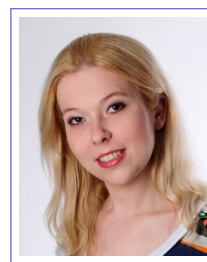


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KASIA REJZNER

Employment:

- **April 2017 - present**, senior lecturer (permanent), Department of Mathematics, University of York, UK.
- **October 2013 - March 2017**, lecturer (permanent), Department of Mathematics, University of York, UK.
- **July 2012 - August 2013**, post-doc, Department of Mathematics, University of Rome Tor Vergata, Italy.
- **November 2011 - June 2012**, post-doc, Department of Mathematics, University of Hamburg, Germany.

Qualifications:

- **2011**, Ph.D. in physics, with distinction (supervisor: K. Fredenhagen), University of Hamburg, Germany.
- **2009**, M.Sc. in physics, with distinction, Jagiellonian University in Cracow, Poland.

RESEARCH

I am a mathematical physicist and my research concerns mathematical aspects of quantum field theory (QFT), with a particular focus on understanding interactions between quantum theory and gravitation.

Publications

In mathematical physics publications, the order of authors is always *alphabetical*. In all my publications with joint authorship, I was an equal contributor.

(i) Books

- K. Rejzner, *Perturbative algebraic quantum field theory. An introduction for mathematicians*, Springer, 2016.

(ii) Chapters in books

- K. Fredenhagen, K. Rejzner, *Local covariance and background independence*, book chapter in *Quantum Field Theory and Gravity: Conceptual and Mathematical Advances in the Search for a Unified Framework*, F. Finster, O. Müller, M. Nardmann, J. Tolksdorf, E. Zeidler, (Eds.), Birkhäuser, 2012.
- K. Fredenhagen, K. Rejzner, *Perturbative algebraic quantum field theory*, book chapter in *Mathematical Aspects of Quantum Field Theories*, D. Calaque, T. Strobl (Eds.), Springer, 2015.
- K. Fredenhagen, K. Rejzner, *Perturbative Construction of Models of Algebraic Quantum Field Theory*, book chapter in *Advances in Algebraic Quantum Field Theory*, R. Brunetti, C. Dappiaggi, K. Fredenhagen, J. Yngvason (Eds.), Springer, 2015.

(iii) Articles in journals.

1. K. Rejzner, *Fermionic fields in the functional approach to classical field theory*, Rev. Math. Phys. **23** (2011) 1009-1033.
2. A. Herdegen, K. Rejzner, *Spacelike localization of long-range fields in a model of asymptotic electrodynamics*, Annales Henri Poincaré **12** (2011) 1387-1415.
3. K. Fredenhagen, K. Rejzner, *Batalin-Vilkovisky formalism in the functional approach to classical field theory*, Commun. Math. Phys. **314** (2012) 93-127.
4. K. Fredenhagen, K. Rejzner, *Batalin-Vilkovisky formalism in perturbative algebraic quantum field theory*, Commun. Math. Phys. **317** (2013), 697-725.
5. R. Brunetti, M. Dütsch, K. Fredenhagen, K. Keller, K. Rejzner, *Dimensional Regularization in Position Space, and a Forest Formula for Epstein-Glaser Renormalization*, J.Math.Phys. **55** (2014), 122303.
6. R. Brunetti, K. Fredenhagen, P. Imani, K. Rejzner, *The Locality Axiom in Quantum Field Theory and Tensor Products of C^* -algebras*, Rev. Math. Phys. **26** (2014) 1450010.
7. D. Bahns, K. Rejzner, J. Zahn, *The effective theory of strings*, Commun. Math. Phys. **327** (2014) 779-814.
8. K. Rejzner, *Remarks on local symmetry invariance in perturbative algebraic quantum field theory*, Annales Henri Poincaré **16** (2015), 205-238.
9. K. Fredenhagen, K. Rejzner, *QFT on curved spacetimes: axiomatic framework and examples*, J.Math.Phys. **57** (2016), 031101.
10. R. Brunetti, K. Fredenhagen, K. Rejzner, *Quantum gravity from the point of view of locally covariant quantum field theory*, Commun. Math. Phys. **345** (2016), 741-779, DOI: 10.1007/s00220-016-2676-x.
11. R. Brunetti, K. Fredenhagen, B. Pinamonti, T.-P. Hack, K. Rejzner, *Cosmological perturbation theory and quantum gravity*, JHEP **1608** (2016) 032.
12. D. Bahns, K. Rejzner, *The Quantum Sine Gordon model in perturbative AQFT*, Commun. Math. Phys. **357** (2018) no.1, 421.
13. C. Brouder, N. V. Dang, C. Laurent-Gengoux and K. Rejzner, *Properties of field functionals and characterization of local functionals*, J. Math. Phys. **59** (2018) no.2, 023508.

(iv) Papers published in refereed conference proceedings

- F. Fayette, M. W. Krasny, W. Placzek, K. Rejzner, A. Siódmok, *A strategy for precision measurements of the W -boson mass and width at the LHC*, PoS (2009) 095, proceedings of the conference HCP 2009, 16-20 November 2009.
- K. Rejzner, *Perturbative algebraic QFT as a universal framework for constructing physically motivated models in quantum field theory*, PoS(FFP14)147, proceedings of the conference Frontiers of Fundamental Physics 14, Marseille, July 15-18, 2014.

(v) Preprints

- K. Rejzner, *Renormalization and periods in perturbative Algebraic Quantum Field Theory*, 2016, [arXiv:math-ph/1603.02748].
- E. Hawkins, K. Rejzner, *The Star Product in Interacting Quantum Field Theory*, 2016, [arXiv:math-ph/1612.09157].
- D. Bahns, K. Fredenhagen, K. Rejzner, *Local nets of von Neumann algebras in the Sine-Gordon model*, 2017, [arXiv:math-ph/1712.02844].

(vi) All other works

- K. Rejzner, *Batalin-Vilkovisky formalism in locally covariant field theory*, Ph.D. thesis, DESY-THESIS-2011-041, Hamburg, 2011.
- K. Rejzner, *Effective quantum gravity observables and locally covariant QFT*, International Journal of Modern Physics D **25** (2016), 1630012, extended version of a plenary talk given at the XIV Marcel Grossman Meeting.

Research Funding

- K. Rejzner, 2012-2013, “incoming type” grant of the INdAM-COFUND, a fellowship of Istituto Nazionale di Alta Matematica “F. Severi” funded by Marie Curie Actions.
- K. Rejzner, 2015-2016, Emmy Noether fellowship, granted by the Perimeter Institute.
- K. Rejzner, M. Benini, A. Schenkel, Ch. Schweigert, December 2016, funding for an MFO (Mathematisches Forschungsinstitut Oberwolfach) mini-workshop *New interactions between homotopical algebra and quantum field theory* (duration of one week, for about 16 participants with full accommodation and subsistence costs covered).
- K. Rejzner, G. Honecker, S. Paycha, K. Wendland, March 2017, funding for a MITP (Mainz Institute for Theoretical Physics) workshop *Women at the Intersection of Mathematics and High Energy Physics* (duration of one week, for about 20 participants).
- K. Rejzner, EPSRC Starting Grant, 24 months commencing in September 2017, total value of 78,543 GBP.
- K. Rejzner, 2018-2019, visiting fellowship, granted by the Perimeter Institute.

Research Students

- Francis Wingham, current Ph.D. student, started in October 2014, **main supervisor**.
- Michael Kiss, current Ph.D. student, started in October 2015, **co-supervisor**.
- Christoph Minz, current Ph.D. student, started in October 2017, **main supervisor**.
- Alexandre Hefren de Vasconcelos Junior, current Ph.D. student, started in October 2017, **main supervisor**.
- Samuel Crawford, current Ph.D. student, started in October 2018, **main supervisor**.

Other research activities and distinctions

(i) Conference and workshop talks

Plenary conference talks: (date, name of the conference, place, title of the talk)

- 2015** **12-16 July**, *XIV Marcel Grossmann Meeting*, Rome, Italy, “Effective quantum gravity from the point of view of perturbative algebraic QFT”.
- 2016** **25 July**, *Classical and Quantum Symmetries in Mathematics and Physics*, Jena, Germany, “BV quantization on Lorentzian manifolds and applications in perturbative quantum gravity”.
- 2017** **5 May**, *Manchester SIAM-IMA Student Chapter Conference*, Manchester, UK, “Mathematics of Black Holes and the Big Bang”.

2018 **20-23 March**, *DPG Frühjahrstagung 2018*, Würzburg, Germany, plenary symposium talk (Hauptvortrag): “From QFT on curved spacetimes to effective quantum gravity”.

Other invited conference talks since 2015: (out of **28** total)

2015 **7-11 September**, *Hyperbolic Equations on Spacetimes: Stability, microlocal Analysis and Quantum Field Theory*, ESI, Vienna, Austria, “From quantum field theory on Lorentzian manifolds to perturbative quantum gravity”.

21-25 September, DMV Jahrestagung (Yearly meeting of the German Association of Mathematicians), Hamburg, Germany, “BV algebras in causal approach to renormalization”.

8-9 October, *Quantum Field Theory: Infrared problems and constructive aspects*, Munich, Germany, “Algebraic adiabatic limit in theories with local symmetries”.

2016 **10-13 February**, *Paths to, from and in renormalisation*, Potsdam, Germany, “Epstein-Glaser Renormalization on Curved Spacetimes: Algebraic Structures and Analytic Properties”.

8-14 May, *Factorization Algebras and Functorial Field Theories*, Oberwolfach workshop, MFO, Germany, “BV algebras in causal QFT”.

22-27 May, *Renormalization Group*, Oberwolfach workshop, MFO, Germany, “Renormalization on Lorentzian manifolds in pAQFT”.

26-27 September, *Local Quantum Physics and beyond - in memoriam Rudolf Haag*, Hamburg, Germany, “Locality and beyond: from algebraic quantum field theory to effective quantum gravity.”

2017 **4-7 April**, *Quantum Field Theory: Concepts, Constructions & Curved Spacetimes*, York, UK, “Convergence of the Epstein-Glaser S-matrix in the Sine-Gordon model.”

8-15 May, *Quantum Field Theory on Manifolds with Boundary and the BV Formalism*, Perimeter Institute, Waterloo, Canada, “Building bridges between Lorentzian and Euclidean formalisms for BV quantization.”

29 May-2 June, *Foundational and structural aspects of gauge theories*, MITP, Mainz, Germany, “BV formalism in functorial QFT in Lorentzian and Euclidean signature.”

24-28 July, *String Math 2017*, Hamburg, Germany, “New perspective on Sine-Gordon model and perturbative QFT.”

11-15 September, *Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications*, Oberwolfach workshop, MFO, Germany, “Interacting models in perturbative AQFT”.

26-27 October, *Quantum Investigations: A Conference in Honour of Miklós Rédei*, LSE, London, UK, “From perturbation theory to rigorous axioms: modern paradigm for studying foundations of QFT.”

26 November - 01 December, *Reflection Positivity*, Oberwolfach workshop, MFO, Germany, “Local nets of von Neumann algebras in the sine-Gordon model.”

2018 **9-12 April**, *Women at the intersection of Mathematics and High Energy Physics*, Hamburg, Germany, “Mathematical structures in quantum field theory: from axioms to Feynman graphs and back.”

1-2 June, *ICFT 22: Meeting on Integrable and Conformal Field Theory and Related Topics*, Cardiff, United Kingdom, “Sine Gordon model from the perspective of perturbative algebraic quantum field theory.”

3-8 June, *Algebraic Quantum Field Theory: Where Operator Algebra meets Microlocal Analysis*, Cortona, Italy, “Convergence in the perturbative AQFT framework: recent results and perspectives.”

5-6 October, *The Philosophy and Physics of Noether's Theorems*, University of Notre Dame (London Campus), UK, "From Noether theorems to BV quantization and beyond."

Contributed conference talks since 2015: (out of **25** total)

2015 11-15 February, *New Trends in Algebraic Quantum Field Theory (AQFT2015)*, Frascati, Italy, "Relational observables in effective quantum gravity from the point of view of pAQFT".

3-9 March, *The interrelation between mathematical physics, number theory and non-commutative geometry*, ESI, Vienna, Austria, "BV algebras in perturbative AQFT and effective quantum gravity".

17-23 July, *Operator Algebras and Quantum Physics*, São Paulo, Brazil, "Locally covariant QFT and perspectives on quantum gravity".

2017 12-16 June, *Subfactors, K-theory and conformal field theory*, INI, Cambridge, UK, "The Quantum Sine-Gordon model in perturbative AQFT."

(ii) Visiting research posts and invited lectures

Invited research visits:

2015 5-20 September, participant at the thematic program *Modern Theory of wave equations*, ESI (Erwin Schrödinger Institute), Vienna, Austria.

2016 12-24 March, visitor at the Perimeter Institute, Waterloo, Canada.

11 June-16 July, visitor at the Perimeter Institute, Waterloo, Canada.

26-30 July, participant at the workshop *Recent Mathematical Developments in Quantum Field Theory*, MFO, Oberwolfach, Germany.

28 August – 17 September 2016, visitor during the trimester program *Mathematical Physics at the Crossroads* at INFN Frascati. During the visit I gave a talk on the **12th of September** on the topic *New perspectives in effective quantum gravity and cosmological perturbation theory*.

2 October-17 December, visitor at the Perimeter Institute, Waterloo, Canada.

2017 9-14 April, 22-25 April, 11-16 June, participant at the Newton Institute Program *Operator algebras: subfactors and their applications*.

7 November-21 November, visitor at the Perimeter Institute, Waterloo, Canada.

2018 4-13 January and 25-30 March, visitor at the Max Planck Institute for Mathematics, Bonn, Germany.

1 July-31 August, visitor at the Perimeter Institute, Waterloo, Canada.

2-31 September, Simons visiting fellowship at CRM (Centre for Mathematical Research), University of Montreal, Canada.

Invited lecture series:

2014 9-10 April, 2 lectures (4h), *Introduction into pAQFT*, University of Nottingham, UK.

9-14 June, lecture series (15h), *BV formalism*, Claude Bernard University, Lyon, France.

2015 22-26 June, lecture series (15h), *Quantum gravity from the point of view of perturbative algebraic quantum field theory*, IHP (The Henri Poincaré Institute), Paris, France.

2017 7-9 June, mini-lecture series (3h), *Construction of models in the framework of perturbative algebraic QFT* at Journées de Physique Mathématique Lyon: Quantum Field Theories on Curved Space-Times, Lyon, France.

Invited seminar talks since 2015: (out of **47** total)

2015 13 March, *Perturbative construction of models in algebraic quantum field theory*, TUM (Technical University of Munich), Munich, Germany.

- 10 April**, *Renormalization without infinities and algebraic structures in quantum field theory*, Warsaw University, Poland.
- 11 April**, *Quantization of relative observables in perturbative algebraic QFT*, Warsaw University, Poland.
- 1 June**, *Causality in the modern approach to foundations of quantum field theory*, Sigma Club, LSE (London School of Economics).
- 2016** **16 February**, *Functional analytic aspects of renormalization on Lorentzian manifolds*, analysis seminar, Glasgow, UK.
- 7 April**, *Perturbative QFT*, ZMP (Center for Mathematical Physics) seminar, Hamburg, Germany.
- 30 May**, *Gauge invariant observable in effective quantum gravity and cosmology*, Nijmegen, The Netherlands.
- 2017** **28 February**, *Mathematical structures in QFT: between functional analysis and geometry*, DAMTP, Cambridge, UK.
- 24 May**, *Mathematical quantum field theory: from analysis to homological algebra*, pure mathematics colloquium, University of Sheffield, UK.
- 24 October**, *Convergence and new perspectives in perturbative algebraic quantum field theory*, quantum field theory seminar, Oxford University, UK.
- 13 November**, *Nets vs. factorization algebras: lessons from the comparison*, mathematical physics seminar, Perimeter Institute, Waterloo, Canada.
- 5 December**, *Algebraic QFT on curved spacetimes: observables, states and interactions*, theory group seminar in the Department of Physics at the Imperial College London, UK.
- 13 December**, *Approaching quantum gravity from the perturbative QFT perspective*, quantum gravity seminar at the Institute for Theoretical Physics, University of Heidelberg, Germany.
- 2018** **15 February**, *From perturbation theory to rigorous axioms in quantum field theory*, Geometry, Topology and Mathematical Physics seminar, University of Manchester, UK.
- 6 April**, *Mathematical perspective on perturbative QFT*, Field Theory Seminar, Physics Institute at the Jagiellonian University, Cracow, Poland.
- 22 May**, *BV quantization in perturbative algebraic quantum field theory: recent results and perspectives*, University of Zürich, Switzerland.
- 7 September**, *Mathematical challenges in constructing quantum field theory models*, Colloque des Sciences Mathématiques du Québec, Montreal, Canada.
- 4 October**, *Locality in perturbative algebraic quantum field theory*, Analysis Seminar, University of Potsdam, Germany.
- 12 October**, *From perturbation theory to operator algebras: the example of sine-Gordon model*, Integrable Systems seminar, University of Leeds, United Kingdom.
- 16 October**, *Construction of models in perturbative algebraic quantum field theory*, Mathematical Physics seminar, University of Genova, Italy.

(iii) Symposia/conference organisation

- 2012** **26-28 September**, co-organizing the Hausdorff Institute (HIM) Workshop *Algebraic Quantum Field Theory and Local Symmetries*, Bonn, Germany.
- 2016** **16-18 July**, member of the program committee of the international conference *Foundations 2016*, LSE (London School of Economics), London, UK.
- 1-8 December**, main organizer of the workshop *Infrared Problems in QED and Quantum Gravity*, Perimeter Institute, Waterloo, Canada.

18-23 December, one of the organizers of the MFO mini-workshop *New interactions between homotopical algebra and quantum field theory*, MFO, Oberwolfach, Germany.

2017 6-10 March, one of the organizers of the workshop *Women at the Intersection of Mathematics and High Energy Physics*, Mainz Institute for Theoretical Physics (MITP), Mainz, Germany.

5-7 September, organizer of the international, EPSRC-funded, workshop *Modern Mathematics of Quantum Theory*, University of York, York, UK.

8-9 December, organizer of the international workshop *Quantum Physics meets Mathematics - a workshop on the occasion of Klaus Fredenhagen's 70th birthday*, Hamburg, Germany.

(vii) Memberships

2011-present, Deutsche Physikalische Gesellschaft (DPG, German Physicists Association).

2012-present, IAMP (International Association of Mathematical Physics).

2016-present, LMS (London Mathematical Society).

2017-present, Polish Society on Relativity.

TEACHING AND SUPERVISION

Courses taught

- **2013, QFT on curved spacetimes: axiomatic framework and applications**, a mini-course for Ph.D. students in mathematics, summer semester, University of Rome “Tor Vergata”.
- **2013-2017, Classical Mechanics**, Year 2 undergraduate module in mathematics extending over 2 terms, University of York.
- **2018-present, Classical and Quantum Dynamics**, Year 2 undergraduate module in mathematics extending over 2 terms, University of York., University of York.

Supervision and support for students' learning

- **2011/12**, co-supervised a masters student (Master Programme in Mathematical Physics), University of Hamburg.
- **2013/14**, supervised a BSc project.
- **2014/15**, supervised a BSc project and an MMath project.
- **2015/16**, supervised 6 BSc projects and an MMath Group Project (3rd year MMath module, the group consisted of 4 students).
- **summer 2016**, supervised a summer student (supported by an EPSRC bursary).
- **2016/17**, supervising 5 BSc projects and an MMath project.

ACADEMIC CITIZENSHIP

Departmental activities

Administrative roles in the department:

- **2013-2016**, *Mathematics Facilitator* for Natural Sciences and *Head of the Chemistry/Mathematics/Physics Pathway Program Committee*.
- **June 2015-present**, *Careers and Employability Coordinator*.
- **2013-present**, taking part in UG Open Days and conducting student interviews in both the Mathematics Department and the School of Natural Sciences.
- **2016-present**, peer reviewing grant applications, as a part of the newly introduced internal peer-review process in the Mathematics Department.
- **2018**, featured in the video promoting the new MSc program in mathematical sciences.

Other forms of service and outreach

- I was chosen to be among 13 female mathematicians (2 from the UK) to take part in the exhibition project *Women of mathematics throughout Europe: a gallery of portraits*
<http://womeninmath.net/protagonist/kasia-rejzner/>
 The opening of the photograph exhibition took place on the **20th of July 2016** during the 7th European Congress in Mathematics. The aim of the projects is to encourage more women to pursue career in Mathematics by providing them with role models.
 - **27 January 2016**, public lecture at the MathSoc (Student Maths Society) Seminar (aimed at UG students), *Mysterious Beginnings of Everything*.
 - **2 February 2017**, popular science lecture for Natural Science UG students at the University of York, *From quantum field theory to Quantum Gravity and the Big Bang*.
 - **9 June 2017**, I led a session: *Throwing sticks to find pi*, during the outreach event *Maths: unlocking the world around us* aimed at school children.
 - **8 June 2018**, I led a session: *Throwing sticks to find pi*, during the outreach event *Maths: unlocking the world around us* aimed at school children.
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