

# Ricardo Buring

## Curriculum Vitae

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## Education

- 2017 – now **Ph.D. in Mathematics**, *Johannes Gutenberg-Universität Mainz*, Germany.  
Supervisors: Dr. A.V. Kiselev (Groningen), Prof. dr. D. van Straten (Mainz).
- 2013 – 2017 **Master of Science in Mathematics**, *University of Groningen*, The Netherlands.  
Thesis: *Kontsevich graphs and their weights in deformation quantization of Poisson structures*.  
Supervisor: Dr. A.V. Kiselev.
- 2010 – 2013 **Bachelor of Science in Mathematics**, *University of Groningen*, The Netherlands.  
Thesis: *An explicit algebro-geometric proof of Poncelet's closure theorem*.  
Supervisor: Prof. dr. J. Top.
- 2009 – 2010 **Propedeuse in Computer Science**, *Hanzehogeschool Groningen*, The Netherlands.
- 2004 – 2009 **Higher General Secondary Education (HAVO)**, *Zernike College*, The Netherlands.

## Experience

### Teaching

- 2017 – now **Teaching assistant**, *Johannes Gutenberg-Universität Mainz*, Germany.  
Sommersemester 2019: Computeralgebra (mathematics).  
Wintersemester 2018: Diskrete Mathematik für Informatiker (discrete mathematics, first year).  
Sommersemester 2018: Computeralgebra (mathematics).  
Wintersemester 2017: Diskrete Mathematik für Informatiker (discrete mathematics, first year).
- 2013 – 2017 **Teaching assistant**, *University of Groningen*, The Netherlands.  
2016 – 2017: Geometry & Differential Equations (mathematics, masters course).  
2014 – 2015: Propaedeutic project (mathematics, first year).  
2013 – 2014: Propaedeutic project (mathematics, first year).
- 2014 – 2015 **Mentor**, *University of Groningen*, The Netherlands.  
Mentoring a group of first year mathematics students.
- 2013 – 2018 **Private tutor** (freelance), The Netherlands and Germany.  
Teaching mathematics to students individually and in small groups.  
2017 – 2018 at Johannes Gutenberg-Universität Mainz: discrete mathematics, computeralgebra.  
2013 – 2017 at University of Groningen: group theory, analysis on manifolds.

### Software development

- 2018 – now **Freelance software developer**, *rburing* (KvK-nummer: 72761415), The Netherlands.  
Developing various software, including a mobile web application.
- 2010 – 2017 **Web application developer** (project-based), *G4S*, The Netherlands.  
Developing several web applications.

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## Committees

- 2014 – 2016 **Mathematics Programme Committee**, *University of Groningen*, The Netherlands.  
Served as a student member 2014 – 2015, and as student chairman 2015 – 2016.  
Organized the *Mathematics Pizza Meeting on Motivation*, with  $\approx 40$  attendees.
- 2014 – 2015 **Mathematics Alumni Day Committee**, *FMF study association*, The Netherlands.  
Organized the *Mathematics Alumni Day 2015* at the University of Groningen.

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## Talks and posters

- September 16 – 22, 2018 **Homotopy algebras, deformation theory and quantization**, Będlewo, Poland.  
Conference supported by Banach Center, Université du Luxembourg and Institute of Mathematics of the Polish Academy of Sciences.  
Poster title: *Deformation quantization: expansion  $\star \bmod \bar{o}(\hbar^4)$  via graphs.*
- July 9 – 13, 2018 **The 32nd International Colloquium on Group Theoretical Methods in Physics**, Prague, Czech Republic.  
Organized by the Czech Technical University in Prague.  
Talk title: *The orientation morphism: from graph cocycles to deformations of Poisson structures.*
- March 25 – 31, 2018 **Enumerative Invariants from Differential Graded Lie Algebras and Categories**, Montegufoni, Italy.  
Spring School organized by Helge Ruddat (Johannes Gutenberg-Universität Mainz, Germany).  
Talk title: *Feynman diagrams and Kontsevich graphs.*
- January 26 – 29, 2018 **Ph.D. meeting Sonderforschungsbereich/Transregio 45**, Physikzentrum Bad Honnef, Germany.  
Talk title: *Deformations of Poisson structures via graphs.*
- July 3 – 7, 2017 **GQT Graduate Colloquium**, Den Dolder, The Netherlands.  
Organized by the Geometry and Quantum Theory (GQT) cluster.  
Talk title: *The Kontsevich graph calculus in deformation quantization of Poisson structures.*
- May 3, 2017 **Junior Geometry and Topology seminar**, Oxford, United Kingdom.  
Organized by the Mathematical Institute of the University of Oxford.  
Talk title: *Integrating without integrating: weights of Kontsevich graphs.*
- April 7, 2017 **Intercity Number Theory Seminar**, Groningen, The Netherlands.  
Organized by the Dutch mathematics cluster DIAMANT.  
Talk title: *Relations among Kontsevich graph weight integrals.*
- October 19 – 21, 2016 **Symposium on Advances in Semi-Classical Methods in Mathematics and Physics**, Groningen, The Netherlands.  
Organized by the Johann Bernoulli Institute for Mathematics and Computer Science (JBI) and the Van Swinderen Institute for Particle Physics and Gravity (VSI) of the University of Groningen.  
Talk title: *The Hunting of the Star-product.*
- June 12 – 17, 2016 **Group Analysis of Differential Equations and Integrable Systems**, Larnaca, Cyprus.  
Workshop organized by the Department of Mathematics and Statistics of the University of Cyprus and the Department of Applied Research of the Institute of Mathematics of the National Academy of Sciences of Ukraine.  
Talk title: *The explicit associativity mechanism for Kontsevich's  $\star$ -product up to orders 3 and 4.*
- August 3 – 7, 2015 **Symmetries of Discrete Systems and Processes III**, Děčín, Czech Republic.  
Conference organized by the Czech Technical University in Prague.  
Talk title: *Deformation quantization of variational Poisson structures: examples.*

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## Schools attended

- September 16 – 22, 2018 **Homotopy algebras, deformation theory and quantization**, Będlewo, Poland.  
Conference supported by Banach Center, Université du Luxembourg and Institute of Mathematics of the Polish Academy of Sciences.  
Courses taken:
  - *Derived representation schemes and supersymmetric gauge theory* by G. Felder,
  - *Deformation theory and group actions* by S. Gutt,
  - *Graph complexes in algebra and geometry - recent advances* by S. Merkulov,
  - *Dg manifolds, formality theorem and Kontsevich-Shoikhet conjecture* by P. Xu.
- March 25 – 31, 2018 **Enumerative Invariants from Differential Graded Lie Algebras and Categories**, Montegufoni, Italy.  
Spring School organized by Helge Ruddat (Johannes Gutenberg-Universität Mainz, Germany).
- July 3 – 7, 2017 **GQT Graduate School**, Den Dolder, The Netherlands.  
Organized by the Geometry and Quantum Theory (GQT) cluster.  
Courses taken:
  - *Topological field theories* by A. Ros Camacho,
  - *Knot invariants* by R. van der Veen,
  - *Derived categories in algebraic geometry* by M. Shen.
- November 28 – 30, 2016 **GQT Graduate School**, Den Dolder, The Netherlands.  
Organized by the Geometry and Quantum Theory (GQT) cluster.  
Courses taken:
  - *Toric varieties and equivariant vector bundles* by M. Kool,
  - *Noncommutative geometry and gauge theories* by W. van Suijlekom & F. Arici,
  - *Modular forms* by G. van der Geer.
- September 8 – 12, 2014 **The 3rd Summer School on Geometry of Differential Equations**, Malenovice, CZ.  
Organized by the Mathematical Institute of Silesian University in Opava.  
Courses taken:
  - *Differential Invariants* by V.V. Lychagin,
  - *Riemann Surfaces and Soliton Equations* by A.E. Mironov.

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## Languages

- English Fluent.  
German Working proficiency.  
Dutch Native.

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## Computer skills

- OS FreeBSD, Linux (various distributions), Windows.  
Programming Python, C++, C, Java, SQL, PHP, JavaScript, Google Apps Script.  
Scientific Sage, Maple, Mathematica, MATLAB, Excel.  
Revision ctrl. Git.  
Web design HTML, CSS, JavaScript, jQuery.  
Web dev. Django.  
Game dev. Unreal Engine 4.  
Typesetting  $\LaTeX$ .  
2D Graphics GIMP.  
3D Graphics Blender.  
Video editing Editing HD video using Kdenlive, ffmpeg.

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## List of publications

### Publications

- [1] A. Bouisaghouane, R. Buring, and A.V. Kiselev. The Kontsevich tetrahedral flow revisited. *J. Geom. Phys.*, 119:272–285, 2017. Preprint arXiv:1608.01710 [q-alg] — 29 p.
- [2] R. Buring, A. V. Kiselev, and N. J. Rutten. The heptagon-wheel cocycle in the Kontsevich graph complex. *J. Nonlin. Math. Phys.*, 24:157–173, 2017. Suppl. 1 'Local & Nonlocal Symmetries in Mathematical Physics'. Preprint arXiv:1710.00658 [math.CO] — 17 p.
- [3] R. Buring, A. V. Kiselev, and N. J. Rutten. Poisson brackets symmetry from the pentagon-wheel cocycle in the graph complex. *Physics of Particles and Nuclei*, 49, 2018. Supersymmetry and Quantum Symmetries '2017. Preprint arXiv:1712.05259 [math-ph] — 4 p.

### Preprints

- [4] R. Buring and A.V. Kiselev. The orientation morphism: from graph cocycles to deformations of Poisson structures. 2018. Preprint arXiv:1811.07878 [math.CO] — 12 p.
- [5] R. Buring and A.V. Kiselev. Software modules and computer-assisted proof schemes in the Kontsevich deformation quantization. *Exp. Math. (submitted)*, 2018. Preprint arXiv:1702.00681 [math.CO] — 67 p.

### Conference proceedings

- [6] R. Buring, A. V. Kiselev, and N. J. Rutten. Infinitesimal deformations of Poisson bivectors using the Kontsevich graph calculus. *J. Phys.: Conf. Ser.*, 965, 2018. Proc. XXV Int. conf. 'Integrable Systems & Quantum Symmetries' (6–10 June 2017, CVUT Prague, Czech Republic), 012010. Preprint arXiv:1710.02405 [math.CO] — 12 p.
- [7] R. Buring and A.V. Kiselev. The table of weights for graphs with  $\leq 3$  internal vertices in Kontsevich's deformation quantization formula. (3rd International workshop on symmetries of discrete systems & processes, 3–7 August 2015, CVUT Děčín, Czech Republic) — 3 p.
- [8] R. Buring and A.V. Kiselev. On the Kontsevich  $\star$ -product associativity mechanism. *Physics of Particles and Nuclei Letters*, 14(2):403–407, 2017. Preprint arXiv:1602.09036 [q-alg] — 4 p.

### Theses

- [9] R. Buring. An explicit algebro-geometric proof of Poncelet's closure theorem. Bachelor's thesis, University of Groningen, 2013 — 36 p.
- [10] R. Buring. Kontsevich graphs and their weights in deformation quantization of Poisson structures. Master's thesis, University of Groningen, 2017 — 100 p.

Date: December 8, 2018.