

Curriculum Vitae

Eddie Nijholt



PERSONAL DETAILS

Name Eddie Nijholt
Current Employment Postdoctoral Researcher in Mathematics
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EMPLOYMENT

Oct 2022 - Present - [Chapman Fellow](#)
Imperial College London, UK
Mar 2020 - Oct 2022 - Co-PI in the [ReconNeCT Project](#)
Led by Prof. Dr. Tiago Pereira
University of São Paulo, Brazil
Jan 2018 - Jan 2020 - Postdoctoral Researcher in Mathematics
University of Illinois at Urbana-Champaign, USA
Mentor: Prof. Dr. Lee DeVille
Funded by NWO Rubicon grant
Sep 2013 - Sep 2017 - PhD position in Mathematics
Vrije Universiteit Amsterdam, the Netherlands

EDUCATION

Mar 2018 - PhD in Mathematics
Vrije Universiteit Amsterdam
Cum laude
Thesis: *Bifurcations in Network Dynamical Systems*
Supervisor: Prof. Dr. B. W. Rink
Oct 2013 - Master of Science, Mathematical Physics
University of Amsterdam
Cum laude
Thesis: *Integrable systems on Coxeter symplectic leaves in $SL(n, \mathbb{C})$*
Supervisor: Prof. Dr. N. Reshetikhin

Oct 2011 Bachelor of Science, Mathematics
University of Amsterdam
Cum laude, cum honore
Thesis: *Bruhat cells and double Bruhat cells for GL_n*
Supervisor: Prof. Dr. N. Reshetikhin

Oct 2011 Bachelor of Science, Physics
University of Amsterdam
Cum laude, cum honore

RESEARCH GRANTS & PRIZES

Oct 2022 **Chapman Fellowship** in Mathematics at Imperial College London

July 2017 **Rubicon Grant** by NWO (Dutch Science Foundation) for proposal *Designing Network Dynamical Systems through Algebra*, highest ranking proposal, (approx. €134.000)

Aug 2022 The publication *Emergent hypernetworks in weakly coupled oscillators* is featured in a Nature Communications Editors' Highlights webpage (titled *Applied physics and mathematics*)

Sep 2018 The publication *Center Manifolds of Coupled Cell Networks* selected as the outstanding paper of general interest to appear as SIGEST paper in SIAM Review (SIREV)

Oct 2022 Accommodation grant by UCLA (University of California, Los Angeles) (approx. \$1.500)

July 2019 Traveling grant by **Lorentz Center** for participating in the summer school **Data Science for Dynamical Systems** in Leiden, the Netherlands (€400)

June 2019 Traveling grant by Imperial College London, UK (approx. €180)

Jan 2019 **NDNS+** (Nonlinear Dynamics in Natural Systems) visiting scholarship (approx. €2.500)

Apr 2017 Conference support grant by **NWO**, together with Prof. Dr. B. Rink and Dr. C. Bick, (approx. €2.000)

Dec 2016 Conference support grant by **Lorentz Center**, together with Prof. Dr. B. Rink and Dr. C. Bick, (approx. €30.000)

May 2016 Traveling grant by **BREUDS** (Brazilian-European Partnership in Dynamical Systems), (approx. €600)

Feb 2016 Traveling grant by **NDNS+**, (approx. €2.000)

Nov 2014 Traveling grant by **NDNS+**, (approx. €2.000)

July 2011 Perfect score (10) for Bachelor thesis. In addition, received split first prize for best Bachelor thesis presentation in mathematics at the University of Amsterdam

July 2009 Honorable mention at the IMC, **International Mathematics Competition** in Budapest, Hungary

June 2009 Member of best first year's team at LIMO, Landelijke Interuniversitaire Mathematische Olympiade (Dutch mathematics competition between universities)

June 2008 Top 20 in the Dutch Chemistry Olympiad

Sep 2007 19th in the Dutch Mathematics Olympiad

PUBLICATIONS

E. Nijholt, N. Sieben and J. W. Swift, **Invariant Synchrony and Anti-Synchrony Subspaces of Weighted Networks**, **Journal of Nonlinear Science (JNLS)**, *Volume 33, Number 4, (2023)*

E. Nijholt, T. Pereira, F. Queiroz and D. Turaev, **Chaotic Behavior in Diffusively Coupled Systems**, **Communications in Mathematical Physics**, *Pages 1–42, (2023)*

L. DeVille and E. Nijholt, **Dynamical systems defined on simplicial complexes: symmetries, conjugacies, and invariant subspaces**, **Chaos**, *Volume 32, Number 9, (2022)*

- D. Eroglu, J. Espindola, I. Kiss, E. Nijholt and T. Pereira, [Emergent hypernetworks in weakly coupled oscillators](#), **Nature Communications**, *Volume 13, Number 1, (2022)*
- S. von der Gracht, E. Nijholt and B. Rink, [Amplified steady state bifurcations in feedforward networks](#), **Nonlinearity**, *Volume 35, Issue 4, Pages 2073-2120, (2022)*
- E. Nijholt, B. Rink and S. Schwenker, [A new algorithm for computing idempotents of \$\mathcal{R}\$ -trivial monoids](#), **Journal of Algebra and its Applications**, *Volume 20, Issue 12, Article Number 2150227, (2021)*
- L. DeVille and E. Nijholt, [Circulant Type Formulas for the Eigenvalues of Linear Network Maps](#), **Linear Algebra and its Applications**, *Volume 610, Pages 379-439, (2021)*
- E. Nijholt, B. Rink and S. Schwenker, [Quiver representations and dimension reduction in dynamical systems](#), **SIAM Journal on Applied Dynamical Systems (SIADS)**, *Volume 19, Issue 4, Pages 2428-2468, (2020)*
- E. Nijholt, B. Rink and S. Schwenker, [Generalised symmetry in network dynamics](#), **DSWeb Magazine**, *April 2020*
- E. Nijholt, B. Rink and J. Sanders, [Center manifolds of coupled cell networks](#), **SIAM Review, SIGEST section**, *Volume 61, Issue 1, Pages 121-155, (2019)*
- E. Nijholt, B. Rink and J. Sanders, [Center manifolds of coupled cell networks](#), **SIAM Journal on Mathematical Analysis (SIMA)**, *Volume 49, Issue 5, Pages 4117-4148, (2017)*
- E. Nijholt, B. Rink and J. Sanders, [Projection blocks in homogeneous coupled cell networks](#), **Dynamical Systems**, *Volume 32, Issue 1, Pages 164-186, (2017)*
- E. Nijholt, B. Rink and J. Sanders, [Graph fibrations and symmetries of network dynamics](#), **Journal of Differential Equations**, *Volume 261, Issue 9, Pages 4861-4896, (2016)*

PREPRINTS

- S. von der Gracht, E. Nijholt and B. Rink, [A parametrisation method for high-order phase reduction in coupled oscillator networks](#)
- S. von der Gracht, E. Nijholt and B. Rink, [Hypernetworks: cluster synchronisation is a higher-order effect](#)
- E. Nijholt and B. Rink, [Transversality in Dynamical Systems with Generalized Symmetry](#)

ORGANIZATION OF SCIENTIFIC MEETINGS

- Oct 2022 - Present* - Dynamical Systems Seminar at Imperial College London (DynamIC), together with Dr. Dongchen Li
- May 2023* - Mini-symposium [The Why and How of \(Hyper\)Networks](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Portland, Oregon, USA
- May 2021* - Mini-symposium [Dynamics of and on Networks](#) at the [SIAM Conference on Applications of Dynamical Systems](#), digital
- May 2019* - Mini-symposium [Novel Directions in Network Dynamical Systems \(part I and part II\)](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA
- June 2017* - Lorentz Center Workshop [Emerging Topics in Network Dynamical Systems](#) in Leiden, the Netherlands

- May 2017* Mini-symposium [Mathematical Analysis of Classical and Asynchronous Network Dynamical Systems \(part I and part II\)](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA
- May 2015* Mini-symposium [Analysis of Network Dynamical Systems](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA

ACADEMIC VISITS

- May 2023* University of Warwick, UK. Visiting Prof. Ian Stewart
- July 2022* 2 weeks at the [Nesin Mathematics Village](#), Turkey
- Feb 2020* University of Copenhagen, Denmark
- Jan 2020* Imperial College London, UK
- Apr 2019* Imperial College London, UK
- Mar 2019* Universität Hamburg, Germany
- Feb 2019* University of Minnesota, USA
- Jan 2019* 4 weeks at the [Vrije Universiteit Amsterdam](#), the Netherlands
- May 2016* ICMC (Institute of Mathematics and Computer Sciences) in São Carlos, Brazil. Visiting Dr. T. Pereira.
- Feb 2016* 5 weeks at the Ohio State University in Columbus, Ohio, USA, as part of the MBI's [emphasis semester on dynamics of biologically inspired networks](#). Visiting Prof. M. Golubitsky.
- Nov 2014* 4 weeks at Imperial College London, UK. Visiting Prof. M. Field.
- May 2014* 2 weeks at Rice University in Houston, Texas, USA. Visiting Prof. M. Field.
- May 2012* 3 weeks at [Retreat for QGM and GEOMAPS PhD students](#) at Aarhus University, Denmark.

CONFERENCES & PRESENTATIONS

- May 2023* Invited talk in the mini-symposium [Dynamics of and on Networks with Varying Topologies](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Portland, Oregon, USA
- May 2023* Invited talk in the [Ergodic Theory and Dynamical Systems Seminar](#) at the University of Warwick, UK
- Mar 2023* Conference [Nonlinear Data Analysis and Modeling: Advances, Applications, Perspectives](#) in Potsdam, Germany (on the occasion of Prof. Jürgen Kurths' 70th birthday)
- Mar 2023* Invited talk at the [Centre for Complexity Science](#) at Imperial College London, UK
- Oct 2022* [International Conference on Dynamical Systems \(Celebrating the 60th Birthday of Marcelo Viana\)](#) at IMPA, Rio de Janeiro, Brazil
- Aug 2022* Workshop [Reconstructing Network Dynamics from Data: Applications to Neuroscience and Beyond](#) at UCLA, Los Angeles, USA
- July 2022* Invited lecture at the [Nesin Mathematics Village](#), Turkey
- Feb 2022* Participant in the [2nd International Meeting of Young Researchers in Singularity Theory and Related Fields](#), digital
- Jan 2022* Invited talk at Imperial College London, UK, digital
- July 2021* Invited talk at Utrecht University, the Netherlands, digital
- May 2021* Invited talk in the mini-symposium [Noise and Heterogeneity Effects in Network Dynamics, Part II](#) at the [SIAM Conference on Applications of Dynamical Systems](#), digital
- May 2021* Invited talk in the mini-symposium [Normal Forms and Algebraic Structures for Dynamical Systems](#) at the [SIAM Conference on Applications of Dynamical Systems](#), digital
- Apr 2021* Invited talk in the [Oberseminar Nonlinear Dynamics](#) at the Free University Berlin, digital
- Mar 2021* Invited talk in the [One World Dynamics](#) seminar, digital
- Jan 2021* Invited talk at Imperial College London, UK, digital

Sep 2020 Invited talk in the [Mathematics Colloquium](#) at the RUG (University of Groningen), digital
Aug 2020 Participant in the [Dynamics Days Digital 2020](#)
June 2020 Participant in the [NDNS+ online meeting 2020](#)
Jan 2020 Invited talk at the [Dynamics, geometry and \$C^*\$ algebras seminar](#) at the University of Copenhagen, Denmark
July 2019 30 minute talk at the mini-symposium [Dynamics and Topology](#) at [Equadiff](#) in Leiden, the Netherlands
July 2019 Summer school [Data Science for Dynamical Systems](#) at the Lorentz Center in Leiden, the Netherlands
May 2019 Invited talk in the mini-symposium [Influence of Network Structure and Symmetry on Dynamics, Part II](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA
May 2019 20 minute talk in the mini-symposium [Novel Directions in Network Dynamical Systems, Part I](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA
Apr 2019 Talk at the [DynamIC Seminar](#) (Dynamical Systems at Imperial College London) in the UK
Mar 2019 Talk at the Universität Hamburg in Germany
Feb 2019 Invited talk at the Dynamical Systems Seminar at the University of Minnesota
Jan 2019 30 minute talk at the Vrije Universiteit Amsterdam, the Netherlands
June 2018 [SIAM Conference on Nonlinear Waves and Coherent Structures](#) in Anaheim, California, USA
2013 - 2017 Multiple talks at the Most Informal Nonlinear Dynamics Seminar (MINDS) at the Vrije Universiteit Amsterdam
June 2017 15 minute talk at the Lorentz Center Workshop [Emerging Topics in Network Dynamical Systems](#) in Leiden, the Netherlands
May 2017 25 minute talk in the mini-symposium [Mathematical Analysis of Classical and Asynchronous Network Dynamical Systems, Part I](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA
Nov 2016 Invited talk at the dynamical systems seminar at the University of Leiden, the Netherlands
July 2016 Summer school [Introductory Workshop on the Representation of Finite Groups](#) at the EPFL in Lausanne, Switzerland
May 2016 30 minute talk at the [6th international conference on nonlinear science and complexity](#) in São José dos Campos, Brazil
Feb 2016 Talk at the [generalized Network Structures & Dynamics workshop](#) in Columbus, Ohio, USA
Aug 2015 Two talks at the [International Summer School in Nonlinear Dynamics](#) in Peyresq, France
May 2015 [Workshop on Applied Dynamical Systems: Equivariance and Beyond](#) at the MBI (Ohio State University) in Columbus, Ohio, USA
May 2015 25 minute talk in the mini-symposium [Analysis of Network Dynamical Systems](#) at the [SIAM Conference on Applications of Dynamical Systems](#) in Snowbird, Utah, USA
Feb 2014 [Workshop on Coupled Cell Networks and Dynamics](#) at the University of Porto, Portugal
July 2013 Summer school [Integrable Systems and Semiclassical Analysis](#) at the EPFL in Lausanne, Switzerland
May 2012 Talk at [Retreat for QGM and GEOMAPS PhD students](#) at Aarhus University, Denmark
July 2009 Participated in the [16th International Mathematics Competition for University Students](#) (IMC), in Budapest, Hungary

TEACHING

- Fall 2022 - Present* Personal tutor for 1st, 2nd and 3rd year students at Imperial College London, UK
- Spring 2022* *Bifurcation Theory* at the University of São Paulo (USP), Brazil, for PhD students and postdocs
- Fall 2021* Extensive lecture series on *Dimension Reduction for Dynamical Systems with Quiver Symmetry* for PhD students and postdocs at the University of São Paulo (USP), Brazil
- Fall 2019* Math 595 (Advanced Topics Course) at the University of Illinois at Urbana-Champaign: [Quiver Representations](#)
- 2019* Held the Operator Algebra Learning Seminar at the University of Illinois in Urbana-Champaign, together with Dr. Adam Dor On. Gave various lectures on Riemannian geometry, spin manifolds and the Dirac operator.
- 2013 - 2017* Teaching assistant (teacher/supervisor during exercise classes) for multiple courses, including
- Differential Geometry (BSc mathematics, year 3), 3 times
 - Rings and Fields (BSc mathematics, year 2)
 - Ordinary Differential Equations (BSc mathematics, year 2)
 - Linear Algebra (BSc Science, Business and Innovation (SBI), year 2)
 - Mathematical Methods (BSc Medical Natural Sciences (MNW), year 1; BSc Pharmaceutical Sciences, year 2)
 - Sets and Combinatorics (BSc Business Analytics, year 1)
- 2015 - 2016* Coordination of the Vrije Universiteit Amsterdam [Wiskunde D](#) (Mathematics D) project for outstanding high school students. I was the contact person for high school teachers and did part of the grading.

SUPERVISING EXPERIENCE

- Spring 2023* Advisor of master's student Pengyu Zhang at Imperial College London (ongoing)
- 2021 - 2022* Co-adviser of PhD-student Fernando Cordeiro de Queiroz University of São Paulo (USP), Brazil
Thesis: [Chaotic behaviour in diffusively couple systems](#)
Defense: 10/10/2022
- Fall 2019* Running an IGL (Illinois Geometry Lab) project. This includes supervising a team of two graduate students and four undergraduate students on a project of my design. Title of the project: [How Strange are Networks?](#)

ASSESSMENT OF OTHERS' WORK

- June 2021 - Present* Review editor
[Frontiers in Systems Neuroscience](#)
- Oct 2019* Served on doctoral committee of James Schmidt. University of Illinois at Urbana-Champaign (UIUC), USA
Thesis: *Morphisms of Networks of Hybrid Open Systems*
- Nov 2018* Committee member for the prelim exam of James Schmidt (examination in the USA to determine if a graduate students is qualified to begin working on a doctoral thesis),

at the University of Illinois at Urbana-Champaign. The project is on understanding network systems from a categorical perspective.

Title: *Maps of Networks of Hybrid Open Systems*

- Peer reviewer for various journals, including PLOS ONE, Communication Physics, SIAM Journal on Applied Dynamical Systems (SIADS) and SIAM Journal on Mathematical Analysis (SIMA)

OTHER ACADEMIC ACTIVITIES

- June 2009 - Present* Volunteering for [Pythagoras](#), a Dutch mathematics magazine for high school students. Tasks include creating exercises for the competition section ('Pythagoras Olympiade'), grading exercises and writing solutions
- May 2017* Volunteering at a training for the second round of the Dutch Mathematics Olympiad
- Mar 2017* Competition leader for the second round of the Dutch Mathematics Olympiad at the Vrije Universiteit Amsterdam
- May 2016* Volunteering at a training for the second round of the Dutch Mathematics Olympiad
- Mar 2012* Released the book *Bruhat cells and double Bruhat cells for GL_n*
- May 2009* Volunteering at a training for the second round of the Dutch Mathematics Olympiad

MISCELLANEOUS

- Feb 2021* Completed the Coursera Machine Learning course ([certificate](#))

LANGUAGE SKILLS

Dutch (native language), English (fluent), German (basic), French (basic)