in Twistor Theory*, University of Oxford, UK, 2017 (**invited speaker**).
- *C-projective equivalence in Kähler geometry*, conference *Conformal and Symplectic geometry* at the University of Auckland, 2018 (**invited speaker**).
- *C-projective equivalence in Kähler geometry*, *Mini-Workshop on Cartan Geometry*, Korea Institute for Advanced Study, 2018 (**invited speaker**).
- *Projective Geometry of Sasaki–Einstein structures*, Winterschool-Geometry and Physics, Srni, Czech Rep., 2019.
- *Symmetry and Geometric Rigidity*, Australian-German Workshop on *Differential Geometry in the Large*, MATRIX, Australia, 2019 (**invited speaker**).
- *Projective Geometry of Sasaki–Einstein structures and their compactification*, Mini-Workshop on Cartan Geometry, Korea Institute for Advanced Study, May 2019 (**invited speaker**).
- *C-projective equivalence in Kähler geometry*, Géométrie et dynamique de A à Z, Université d'Avignon, June 2019 (**invited speaker**).
- *Projective Geometry of Sasaki–Einstein structures and their compactification*, Abel Symposium 2019: *Geometry, Lie Theory and Applications*, Norway, June 2019 (**invited speaker**).
- *Projective Geometry of Sasaki–Einstein structures*, DGA 2019, Hradec Kralove, Czech Republic, September 2019.
- *Symmetry and Geometric rigidity*, Selected Topics of Simons Semester in Banach Center, Poland, December 2019 (**invited speaker**).
- Oberwolfach workshop *Komplexe Analysis–Algebraicity and Transcendence*, MFO, Germany, August 2020.

## Selected Seminar Talks and Lecture Series

- *On automorphism groups of some types of generic distributions*, Nara Women's University, Nara, Japan, 2009.
- *Parabolic geometries*, an introductory talk for students at University of Maryland, USA, 2012.
- *Some complexes of differential operators*, Geometry Seminar, University of Maryland, USA, 2012.
- *Strongly essential flows on parabolic geometries* at the Dynamics Seminar at Tufts University in Boston, USA, 2015.
- Lecture series *On c-projective geometry*, Charles University, Prague, 2015/2016.
- *C-projective structures*, Differential Geometry Seminar, University of Vienna, 2016.
- *Prolongation of overdetermined systems on parabolic geometries*, University of Tromsø, 2017.
- *On c-projective structures of degree of mobility at least 2*, Goethe-University, Frankfurt, 2017.

- *On c-projective structures of degree of mobility at least 2*, University of Heidelberg, 2017.
- Mini-Course (10 hours) *Symmetry and Geometric Rigidity* at the Simons Semester on *Symmetry and Geometric Structures* at IMPAN, Poland, Sept.–Nov. 2017.
- *Symmetry and Geometric Rigidity*, University of Melbourne, 2018.
- Lecture series *Symmetry and Geometric Rigidity* at the Korea Institute for Advanced Study, Seoul, May 2018.
- Lectures series *Parabolic Geometry* at the conference *Quantum flag manifolds in Prague*, 2019.
- *Symmetry, Cartan connections and Rigidity*, Friday Fish Seminar, Utrecht Geometry Centre, December 2020.
- *Cone structures and parabolic geometries*, Oberseminar Algebra und Zahlentheorie, Albert-Ludwigs- Universität Freiburg, January 2021.
- *Cone structures and parabolic geometries*, Joint Seminar on Complex Algebraic Geometry and Complex Analysis, Bochum–Essen–Köln–Wuppertal, May 2021.
- Mini-Course *Introduction to Cartan connections and applications*, University of Bologna, June 2021.

## Organised Conferences

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- *The Geometry of Differential Equations* at the Australian National University (with M. Eastwood and R. Gover) 19/09-23/09 2011  
<http://maths-people.anu.edu.au/~eastwood/GDEworkshop.html>
- *C-projective geometry and related geometric structures-perspectives and possibilities of cooperation*, ANU campus in Kioloa, Australia (with V. Matveev and K. Sagerschnig) 31/03-01/04 2014  
<http://www.geometrie-matveev.uni-jena.de/Past+activities.html>
- Zoom Workshop *Connections, Symmetries and Finsler geometry*, (with M. Dalfinger, B. Kruglikov, V.S. Matveev, Z. Muzsnay) 27/11 2020.  
[http://www.geometrie-matveev.uni-jena.de/Workshop+\\_CSFG+2020\\_.html](http://www.geometrie-matveev.uni-jena.de/Workshop+_CSFG+2020_.html)
- *Geometric structures, Compactifications and Group Actions*, Université de Strasbourg (with A. Čap, C. Frances, K. Melnick and T. Mettler) 27/06-01/07 2022

## Teaching Experience

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- Exercise class on general topology at the University of Vienna 2007
- First year undergraduate course *Mathematics and Applications 2 Honours* at the Australian National University 2011
- Honours/PhD Special Topics Course *Conformal differential geometry* at the Australian National University (with Michael Eastwood and Rod Gover) 2011
- *Riemann Surfaces* at Charles University in Prague 2016
- Mini-course (10 hours) *Symmetry and Geometric Rigidity* at IMPAN Aug./Sep. 2017

- *Representation theory of Lie groups and algebras* at Masaryk University 2018
- *Global Analysis* at Masaryk University 2019
- *Differential Geometry* at Masaryk University 2020
- *Differential Geometry* at Masaryk University 2021
- Mini-Course (8 hours) *Introduction to Cartan connections and applications*, June 2021  
University of Bologna

### **Service to the Discipline**

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- Referee of the PhD thesis of Henrik Winther at the University of Tromsø, February 2017.
- Referee of the Master Thesis of Timothy Moy at the University of Adelaide, May 2021.
- Referee of the the PhD thesis of Jan Schumm at the Friedrich-Schiller Universität Jena, 2021.