Curriculum Vitae

Personalia

Name:	Mathijs Hubertus Maria Johannes Wintraecken
Date of Birth:	18$^{\text{th}}$ of January, 1985
Nationality:	Dutch
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Professional experience

1/3/2019- Present	Postdoc in the Edelsbrunner group, IST Austria
1/11/2015- 31/1/2019	Postdoc in the DATASHAPE group, INRIA Sophia-Antipolis

Education

4/9/2015:	PhD. Mathematics at **Rijksuniversiteit Groningen** Thesis: *Ambient and intrinsic triangulations and topological methods in cosmology* Supervisors: Gert Vegter (Mathematics) and Rien van de Weijgaert (Cosmology)
30/10/2009:	MSc. Mathematical Sciences (cum laude) at **Utrecht University** Thesis: *Confluence of singular fibers on rational elliptic surfaces* Supervisor: Hans Duistermaat
31/8/2009:	MSc. Theoretical Physics at **Utrecht University** Thesis: *Cylinder amplitudes in 2D quantum gravity* Supervisor: Jan Ambjørn
19/1/2007:	BSc. Mathematics (cum laude) at **Utrecht University** Thesis: *Geodesics and connections* Supervisor: Erik van den Ban
19/1/2007:	BSc. Physics (cum laude) at **Utrecht University**. Thesis combined with mathematics
26/6/2003:	Gymnasium at K. S. G. De Breul, Zeist. 'Natuur en Techniek', 'Natuur en Gezondheid' together with Latin, Economics II and Geography.

Grants

1/3/2019-28/2/2021	ISTplus Fellowship, supported by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 754411.
1/6/2021-31/1/2023	Lise Meitner grant (FWF) grant number M–3073.
Accepted	Local coordinator of the ANR grant StratMesh.

Publications

The list with links to digital versions of all papers can be found on `https://orcid.org/0000-0002-7472-2220`.

Conference papers

1. R.H. Dyer, G.Vegter and M.H.M.J.Wintraecken. Riemannian Simplices and Triangulations. *SoCG2015*
2. Jean-Daniel Boissonnat, Mael Rouxel-Labbé and Mathijs Wintraecken. Discretized Riemannian Delaunay triangulations. *25th International Meshing Roundtable*
3. Jean-Daniel Boissonnat, Mael Rouxel-Labbé and Mathijs Wintraecken. Anisotropic Triangulations via Discrete Riemannian Voronoi Diagrams *SoCG2017*
4. Jean-Daniel Boissonnat, André Lieutier, and Mathijs Wintraecken. The reach, metric distortion, geodesic convexity and the variation of tangent spaces. hal–01661227 *SoCG2018*
5. Local criteria for triangulation of manifolds. Jean-Daniel Boissonnat, Ramsay Dyer, Arijit Ghosh, and Mathijs Wintraecken. hal–01661230 *SoCG2018*
6. The extrinsic nature of the Hausdorff distance of optimal triangulations of manifolds. Gert Vegter, and Mathijs Wintraecken. *CCCG2019*

7. The topological correctness of PL-approximations of isomanifolds, Jean-Daniel Boissonnat, and Mathijs Wintraecken. hal–02386193 *SoCG2020*

8. Jean-Daniel Boissonnat, Siargey Kachanovich, and Mathijs Wintraecken. Tracing isomanifolds in $\mathbb{R}^d$ in time polynomial in d using Coxeter-Freudenthal-Kuhn triangulations. *SoCG2021*

9. Herbert Edelsbrunner, Teresa Heiss, Vitaliy Kurlin, Philip Smith, and Mathijs Wintraecken. The density fingerprint of a periodic point set. *SoCG2021*

10. André Lieutier and Mathijs Wintraecken. Hausdorff and Gromov-Hausdorff Stable Subsets of the Medial Axis. hal–04083167 *STOC2023*

11. Dominique Attali, Hana Dal Poz Kouřimská, Christopher Fillmore, Ishika Ghosh, André Lieutier, Elizabeth Stephenson, and Mathijs Wintraecken. Tight Bounds for the Learning of Homotopy à la Niyogi, Smale, and Weinberger for Subsets of Euclidean Spaces and of Riemannian Manifolds. hal–03721463 *SoCG2024*

12. Hana Dal Poz Kouřimská, André Lieutier, and Mathijs Wintraecken. The medial axis of closed bounded sets is Lipschitz stable with respect to the Hausdorff distance under ambient diffeomorphisms. hal-04297370 *SoCG2024*

Conference multimedia contributions

13. Erin Chambers, Christopher Fillmore, Elizabeth Stephenson, and Mathijs Wintraecken. A cautionary tale: burning the medial axis is unstable. *SoCG2022*.

14. Dominique Attali, Hana Dal Poz Kouřimská, Christopher Fillmore, Ishika Ghosh, André Lieutier, Elizabeth Stephenson, and Mathijs Wintraecken. The Ultimate Frontier: An Optimality Construction for Homotopy Inference. hal-04579406 *SoCG2024*

Journal publications

15. M.H.M.J.Wintraecken and G.Vegter. A geometrical take on invariants of low-dimensional manifolds found by integration. *Topology and its Applications*, 2013. Volume 160, pages 2175–2182.

16. M.H.M.J.Wintraecken and G.Vegter. On the Optimal Triangulation of Convex Hypersurfaces, Whose Vertices Lie in Ambient Space. *Mathematics in Computer Science*, 2014. Volume 9 (3) pages 345-353.

17. R.H. Dyer, G.Vegter and M.H.M.J.Wintraecken. Riemannian Simplices and Triangulations. *Geometricae Dedicata*, 2015. Volume 179(1) pages 91-138.

18. Jean-Daniel Boissonnat, Mael Rouxel-Labbé and Mathijs Wintraecken. Discretized Riemannian Delaunay triangulations. *Procedia Engineering, 2016*. Volume 163, pages 97-109.

19. Pratyush Pranav, Herbert Edelsbrunner, Rien van de Weygaert, Gert Vegter, Michael Kerber, Bernard J. T. Jones, and Mathijs Wintraecken. The topology of the cosmic web in terms of persistent Betti numbers. *Monthly Notices of the Royal Astronomical Society,* 2016. Volume 465 (4), pages 4281-4310.

20. Dror Atariah, Günter Rote and Mathijs Wintraecken. Optimal Triangulation of Saddle Surfaces. arXiv:1511.01361. *Beiträge zur Algebra und Geometrie*, 2018. Volume 59, no. 1, pages 113-126.

21. Jean-Daniel Boissonnat, Mael Rouxel-Labbé, and Mathijs H. M. J. Wintraecken. Anisotropic Triangulations via Discrete Riemannian Voronoi Diagrams. *SIAM Journal on Computing*, 2019. Volume 48(3), Pages 1046–1097.

22. R.H. Dyer, G.Vegter and M.H.M.J.Wintraecken. Simplices modelled on spaces of constant curvature. *Journal of Computational Geometry*, 2019. Volume 10, No 1, pages 223-256.

23. Jean-Daniel Boissonnat, André Lieutier, and Mathijs Wintraecken. The reach, metric distortion, geodesic convexity and the variation of tangent spaces. *Journal of Applied and Computational Topology*, 2019. Volume 3, Issue 1-2, pages 29-58.

24. Aruni Choudhary, Siargey Kachanovich, and Mathijs Wintraecken. Coxeter triangulations have good quality. *Mathematics in Computer science*, 2020, Volume 14, pages 141-176.

25. Gert Vegter, and Mathijs Wintraecken. Refutation of a claim made by Fejes Tóth on the accuracy of surface Meshes. *Studia Scientiarum Mathematicarum Hungarica*, 2020. Volume 57 (2), pages 193–199.

26. Jean-Daniel Boissonnat, Ramsay Dyer, Arijit Ghosh, André Lieutier, and Mathijs Wintraecken. Local conditions for triangulating submanifolds of Euclidean space. *Discrete and Computational Geometry*, 2021, Volume 66, pages 666-686.

27. Jean-Daniel Boissonnat, Siargey Kachanovich, and Mathijs Wintraecken. Triangulating submanifolds: An elementary and quantified version of Whitney's method. *Discrete and Computational Geometry*, 2021, Volume 66, pages 386-434.

28. Jean-Daniel Boissonnat and Mathijs Wintraecken. The Topological Correctness of PL Approximations of Isomanifolds. *Foundations of Computational Mathematics*. Online, 2021, `doi.org/10.1007/s10208-021-09520-0`.

29. Jean-Daniel Boissonnat, Ramsay Dyer, Arijit Ghosh, and Mathijs Wintraecken. Local criteria for triangulating general manifolds. *Discrete and Computational Geometry*, Online, 2022, `doi.org/10.1007/s00454-022-00431-7`

30. Jean-Daniel Boissonnat, Siargey Kachanovich, and Mathijs Wintraecken. Tracing Isomanifolds in $\mathbb{R}^d$ in Time Polynomial in d using Coxeter-Freudenthal-Kuhn Triangulations. *SIAM Journal on Computing*, 2023.

31. Jean-Daniel Boissonnat, and Mathijs Wintraecken. The reach of subsets of manifolds. *Applied and Computational Topology*, 2023.

32. Herbert Edelsbrunner, Alexey Garber, Mohadese Ghafari, Teresa Heiss, Morteza Saghafian, and Mathijs Wintraecken. Brillouin Zones of Integer Lattices and Their Perturbations. *SIAM Journal on Discrete Mathematics*, 2024.

Workshop contributions

33. M.H.M.J.Wintraecken and G. Vegter. A conceptual take on invariants of low-dimensional manifolds found by integration. *EUROCG2013*

34. Ramsay Dyer, Gert Vegter and Mathijs Wintraecken. Intrinsic simplices on Riemannian manifolds. *EUROCG2014*

35. Ramsay Dyer, Gert Vegter and Mathijs Wintraecken. Barycentric coordinate neighbourhoods in Riemannian manifolds. *Young Researchers Forum CG week 2016*

36. Mathijs Wintraecken. Bounds on the angle between tangent spaces and the metric distortion for C^2 manifolds with given positive reach. *EUROCG2017*

37. Siargey Kachanovich, Mathijs Wintraecken and Aruni Choudhary. Coxeter triangulations have good quality. *EUROCG2018*

38. Jean-Daniel Boissonnat, and Mathijs Wintraecken. Triangulating stratified manifolds I: a reach comparison theorem *Curves and Surfaces 2018*

39. Jean-Daniel Boissonnat, and Mathijs Wintraecken. Topologically correct PL-approximations of isomanifolds. *EUROCG2020*

40. Hana Dal Poz Kouřimská and Mathijs Wintraecken. Curvature variation based adaptive sampling for Delaunay triangulations of Riemannian manifolds. *EUROCG2022*

41. Dominique Attali, Christopher Fillmore, Ishika Ghosh, Hana Dal Poz Kouřimská, André Lieutier, Elizabeth Stephenson, and Mathijs Wintraecken. A short proof of the Homotopy reconstruction result by Niyogi, Smale and Weinberger for sets of positive reach with tight bounds. *ATMCS2022*

42. Erin Chambers, Christopher Fillmore, Elizabeth Stephenson, and Mathijs Wintraecken. A cautionary tale: burning the medial axis is unstable.*ATMCS2022*.

Submitted to journals/conferences/in preparation

43. Rien van de Weygaert, Pratyush Pranav, Bernard J.T. Jones, E.G. Patrick Bos, Gert Vegter, Herbert Edelsbrunner, Monique Teillaud, Wojciech A. Hellwing, Changbom Park, Johan Hidding, Mathijs Wintraecken. Probing Dark Energy with Alpha Shapes and Betti Numbers. ArXiv:1110.5528

44. Ramsay Dyer, Gert Vegter and Mathijs Wintraecken. Barycentric coordinate neighbourhoods in Riemannian manifolds. ArXiv:1606.01585

Talks and presentations

Invited talks

- 26–28/8/2015, Computational geometry in non-Euclidean spaces, Nancy, France. Title: Intrinsic simplices on spaces of nearly constant curvature and quality measures for simplices on space forms; a road towards adaptive sampling
- 4–7/7-2017, CGweek workshop at SoCG; Algorithms for the Medial Axis workshop, Brisbane, Australia. Title: Manifolds with positive reach: metric distortion, tangent space variation and geodesic convexity.
- 11–14/7/2018, CGweek workshop at SoCG; 7th Annual Minisymposium on Computational Topology, Budapest, Hungary. Title: Triangulating stratified manifolds: a reach comparison theorem
- 2–3/9/2019, Recent advances in Space-Time Methods workshop at ECCOMAS Young Investigators Conference (YIC2019), Krakow, Poland. Title: Triangulating submanifolds: An elementary and quantified version of Whitney's method.
- 5–6/9/2019, New Horizons in Computational Geometry and Topology, Inria Sophia-Antipolis, France. Title: Triangulating submanifolds (with boundary) à la Whitney.

Presentations at workshops without reviewed proceedings

- 27–28/3/2013, Quantum Universe 3, Groningen, The Netherlands.
- 10–15/12/2017, *Journées de Géométrie Algorithmique (JGA 2017)*
- 31/3/2019-5/4/2019, *Journées de Géométrie Algorithmique (JGA 2019)*

Administrative duties

Organization of the Datashape/Ghudi Seminar Inria Sophia-Antipolis.
Organization of group meetings during the Corona-pandemic
Organizing the geometry and topology seminar at the IST Austria.

PC membership

SoCG2023

Reviewing

- SoCG2016 (twice)
- SoCG2017
- SoCG2018 (twice)
- SODA2019
- WALCOM2019
- JoCG
- Journal of the AMS (quick evaluation)
- SoCG2020 (three times)
- ESA2020
- MFCS 2020
- Progress in Information Geometry: Theory and Applications
- SoCG2021 (three times)
- Springer Nature Applied Sciences
- Discrete and computational geometry (often)
- SIAM Journal on Discrete Mathematics
- SoCG2022 (three times)

- Journal of Computational and Applied Mathematics
- FoCM
- Computing in Geometry and Topology
- SoCG2024 (two times)

Teaching experience

Courses (as a teaching assistent)

Spring 2009	Teaching Assistant 'Mechanica 2' (Advanced Mechanics) at the Department of Physics and Astronomy, Utrecht University.
2010-2013	Teaching Assistant Group theory, Rijksuniversiteit Groningen
2010-2013	Teaching Assistant Geometry, Rijksuniversiteit Groningen

The courses at the Rijksuniversiteit Groningen all took half a semester, with a single retake opportunity. I also assisted with special retake opportunities and remedial teaching for students with special circumstances or needs, for example autism spectrum disorder.

The courses at Utrecht University were a semester long.

responsible for the Oral exams

Spring 2024	Geometrie et Topologie, Math department, University of Nice.

Courses (lecturing)

2022-present	The reach and the medial axis (IST Austria)

Bachelor students (official)

Sanne Jonker, Hyperbolic geometry, 2011-2012, Rijksuniversiteit Groningen.

Master students (official)

Ishika Ghosh, June 2021- present, IST Austria and IISER Tirupati.

Past PhD student (unofficially)

Mael Rouxel-Labbé, Génération de Maillages Anisotropes, 2016.
Mael Rouxel-Labé's PhD was a joint PhD-project with an industrial partner, namely Geometry Factory. As is usual for students at Inria Sophia-Antipolis, the degree was awarded by the Université Côte d'Azur. Jean-Daniel Boissonnat acted at the primary supervisor and Jane Tournois from Geometry Factory as official second supervisor. I did most of the day to day supervision.

Past PhD student (official)

Siargey Kachanovich, Maillage de variétés avec les triangulations de Coxeter, Inria Sophia-Antipolis, Co-supervision with Jean-Daniel Boissonnat, 2019.

Outreach

27/11/2013	Presentation for prospective mathematics students at the Rijksuniversiteit Groningen
5/4/2011, 1/6/2011, 2/4/2012	Checking regional mathematical Olympiad results and giving training
4/4/2014	Famelab Groningen

Language skills

Dutch (native), English (fluent), French (intermediate), German (intermediate)