*Department of Mathematics and Computer Science*
*Philipps-University of Marburg*
*35032 Marburg, Germany*
☎ *+49 6421 2825 487*
✉ *jonas.henkel@uni-marburg.de*
*jmhenkel.github.io*
** 19.07.1996, Frankfurt am Main*

# Jonas Henkel

*Curriculum Vitae*

## Studies

From 10/2022 **PhD Student in Mathematics**, *Philipps-University*, Marburg.
Topic: Spectral Geometry on Homogeneous Spaces. Advisor: Prof. Dr. habil. Ilka Agricola

06/2021–09/2022 **Master of Science in Mathematics**, *Philipps-University*, Marburg, Final grade 1.1 (Excellent).
Thesis: The Laplacian on Riemannian Manifolds with Symmetries

10/2015–05/2021 **First State Examination for the Teaching Profession at High Schools in Mathematics and Physics** (Equivalent to M.Ed.), *Philipps-University*, Marburg, Final grade 1.2 (Excellent).
Included comprehensive training in mathematics didactics

## Publications

2026 **Explicit Laplace Spectra of Homogeneous Principal Bundles**, *Ilka Agricola, Jonas Henkel*, arXiv:2605.11177v1 [math.DG].
Submitted for review to The Journal of Geometric Analysis

2026 **Hodge Laplacian on $1$-forms of homogeneous $3$-spheres**, *Jonas Henkel, Emilio Lauret*, arXiv:2605.05406 [math.DG].
Submitted for review to Communications in Analysis and Geometry

2026 **A Machine Learning Approach to the Nirenberg Problem**, *Cortés, Esteban-Casadevall, Feng, Henkel, Hirst, Schettini-Gherardini, Stapleton*, arXiv:2602.12368 [cs.LG].
Submitted for review to Journal of the London Mathematical Society

2025 **The Laplace-Beltrami Spectrum on Naturally Reductive Homogeneous Spaces**, *Ilka Agricola, Jonas Henkel*, arXiv:2503.21416 [math.DG].
Submitted for review to Mathematische Zeitschrift

2025 **The Mathematician's Assistant: Integrating AI into Research Practice**, *Jonas Henkel*, Mathematische Semesterberichte, vol. 72, 117-144.
doi.org/10.1007/s00591-025-00400-0

## Computational Mathematics & Programming

Symbolic Computation — Extensive use of Python and SageMath to translate geometric and representation-theoretic problems into computational frameworks, including custom algebraic solvers.

Machine Learning (PINNs) — Applied Physics-Informed Neural Networks (PINNs) to approximate solutions for non-linear geometric equations (e.g., the Nirenberg problem). Contributed to the *AInstein* project group at the London Geometry and Machine Learning Summer School.

## Scholarships

09/2024–12/2024 **Research Scholarship** by *Deutscher Akademischer Austauschdienst*, Bonn
Awarded to participate in the SLMath Semester Program, Berkeley

10/2020–09/2021 **Private Scholarship** by *Dr. med. Alexander Liesenfeld,* Amöneburg
Recommended by the Department of Mathematics and Computer Science, Philipps-University of Marburg

## Professional Experience

### Academic Positions

From 10/2022 **Research Associate**, *Philipps-University of Marburg*, Germany.

### Research Stays

08/2024–12/2024 **Program Associate**, *Simons Laufer Mathematical Sciences Institute*, Berkeley, USA.

### Additional Professional Experience

10/2018–07/2024 **Technical Assistant**, *Marburg Ion Beam Therapy Center*, Germany.

## Presentations

### Lecture Series and Invited Talks

07/2026 **Spectral Geometry of Deformed Normal Homogeneous Spaces**, *Virtual Seminar on Geometry with Symmetries*, Online.

01/2026 **AI-Assisted Research in (pure) Math**, *Graduate Training Workshop, INI*, Cambridge, UK.

09/2025 **Researching with Thinking Models: AI-Assisted Paths in Mathematics**, *The Annual 2025 ÖMG-DMV Meeting*, Linz, Austria.

02/2024 **Spectral Geometry (Five-Day Lecture Series)**, *University of Malaga*, Spain (invited).

11/2023 **Spectral Geometry of Aloff-Wallach Spaces**, *Oberseminar Geometrie und Topologie, University of Stuttgart*, Germany.

### Conference and Seminar Presentations

**AI in Spectral Geometry**

04/2026 *An AI-Assisted Proof in Spectral Geometry*, GSTW07 Workshop, INI, Cambridge, UK.

**Spectral Geometry on Naturally Reductive Spaces**

09/2025 *The Annual 2025 ÖMG-DMV Meeting*, Linz, Austria.

09/2025 *Differential Geometry & Applications, Masaryk University*, Brno, Czech Republic.

10/2024 *Graduate Seminar, Simons Laufer Mathematical Sciences Institute*, Berkeley, USA.

06/2024 *41. Süddeutsches Kolloquium über Differentialgeometrie, Goethe University Frankfurt.*

03/2025 **The Dirac Operator with Skew Torsion on Naturally Reductive Spaces**, *Lie Theory in Geometry, Algebra and Analysis, National University of Cordoba*, Argentina.

**Geometry of Aloff-Wallach Spaces**

08/2023 *Prospects in Geometry and Global Analysis, Castle Rauischholzhausen*, Germany.

05/2023 *Spinorial & Octonionic Aspects of $G_2$ and Spin$(7)$ Geometry, BIRS*, Banff, Canada.

### Poster Presentations

**Geometry of Aloff-Wallach Spaces**

08/2023 *Workshop on Curvature and Global Shape, University of Münster*, Germany.

08/2023 *Prospects in Geometry and Global Analysis, Castle Rauischholzhausen*, Germany.

## University Teaching at Philipps-University of Marburg

**Co-Lecturer** AI in Mathematics Education (Summer 2026). Co-designing and co-leading a seminar focusing on didactic methods for integrating artificial intelligence into mathematics teaching.

**Lead Tutor** Foundations of Math (Winter 2025/26), Analysis 1 (Summer 2025, 2023) Complex & Vector Analysis (Summer 2024, 2022), PDEs (Summer 2024), Lie Groups & Lie Algebras (Winter 2023/24), Differential Geometry 1 (Winter 2022/23).

**Interactive Workshops** Co-organized and led 90-minute interactive sessions in Analysis 1 (Summer 2025, 2023). Provided hands-on guidance to students, teaching them how to construct and structure mathematical proofs.

**Tutor** Functional Analysis (Winter 2021/22), Complex Analysis & Vector Analysis (Summer 2021).

## Selected Conference, Workshop, and School Participation

08/2025 **AI Meets Mathematics Workshop**, *Imperial College*, London.

07/2025 **London Geometry and Machine Learning Summer School**, *Imperial College*.

02/2024 **Mathematical Supergravity**, *UNED - Madrid*.

10/2023 **Workshop on Einstein Manifolds**, *University of Stuttgart*.

03/2023 **Seminar Sophus Lie**, *Friedrich-Alexander-Universität*, Erlangen.

11/2022 **Oberwolfach Graduate Seminar: Geometry and Topology of Compact Homogeneous Spaces**, *Castle Będlewo*, Poland.

08/2022-09/2022 **Spaces, Structures, Symmetries**, *Università degli Studi di Bari Aldo Moro*, Bari, Italy.

06/2022 **Seminar Sophus Lie**, *Sophus Lie Conference Center*, Nordfjordeid, Norway.

10/2021 **Special Geometries on Riemannian Manifolds**, *UQAM*, Montreal.

## Voluntary activities

10/2019–02/2022 **Moderator and Member of the Participation Advisory Board**, *Department 72 - Citizen Participation, Magistrate*, Marburg.
Advised on projects to encourage citizen participation in regional democratic decisions

## Languages

German (native), English (fluent), Latin (basic knowledge)

## References

**Prof. I. Agricola** Full Professor of Differential Geometry, University of Marburg, Germany.

**Prof. E. Lauret** Indep. Researcher (CONICET)/Assoc. Prof, Universidad Nacional del Sur, Argentina.