# Renee Hoekzema
## Curriculum vitae

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## ACADEMIC CAREER

AUG 2022 –

**ASSISTANT PROFESSOR**
Vrije Universiteit Amsterdam, Department of Mathematics

JUN 2022 – AUG 2022

**POSTDOCTORAL RESEARCHER**
Utrecht University, Mathematical Institute

JUN 2020 – MAY 2022

**POSTDOCTORAL RESEARCH ASSOCIATE**
University of Oxford, Mathematical Institute, Centre for Topological Data Analysis

OCT 2019 – MAY 2020

**POSTDOCTORAL FELLOW**
Max Planck Institute for Mathematics, Bonn

OCT 2018 – SEPT 2019

**POSTDOCTORAL RESEARCHER**
University of Copenhagen, Department of Mathematical Sciences

2015 – 2018

**DPHIL MATHEMATICS**
University of Oxford, Trinity college

MAR/APR 2016 | *Visitor at Stanford University, Department of Mathematics*

2012 – 2015

**DPHIL EARTH SCIENCES**
University of Oxford, St Cross college

2013-2014 | *Visitor at Utrecht University, Department of Physical Geography*
MAR/APR 2014 | *Visitor at UC Berkeley, Department of Integrative Biology*

2008 – 2012

**MSC MATHEMATICAL SCIENCES** *(GPA: 4.0/4.0)*
**MSC THEORETICAL PHYSICS** *(GPA: 4.0/4.0)*
Utrecht University

JAN-JUN 2009, | *Student at ETH Zürich,*
2011-2012 | *Department of Mathematics*

2005 – 2009

**BSC MATHEMATICS** *(GPA: 4.0/4.0)*
**BSC PHYSICS AND ASTRONOMY** *(GPA: 4.0/4.0)*
**MINOR BIOGEOLOGY**
Utrecht University

## AWARDS & SCHOLARSHIPS

2022 | NWO VENI Fellowship
2022 | Oberwolfach Research Fellowship
2020 | Oberwolfach Research Fellowship
2020 | MSRI Summer Research Program
*Awarded to 18 groups out of 300 applicants.*
2018 | Schmidt Science Fellows Finalist
*selected from over 200 applicants across the sciences, each of which nominated to apply as 1 of 5 from 46 world leading universities.*
2017 | Scholarship at Trinity College *awarded for outstanding work during second DPhil.*
2014 | EPSRC scholarship
2014 | Fundatie van de Vrijvrouwe van Renswoude scholarship
2014 | Hendrik Muller Fonds scholarship
2013 | Burdett Coutts award
2013 | Pieter Langerhuizen Stipendium
*awarded to a single researcher in the Netherlands yearly.*
2013 | VSBfonds scholarship
2012 | Prins Bernhard Cultuurfonds Fellowship
2012 | Hendrik Muller Fonds scholarship
2012 | Vreedefonds scholarship
2012 | Genootschap Noorthey scholarship

## PUBLICATIONS & PREPRINTS

MATHEMATICS

➤**Manifolds with odd Euler characteristic and higher orientability**, R. S. Hoekzema, *International Mathematical Research Notices, 2020(14), 4496-4511*. 5 citations.

➤ **Cut and paste invariants of manifolds via algebraic $K$-theory**, R. S. Hoekzema, M. Merling, L. Murray, C. Rovi, J. Semikina, *Topology and its Applications, 2022(108105), 0166-8641*.

➤ **Orientability of high-dimensional manifolds with odd Euler characteristic**, R. S. Hoekzema. *arXiv preprint 2007.05451*, 2020. *Under review.*

TOPOLOGICAL DATA ANALYSIS

➤ **A blood atlas of COVID-19 defines hallmarks of disease severity and specificity**, COvid-19 Multiomics Blood ATlas (COMBAT) Consortium (203 authors), *Cell, 185(5), 916-938*, 2022. 27 citations.

➤ **Multiscale methods for signal selection in single cell data**, R. S. Hoekzema, O. Sumray, L. Marsh, T. M. Carroll, X. Lu, H. M. Byrne, H. A. Harrington. *arXiv preprint 2206.07760*, 2022. *Accepted in Entropy.*

PHILOSOPHY

➤ **Augmenting the Human Mathematician**, H. Breman, R. S. Hoekzema, M. W. Johansen, H. K.

Sørensen, *1st Mathematical Reasoning in General Artificial Intelligence Workshop, ICLR* 2021.

PALAEONTOLOGY

➤ **Quantitative study of developmental biology confirms *Dickinsonia* as a metazoan**, R. S. Hoekzema, M. D. Brasier, F. S. Dunn and A. G. Liu, *Proceedings of the Royal Society B,* 2017. Widely reported in media, attention score in top 5% of research outputs scored by Altmetric. 39 citations.

➤ **The Chronicles of *Charnia*: morphology and morphogenesis in an iconic Ediacaran taxon**, F. S. Dunn, A. G. Liu, P. R. Wilby, R. S. Hoekzema, D. V. Grazhdankin, C. G. Kenchington, P. C. J. Donoghue, *International Symposium on the Ediacaran-Cambrian Transition (ISECT): Abstract Book,* 2017.

➤ **Modelling the Growth and Morphology of Ediacaran Organisms**, R. S. Hoekzema, M. D. Brasier, *The Paleontological Society Special Publications, Cambridge University Press,* 2014.

PHYSICS

➤ **On the Topology of Lorentzian manifolds**, R. S. Hoekzema, 2011. Preprint. 1 citation.

## THESES

MATHEMATICS

➤ **Algebraic Topology of Manifolds: *Higher Orientability and Spaces of Nested Manifolds***, R. S. Hoekzema, 2018. DPhil thesis, 111 pages, supervised by Ulrike Tillmann.

PALAEONTOLOGY

➤ **Mathematical Studies of Morphology in the Palaeobiology of Early Life**, R. S. Hoekzema, 2015. DPhil thesis, 312 pages, supervised by Martin Brasier.

PHYSICS

➤ **Generalized Causal Dynamical Triangulations in two dimensions**, R. S. Hoekzema, 2012. MSc thesis, 66 pages, supervised by Renate Loll, Tom Ilmanen (ETH Zürich), Gunther Cornelissen. 5 citations.

➤ **Primordial Gravitational Waves**, R. S. Hoekzema, 2009. BSc thesis, 51 pages, supervised by Tomislav Prokopec, Jan Smit (University of Amsterdam).

## BOOKS

➤ Scientific Advisor for the translation of **The Road to Reality**, Sir Roger Penrose (2004) into Dutch (Uitgeverij Merlin).

➤ Scientific Advisor for the translation of **Lie groups, Physics, and Geometry**, Robert Gilmore (2008) into Dutch (Meromorf Press).

## ORGANISATIONAL

SEMINAR ORGANISATION
➤ Centre for Topological Data Analysis seminar, University of Oxford (2022).

CONFERENCE ORGANISATION
➤ "Creativity in mathematics & AI", interdisciplinary workshop in Maastricht (Jan 2023).

## INVITED TALKS

MAY 2022 Keynote lecture London Mathematical Society Women in Mathematics Day
DEC 2021 Quantum Gravity lunch seminar, Nijmegen
NOV 2021 Ada Lovelace Day, Warwick
MAR 2021 Topology seminar, Northeastern
JAN 2021 Topology seminar, Aberdeen
JAN 2021 Topological Quantum Field Theory Seminar, Lisbon
NOV 2020 Oberseminar Topologie, Münster
SEPT 2020 Centre for TDA, Oxford *(TDA of Covid)*
MAY 2018 Topology seminar, Barcelona
MAR 2018 Utrecht Geometry Centre seminar
JAN 2018 SFB seminar on Higher Invariants, Regensburg
JAN 2018 Geometry/Topology seminar, Augsburg
DEC 2017 Topology seminar, Stanford
NOV 2017 Topology&Algebra seminar, Copenhagen
OCT 2017 Scottish Topology Seminar, Aberdeen
SEP 2016 OAC Manifolds meeting, Cambridge
APR 2016 Topology Progress Seminar, Stanford

## CONTRIBUTED TALKS

2022 Algebraic Structures in Topology, San Juan, Puert Rico
2016 European Autumn School in Topology, Utrecht
2016 Young Topologists' Meeting, Copenhagen
2016 MIT Talbot workshop on Equivariant stable homotopy theory and the Kervaire invariant, Herriman, Utah
2014 PalAss, Annual Meeting of the Palaeontological Association, Leeds
2014 Paleontology seminar, Berkeley
2014 North American Paleontological Convention, Gainesville, Florida
2014 Biomathematics group meeting, Oxford

## TEACHING

2015 – 2018 **COLLEGE LECTURER**
Trinity college Oxford
Admissions of undergraduate applicants, mentoring undergraduate students and tutoring:
➤ *Linear Algebra II*
➤ *Topology*
➤ *Groups and Group Actions*
➤ *Group Theory*
➤ *Special Relativity*
➤ *Graph Theory*

**2014 – 2016 TUTOR & TEACHING ASSISTANT**
Oxford Mathematical Institute
➤ *Algebraic Topology*
➤ *Computational Algebraic Topology*
➤ *Homological Algebra*
➤ *Graph Theory*
➤ *Topology and Groups*

**2012 – 2013 UNDERGRADUATE TUTOR**
St Edmund Hall and St Peter's College
➤ *Mathematics for Materials and Earth Science*

**2006 – 2012 TEACHING ASSISTANT**
Utrecht University
➤ *Calculus*
➤ *Special Relativity*
➤ *Mechanics*
➤ *Mathematical Techniques for Physicists*
➤ *Physics lab course*
➤ *Multi-dimensional Analysis*
➤ *Introduction to logic, number theory and algebra*
➤ *Introduction to Topology*

## SUPERVISION

UNOFFICIAL PHD CO-SUPERVISOR (2020 –)
➤ Hester Breman, Maastricht University
Working on the cognitive psychology of mathematics research, e.g. the use of visualisations and the experience of epistemic emotions.

EXAMINER
➤ Confirmation examiner of Naya Yerolemou (2021)

## OUTREACH & EQUALITY

➤ 2021 **Short video** for the Protect Pure Maths campaign, 10k views on Oxford MI social media.

➤ 2016 – 2018 **Equality Representative** for the Trinity College graduate body.

➤ 2018 **Podcast interview** for 'De Fascinatievolger' with Judith Lengkeek (Verte Vertelling).

➤ 2017 **Invited lecture** for the joint meeting of the Mirzakhani society and Emmy Noether society for women studying mathematics at Oxford and Cambridge respectively.

➤ 2017 **Mathematics Ambassador** for Oxford Mathematics Department assisting outreach activity *It All Adds Up*, a Mathematics conference for girls in years 9-13.

➤ 2016 **Blog post** on popular mathematics blog "Picture this Maths".

➤ 2005 – 2007 Organising **Astronomy camps** for children with the Dutch Youth Astronomy Association - organisation and supervision, giving lectures on scientific topics to children.

## EXTRACURRICULAR

➤ 2015 – 2018 Graduate representative on the **Research Committee** of the Oxford Mathematical Institute.

➤ 2009 – 2010 Board member of **Co-determination Council for Physics Students** (SONS), organising weekly meetings for physics students to discuss education and facilities, member of the **Faculty Council** of the Science Faculty and **Department Council** of the Physics Department of Utrecht University.

## SCIENTIFIC CONSULTANCY

➤ 2017 – 2018 **Mathematical Advisor** for Resurgo Genetics, a research start-up studying topology of human DNA.

## CONFERENCES ATTENDED

2022 Algebraic Topology: Methods, Computation and Science (ATMCS), Oxford (*contributed poster*)
∗2021 Talking Maths in Public, ICMS (*∗virtual*)
∗2021 Manifolds and K-theory: the legacy of Andrew Ranicki, ICMS
∗2021 TopFlavours, Warwick
∗2021 LMA Women in Mathematics Day 2021, Plymouth
∗2020 Topological methods in Data Science, IMA & LMS
∗2020 Women in Mathematical Physics, BIRS
2020 Topologie workshop, Oberwolfach
2020 Introductory Workshop: Higher Categories and Categorification, MSRI Berkeley
2020 Connections for Women: Higher Categories and Categorification, MSRI Berkeley
2019 Automorphisms of Manifolds, Bonn
2019 Women in Topology, Bonn
2018 A Process Ontology for Biology, London
2017 Women in Topology, MSRI Berkeley
2017 K- and L-Theory and Geometric Group Theory, Oberwolfach
2017 Algebraic Topology of Manifolds, Oxford
2017 Young Topologists' Meeting, Stockholm
2017 Groups, Manifolds and K-Theory, Münster
2016 Topology of Manifolds, Lisbon
2016 IAS Women and Mathematics on Curves, Loops and Words in Geometry, Princeton
2016 OAC Manifolds meeting, Aberdeen
2016 OAC Manifolds meeting, Oxford
2015 Graduate Workshop on Topological Quantum Field Theory, Simons Center
2015 Clay Research Conference, Oxford
2015 Conference on Topology and Geometry, Bonn
2015 Young Topologists' Meeting, EPFL Lausanne
2015 ECSTATIC, Imperial College London
2014 Quantum Foundations & Quantum Gravity, Imperial College London
2014 Young Researchers in Mathematics, Warwick
2014 I-SKATE, Surgery & K-theory, San Francisco
2014 Reimaging the Foundations of Algebraic Topology, MSRI, Berkeley

2013 Dutch Society of Vertebrate Paleontology meeting, Maastricht

2013 Progressive Palaeontology, Leeds

2013 Life and The Planet spring school, Exeter

2013 Lyell Meeting: The Cambrian Explosion, The Geological Society, London

2013 Characterising Exoplanets: detection, formation, interiors, atmospheres and habitability, The Royal Society, London

2012 Quantum Gravity in Paris

2012 Dutch Society of Vertebrate Paleontology meeting, Maastricht

2012 Exploring Quantum Space-Time, Bad-Honnef