Sarah Hess

Curriculum Vitæ

University of Konstanz
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Personal Information

Date of Birth	15/03/1996
Nationality	German

Education

Since 10/2020	**Doctoral Studies in Mathematics**, *University of Konstanz.*
	Project Title: Intermediate Cones between the SOS and PSD Cones
	Expected Date of Award: 10/2024
	Supervisor: Prof. Dr. S. Kuhlmann
	Co-Supervisor: Asst. Prof. Dr. C. Goel
10/2018 – 09/2020	**Master of Science (Mathematics)**, *University of Konstanz.*
	Research Group: Real Algebraic Geometry
	Supervisors: Prof. Dr. Salma Kuhlmann, Dr. habil. Maria Infusino
	Grade: Very Good with Distinction
10/2015 – 10/2018	**Bachelor of Science (Mathematics)**, *University of Konstanz.*
	Research Group: Real Algebraic Geometry
	Supervisor: Prof. Dr. Salma Kuhlmann
	Grade: Excellent
10/2014 – 10/2015	**Bachelor Programme in Psychology**, *University of Konstanz.*
06/2014	**Abitur**, *Friedrich-Wöhler-Gymnasium.*
	Grade: Very Good
09/2012 – 06/2014	**Senior Classes**, *Friedrich-Wöhler-Gymnasium.*
09/2006 – 06/2012	**Secondary School**, *Deutsche Schule Shanghai.*

Publications and Preprints

Preprints	**A Refinement of Hilbert's 1888 Theorem: Separating Cones along the Veronese Variety**, *ArXiv 2401.03813.*
	Intermediate Cones between the Cones of Positive Semidefinite Forms and Sums of Squares, *ArXiv 2303.13178*, To be published in *Advances in Geometry.*
Extended Abstracts	**Intermediate Cones between the SOS and PSD Cones: Quartics and Sextics**, *https://publications.mfo.de/handle/mfo/4030.*
	Positive Semidefinite Quadratic Forms on Varieties Defined by Quadratic Forms, *https://doi.org/10.15495/EPub_UBT_00006809.*

Master's Thesis	**Examination of the Connection between Horn's Problem and the Lax Conjecture**, *http://nbn-resolving.de/urn:nbn:de:bsz:352-2-160cfrqubrq6n2*.
Bachelor's Thesis	**Elliptic Curves and their Application in Key-Exchange Cryptography**, *http://nbn-resolving.de/urn:nbn:de:bsz:352-2-gulfjde9kdan6*.

Teaching Activities

Since 10/2023	**University of Konstanz.** Assistent Lecturer for the Courses *Linear Algebra I* and *Linear Algebra II*
09/2021 – 02/2023	**University of Applied Sciences Konstanz.** Lecturer for the Course *Consolidation of Fundamental Mathematics* and the *Pre-Course in Mathematics*
10/2020 – 03/2022	**University of Konstanz.** Assistent Lecturer for the Courses *Positive Polynomials and Moment Problems*, *Algorithmic Algebraic Geometry*, *Algebraic Number Theory*, *Algebra II*, *Algebra I* and the *Support Course in Mathematics*
10/2019 – 03/2020	**University of Konstanz.** Personal Coach for a Pupil Student in Mathematics
10/2016 – 03/2020	**University of Konstanz.** Class Tutor for the Courses *Stochastic Processes I*, *Probability Theory*, *Algebra I*, *Linear Algebra II*, *Linear Algebra I*, *Support Course in Mathematics* and the *Pre-Course in Mathematics*

Scholarships and Awards

07/2023	*SIAM Student Travel Award* from the *Society for Industrial and Applied Mathematics* (SIAM)
06/2023	Travel Grant financed by the *Doctoral Fund of the University of Konstanz*
03/2023	*Oberwolfach Leibniz Graduate Student* Award
09/2022	Travel Grant financed by the *Doctoral Fund of the University of Konstanz*
08/2022	Travel Grant from the *European Women in Mathematics* (EWM)
03/2022 – 03/2024	Doctoral Scholarship of the *German Academic Scholarship Foundation* offering financing (since 09/2023) and mentorship
09/2021 – 08/2023	Doctoral Scholarship following the *Landesgraduiertenförderungsgesetz* provided by the University of Konstanz and the Federal State Baden-Württemberg
01/2020	*Award for Academic Excellence* attributed by the University of Konstanz Alumni Association
03/2019 – 02/2020	Scholarship for Students provided by the *German Academic Scholarship Foundation* including financing and mentorship (both accepted)
09/2018	Travel Grant from the *Konstanz Women in Mathematics* (KWIM)

Research Stays and Talks

25/01/2024 — **University of Konstanz**, Konstanz.
Lecture on the main results of the dissertation: *Intermediate Cones for the SOS and PSD Cones*

15/12/2023 — **University of Konstanz**, Konstanz.
Seminar: Real Algebraic Geometry
Talk: *Separating Cones for the SOS and PSD Cones that Fail to be Spectrahedral Shadows*

09/10 – 11/10/2023 — **Universités Paris VI et VII**, Paris.
Seminar: Structures Algébriques Ordonnées
Talk: *A Refinement of Hilbert's 1888 Theorem*

04/10 – 06/10/2023 — **Women in Automorphic Forms 2023**, Konstanz.
Talk: *A Refinement of Hilbert's 1888 Theorem: Survey Talk*

31/07 – 04/08/2023 — **International Workshop on Operator Theory and its Applications 2023**, Helsinki.
Special Session: Moment Problems and Applications
Talk: *A Cone Filtration in the Dual Setting to the Moment Problem*

10 – 14/07/2023 — **SIAM Conference on Applied Algebraic Geometry**, Eindhoven.
Invited Session: Moment Problems, Convex Algebraic Geometry, and Semidefinite Relaxations
Talk: *Separating Cones for the SOS and PSD Cones*

25 – 28/06/2023 — **Max Planck Institute for Mathematics in the Sciences**, Leipzig.

29/05 – 02/06/2023 — **Mathematisches Forschungsinstitut Oberwolfach**, Oberwolfach.
Seminar: Metric Algebraic Geometry

17 – 24/03/2023 — **Mathematisches Forschungsinstitut Oberwolfach**, Oberwolfach.
Co-Worker in the Oberwolfach Leibniz Fellowship Program *Nonnegative polynomials vs Sums of squares* organized by Asst. Prof. Dr. C. Goel

12 – 17/03/2023 — **Mathematisches Forschungsinstitut Oberwolfach**, Oberwolfach.
Oberwolfach Leibniz Graduate Student
Workshop: Real Algebraic Geometry with a View toward Koopman Operator Methods
Talk: *Intermediate Cones between the SOS and PSD Cones: Quartics and Sextics*

14 – 15/02/2023 — **6ᵗʰ Meeting of the *Danube-Rhine Model Theory and Applications* Network**, Passau.

25 – 28/09/2022 — **Colloquium Logicum 2022**, Konstanz.

21 – 23/09/2022 — **Geometry in Complexity and Computations**, Konstanz.

12 – 16/09/2022	**25th International Symposium on Mathematical Theory of Networks and Systems**, Bayreuth.
	Invited Session: Moment Problems, Convex Algebraic Geometry, and Semidefinite Relaxations
	Talk: *Positive Semidefinite Quadratic Forms on Varieties Defined by Quadratic Forms*
05 – 09/09/2022	**Final Workshop of the *Polynomial Optimization, Efficiency through Moments and Algebra* Network**, Paris.
22 – 26/08/2022	**EWM General Meeting**, Helsinki.
	Session: Real Algebraic Geometry in Action with a View Toward Optimization
	Talk: *Intermediate Cones between the SOS and PSD Cones*
01 – 07/03/2020	**Mathematisches Forschungsinstitut Oberwolfach**, Oberwolfach.
	Workshop: Real Algebraic Geometry with a View Toward Hyperbolic Programming and Free Probability
24/01/2020	**5th Meeting of the *Danube-Rhine Model Theory and Applications* Network**, Konstanz.
22 – 26/06/2019	**International Workshop on Operator Theory and its Applications 2019**, Lisbon.
	Special Session: The Truncated Moment Problem
06 – 07/12/2018	**KWIM Festtage**, Konstanz.
03 – 07/09/2018	**EWM General Meeting**, Graz.

Academic Research Activities

02 – 08/2019	**Academic Research Associate**, *University of Konstanz*.
	Research Group: Numerics by Prof. Dr. Stefan Volkwein in cooperation with the Renal Research Institute (New York)
	Project: *Mathematical Modelling of the Dialysis of Urea Using Hyperbolic PDEs*
10/2018 – 02/2019	**Academic Research Associate**, *University of Konstanz*.
	Research Group: Numerics by Prof. Dr. Stefan Volkwein
	Project: *Optimal Stationary Heat Source*

Voluntary Work

Since 2023	Organization of a workshop for elementary school students at the yearly *Mainau – Explore Science* from the *Klaus Tschira Stiftung*
24 – 26/11/2023	Commissioner in the selection seminar of the German Academic Scholarship Foundation
Since 07/2023	Member of the *Mathe Initiative Bodensee*
13/07/2022	Ambassador for Women in Mathematics on behalf of KWIM at the event *Wege in die Promotion*
Since 2022	Volunteer at the yearly *Tag der Mathematik* at the University of Konstanz

Since 2019	Tutoring of University Students
04/2019 – 09/2020	Ambassador of the German Academic Scholarship Foundation
Since 2018	Active Member of KWIM
2018 – 2019	Yearly Election Worker for the University of Konstanz
Since 2008	Tutoring of High School Students
2007 – 2012	Certified Conflict Mediator at the German School Shanghai

Languages

German	Mother Tongue
English	C2
French	B2
Chinese	A1
Sign Language	German, Intermediate Level, DGS II