

Sebastian De Haro

Curriculum Vitae

Science Park 107
1098 XG Amsterdam, the Netherlands
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Areas of Expertise

Area of Specialization: Philosophy of Physics, Philosophy of Science, Theoretical Physics, Mathematical Physics.

Area of Competence: Philosophy of Technology, Metaphysics, Philosophy of Logic and Language, Epistemology, Philosophy of Mathematics, History of Physics, Ethics.

Academic Positions

2025-present Associate Professor in Philosophy of Science

Institute for Logic, Language and Computation (ILLC) and Institute of Physics (IoP), University of Amsterdam (UvA).

2025-present Member of the Directorate, Public Methodology Centre, University of Amsterdam.

Co-founding member of the Centre.

2021-2025 Assistant Professor in Philosophy of Science (tenured)

Institute for Logic, Language and Computation and Institute of Physics, University of Amsterdam.

2009-2020 Lecturer (tenured), Amsterdam University College, University of Amsterdam.

The Amsterdam University College (AUC) is the English-language Honours degree in liberal arts and sciences, jointly run by UvA and the Free University (Vrije Universiteit Amsterdam). Thus I lectured both physics and philosophy.

2008-2009 Research Associate and Managing Editor of Foundations of Physics on behalf

of Gerard 't Hooft, Utrecht University.

Secondary Academic Appointments

2025-present Research Member, Institute for Advanced Study, UvA.

2021-present Senior Researcher, QuSoft, research line *Quantum for Society and Business*:

<https://qusoft.org>.

Visiting Positions

Jan-Jun 2026 Visiting Senior Research Fellow, Jesus College, Oxford.

Summer 2025 Visiting Scholar, St John's College, Oxford.

2018-2019 Visiting Fellow in Philosophy. Black Hole Initiative, Harvard University. Invitation by: Peter Galison.

Education

- 2020 PhD in philosophy of science (part-time)**, Trinity College, Cambridge.
Department of History and Philosophy of Science, University of Cambridge.
Thesis title: *On Inter-Theoretic Relations and Scientific Realism*.
Supervisors: Jeremy Butterfield and Hasok Chang.
- 2001 PhD in theoretical physics**, Utrecht University.
Thesis title: *Quantum Gravity and the Holographic Principle*.
Supervisor: Gerard 't Hooft.
- 1996 MSc in theoretical physics**, Utrecht University.
Supervisor: Gerard 't Hooft.

Grants, Fellowships and Awards

Grants Acquired as Project Leader or Principal Investigator (PI)

- 2025** €2000 **E. W. Beth Foundation**, Koninklijke Academie voor de Wetenschappen.
- 2025** €1.5 million **Emergence of Time from Chaos in Operator Algebras**, John Templeton Foundation. I am one of four PIs together with Nima Lashkari, Hong Liu and Richard Dawid. Allocated funding: €370,000.
- 2025** €1.6 million **Shaping Interfaces between Science and the Public**, UvA-wide Research Priority Area. I am one of five PIs.
- 2024** €10,000 **The Philosophy and Physics of Duality**, NWO Open Access book grant, 2024-2025.
- 2024** €30,000 **A Responsible Quantum-Safe Cryptography Transition (RQSC)**. Quantum Delta NL Quantum & Society, 2024-2025.
- 2023** €160,000 **Is there Space and Time for Experimental Philosophy?** NWO, NWA-route 2. PI, co-led with experimental quantum matter physicist Mark Golden, 2023-2025.
- 2023** €985,382 **Quantum Impact on Societal Security (QISS)**. NWO, NWA-routes 18 and 16, with co-funding from the Dutch Ministry of Foreign Affairs and the Dutch Banking Association, 2023-2028. Project leader. Project website: <https://projects.illc.uva.nl/quantumimpact>.
- 2023** €36,000 **Grant to support PhD research in Philosophy of Quantum Technology**. QuSoft.
- 2015** €77,000 **Trinity College Turner Studentship in the Philosophy of Science or the History of Scientific Ideas**, University of Cambridge, 2015-2020.
- 2019** **Fellow, Netherlands Institute for Advanced Study**. €45,000: *declined*.

- 2018 €15,000 **Dutch Institute for Emergent Phenomena**, awarded for a workshop on emergence.
- 2015 **EU Marie Skłodowska-Curie individual fellowship** in philosophy of physics, to be held at the University of Cambridge, €152,879: *declined*.
- 2015 €3,000 **Faculty Development Fund**, co-funding for my PhD in Cambridge, UvA.
- 2014 €550 **EU-COST action MP1210** *The String Theory Universe*, for collaboration with University of Thessaloniki.
- 2014 €675 **EU-COST action MP1006** *Foundations of Quantum Mechanics and Gravity*, for a workshop at Imperial College, London.
- '06-'08 €142,500 **EU-RTN Postdoctoral Fellowship** in mathematical physics. King's College London.
- '03-'06 €270,000 **Max-Planck-Gesellschaft Fellowship** in theoretical physics. Potsdam.
- '01-'03 €180,000 **Fellowship University of California, Los Angeles** in theoretical physics.

Awards

- 2017 €1,000 **Essay prize** 'Space and Time After Quantum Gravity' project of the University of Illinois at Chicago and the University of Geneva.
- 2000 €800 **Award Brain Korea 2000** by the Korean Research Foundation, Seoul National University Korea.

Grants Acquired as co-PI of a Large Consortium

- 2024 €7.1 million **Emergence at All Scales**, NWO, NWA-ORC, 2025-2030. I am one of 25 co-PIs. *One PhD candidate*, jointly with Erik Verlinde.
- 2023 €800,000 **Moral smart cities: towards an inclusive strategy for techno-moral decision-making by decentralized governments**. Co-PI, consortium led by Fontys University of Applied Science. NWO Raak-Pro, 2023-2027. *One PhD candidate*.

Publications

Total number of citations (all publications): 3,950. i10-index: 48. h-index: 27.

Full list of publications and citation information on Google scholar profile:

<https://scholar.google.com/citations?user=rmXDqN4AAAAJ> (accessed 12/10/25).

Books

- (1) **2025** De Haro, S. and J. Butterfield. *The Philosophy and Physics of Duality*. Oxford University Press. Available online as PDF: <https://academic.oup.com/book/60809>
- (2) **In press** De Haro, S. and E. Cinti. *Dualities in Physics*, Elements Series, Cambridge University Press. arXiv:2509.15866.
- (3) **Under contract, 2027** van Dongen, J. and S. De Haro. *History and Philosophy of the Black Hole Information Paradox*. Under contract with Cambridge University Press.

Articles and Book Chapters

General Philosophy of Science

- (34) 2026 De Haro, S. 'Scientific Theories'. *Contemporary Philosophy of Science*. Invited contribution, in preparation.
- (33) 2025 De Regt et al. 'Scientific understanding across disciplines: in varietate concordia?' Invited contribution, submitted, June 2025.
- (32) 2023 De Haro, S. 'The Empirical Under-determination Argument Against Scientific Realism for Dual Theories'. *Erkenntnis*, 88, pp. 117-145.
- (31) 2020 De Haro, S. 'Science and Philosophy: A Love-Hate Relationship'. *Foundations of Science*, 25 (2), pp. 297-314.
- (30) 2019 De Haro, S. 'Towards a Theory of Emergence for the Physical Sciences'. *European Journal for Philosophy of Science*, 9, 38, pp. 1-52.
- (29) 2019 De Haro, S. 'The Heuristic Function of Duality'. *Synthese*, 196 (12), pp. 5169-5203.
- (28) 2018 De Haro, S. and H. W. De Regt. 'A Precipice Below Which Lies Absurdity? Theories without Spacetime and Scientific Understanding'. *Synthese*, pp. 1-29.
- (27) 2016 De Haro, S. 'On Artigas and Analytic Philosophy'. *Scientia*, 4 (2), pp. 215-243, invited contribution to special issue on the 10th anniversary of Mariano Artigas' death.

Philosophy of Physics

- (26) 2026 De Haro, S. 'Dualities'. *Contemporary Philosophy of Science*. Invited contribution, in preparation.
- (25) 2025 De Haro, S. 'The Geometric View of Theories'. Submitted, September 2025.
- (24) 2025 Cinti, E., S. De Haro, M. S. Golden, U. Gursoy, S. Mukherjee, and H. T. C. Stoof. 'Holographic Strange Metals for Philosophers and Physicists'. Forthcoming in *Foundations of Physics*. arXiv:2507.23527.
- (23) 2025 Borsboom, S. and S. De Haro. 'Global Gauge Symmetry Breaking in the Abelian Higgs Mechanism'. Submitted, June 2025. <https://philsci-archive.pitt.edu/25158>.
- (22) 2025 Vergouwen, S. and S. De Haro. 'Supersymmetry in the Seiberg-Witten Theory: A Window into Quantum Field Theory'. *Synthese*, 205 (60), pp. 1-24.
- (21) 2022 De Haro, S. 'Noether's Theorems and Energy in General Relativity'. In: *The Philosophy and Physics of Noether's Theorems*, J. Read and N. Teh (Eds.). Cambridge University Press. Invited contribution.

- (20) 2022 Crowther, K. and S. De Haro. 'Four Attitudes Towards Singularities in the Search for a Theory of Quantum Gravity'. In: *The Foundations of Spacetime Physics: Philosophical Perspectives*, Vassallo, A. (Ed.). Routledge.
- (19) 2021 De Haro, S. 'Theoretical Equivalence and Duality'. *Synthese*, 198 (6), pp. 5139-5177.
- (18) 2021 De Haro, S. and J. N. Butterfield. 'On Symmetry and Duality'. *Synthese*, 198 (4), pp. 2973-3013.
- (17) 2020 De Haro, S. 'Spacetime and Physical Equivalence'. In: *Beyond Spacetime. The Foundations of Quantum Gravity*, N. Huggett and C. Wüthrich (Eds.), pp. 257-283. Cambridge University Press.
- (16) 2020 De Haro, S. 'On Empirical Equivalence and Duality'. In: *One Hundred Years of Gauge Theory. Fundamental Theories of Physics*, De Bianchi, S. and Kiefer, K. (Eds.), vol. 199, pp. 91-106. Springer, Cham. Invited contribution.
- (15) 2020 van Dongen, J., S. De Haro, M. Visser and J. N. Butterfield. 'Emergence and Correspondence for String Theory Black Holes'. *Studies in History and Philosophy of Modern Physics*, 69, pp. 112-127.
- (14) 2020 De Haro, S., J. van Dongen, M. Visser and J. N. Butterfield. 'Conceptual Analysis of Black Hole Entropy in String Theory'. *Studies in History and Philosophy of Modern Physics*, 69, pp. 82-111.
- (13) 2020 Castellani, E. and S. De Haro. 'Duality, Fundamentality, and Emergence'. In: *The Foundation of Reality: Fundamentality, Space, and Time*, D. Glick, G. Darby and A. Mormodoro (Eds.), pp. 195-216. Oxford University Press.
- (12) 2018 De Haro, S. and H. W. De Regt. 'Interpreting Theories without Spacetime'. *European Journal for Philosophy of Science*, 8 (3), pp. 631-670.
- (11) 2018 De Haro, S. and J. N. Butterfield. 'A Schema for Duality, Illustrated by Bosonization'. In: *Foundations of Mathematics and Physics one century after Hilbert*, Kounieher, J. (Ed.), pp. 305-376. Springer.
- (10) 2017 De Haro, S. 'The Invisibility of Diffeomorphisms'. *Foundations of Physics*, 47 (11), p. 1464.
- (9) 2017 De Haro, S., D. Mayerson and J. N. Butterfield. 'Conceptual Aspects of Gauge/Gravity Duality'. *Foundations of Physics*, 46 (11), pp. 1381-1425.
- (8) 2017 De Haro, S., N. Teh and J. N. Butterfield. 'Comparing Dualities and Gauge Symmetries'. *Studies in History and Philosophy of Modern Physics*, 59, pp. 68-80.
- (7) 2017 De Haro, S. 'Dualities and Emergent Gravity: Gauge/Gravity Duality'. *Studies in History and Philosophy of Modern Physics*, 59, pp. 109-125.
- (6) 2016 De Haro, S., N. Teh and J. N. Butterfield. 'On the relation between dualities and gauge symmetries'. *Philosophy of Science*, 83 (5), pp. 1059-1069.

- (5) 2015 Dieks, D., Dongen, J. van, Haro, S. de. 'Emergence in Holographic Scenarios for Gravity'. *Studies in History and Philosophy of Modern Physics*, 52, pp. 203-216
- (4) 2013 De Haro, S., G. 't Hooft, E. Verlinde and D. Dieks. 'Forty Years of String Theory: Reflecting on the Foundations'. *Foundations of Physics*, 43, pp. 1-7. Editorial of special issue.
- (3) 2004 Dongen, J. van and Haro, S. de. 'On Black Hole Complementarity'. *Studies in History and Philosophy of Modern Physics*, 35 (3), pp. 509-525.

Philosophy of Technology (submitted)

- (2) 2025 De Jong, E. and S. De Haro. 'A Contextual Approach to Technological Understanding and Its Assessment'. *Philosophy and Technology*, <https://philsci-archive.pitt.edu/24964>
- (1) 2025 De Jong, E. and S. De Haro. 'Technological Understanding: On the cognitive skill involved in the design and use of technological artefacts'. <https://philsci-archive.pitt.edu/24841>

Theoretical and Mathematical Physics

- (25) 2014 De Haro, S. and A. C. Petkou, 'Instantons and the Hartle-Hawking-Maldacena Proposal for dS/CFT'. *Journal of High-Energy Physics*, 1411, 126.
- (24) 2013 De Haro, S. and A. Hahn, 'Chern-Simons Theory and the Quantum Racah Formula'. *Reviews in Mathematical Physics*, 25, 1350004.
- (23) 2009 De Haro, S. 'Dual Gravitons in AdS₄/CFT₃ and the Holographic Cotton Tensor'. *Journal of High Energy Physics*, 0901:042.
- (22) 2008 De Haro, S. and A. C. Petkou, 'Holographic Aspects of Electric-Magnetic Dualities'. *Journal of Physics Conference Series*, 110: 102003.
- (21) 2007 De Haro, S. and P. Gao, 'Electric-magnetic Duality and Deformations of Three-Dimensional CFTs'. *Physical Review*, D 76, 106008.
- (20) 2007 De Haro, S., I. Papadimitriou and A. C. Petkou, 'Conformally Coupled Scalars, Instantons and Vacuum Instability in AdS₄'. *Physical Review Letters*, B 98, 231601.
- (19) 2007 De Haro, S., S. Ramgoolam and A. Torrielli, 'Large-*N* Expansion of q-Deformed Two-Dimensional Yang-Mills Theory and Hecke Algebras'. *Communications in Mathematical Physics*, 273, pp. 317-355.
- (18) 2006 Arcioni, G., S. De Haro and L. Susskind, 'Holographic Views of the World'. *Under the Spell of Physics, Gerard 't Hooft's 60th birthday conference*, arXiv:physics/0611143v1 [physics.hist-ph].
- (17) 2006 De Haro, S. and A. C. Petkou, 'Instantons and Conformal Holography'. With an appendix by Tom Koornwinder. *The Journal of High Energy Physics*, 12, 076.
- (16) 2006 Arcioni, G., S. De Haro and P. Gao, 'A Diffusion Model for SU(N) QCD Screening'. *Physical Review D*, 73, 074508.

- (15) 2006 De Haro, S. 'A Note on Knot Invariants and q -Deformed 2d Yang-Mills'. *Physics Letters B*, 634, pp. 78-83.
- (14) 2005 De Haro, S. and M. Tierz, 'Discrete and Oscillatory Matrix Models for Chern-Simons Theory'. *Nuclear Physics B*, 731, pp. 225-241.
- (13) 2005 De Haro, S. 'Chern-Simons Theory, 2d Yang-Mills, and Lie Algebra Wanderers'. *Nuclear Physics B*, 730, 312.
- (12) 2004 De Haro, S. 'Chern-Simons Theory in Lens Spaces from 2d Yang-Mills on the Cylinder'. *Journal of High Energy Physics* 0408, 041.
- (11) 2004 De Haro, S. and M. Tierz, 'Brownian Motion, Chern-Simons Theory, and 2d Yang-Mills'. *Physics Letters B*, 601, 201-208.
- (10) 2004 de Boer, J. and S. De Haro, 'The Off-Shell M5-Brane and Non-Perturbative Gauge Theory'. *Nuclear Physics B*, 696, 174-204.
- (9) 2004 De Haro, S., K. Skenderis and A. Sinkovics, 'On α' -Corrections to D-Brane Solutions'. *Physical Review D*, 68, 66001.
- (8) 2003 Bena, I., S. De Haro and R. Roiban, 'Generalized Yukawa Couplings and Matrix Models'. *Nuclear Physics B*, 664, 45-58.
- (7) 2003 De Haro, S., A. Sinkovics and K. Skenderis, 'On a Supersymmetric Completion of the R^4 Term in IIB Supergravity'. *Physical Review D*, 67, 084010.
- (6) 2001 Arcioni, G., S. De Haro and M. O'Loughlin, 'Boundary Description of Planckian Scattering in Curved Space-Times'. *The Journal of High Energy Physics* 07, 035.
- (5) 2001 De Haro, S., K. Skenderis and S. N. Solodukhin, 'Gravity in Warped Compactifications and the Holographic Stress Tensor'. *Classical and Quantum Gravity*, 18, pp. 3171-3180.
- (4) 2001 De Haro, S., K. Skenderis and S. N. Solodukhin, 'Holographic Reconstruction of Spacetime and Renormalization in the AdS/CFT Correspondence' [**Note: 2,169 citations**]. *Communications in Mathematical Physics*, 217, pp. 595-622.
- (3) 1999 De Haro, S., 'S-matrices for Planckian Scattering'. In: *Progress in String Theory and M-Theory*, pp. 335-338, proceedings NATO Advanced Study Institute: TMR Summer School.
- (2) 1998 De Haro, S., 'Planckian Scattering and Black Holes'. *The Journal of High Energy Physics*, 10, 023.
- (1) 1998 De Haro, S., 'Non-commutative Black Hole Algebra and String Theory from Gravity'. *Classical and Quantum Gravity*, 15, pp. 519-535.

Book Reviews (invited)

- (5) 2026 De Haro, S. 'Gordon Belot's *Accelerating Expansion*'. Oxford University Press, 2023. *Philosophy of Science*.

- (4) 2025 De Haro, S. 'James Read's *Background Independence in Classical and Quantum Gravity*'. Oxford University Press, 2023. *BJPS Review of Books*.
- (3) 2020 De Haro, S. 'On Visual Representations in Science'. Review of *Visual Representations in Science – Concept and Epistemology*, Mößner, N., Routledge, 2018. *Grazer Philosophische Studien*, 97 (3), pp. 529-538.
- (2) 2015 De Haro, S., Henke, J., Tang, D. Review of *The Birth of String Theory*, Cappelli et al., Cambridge University Press. *Foundations of Physics*, 45(6), pp. 657-660.
- (1) 2009 De Haro, S. and T. van Lier. Review of *Hidden Harmony. The Connected Worlds of Physics and Art*, J.R. Leibowitz, Johns Hopkins University Press. *Foundations of Physics*, 39, pp. 407-410.

Publications for a Broad Audience (invited)

- (4) 2010 De Haro, S. 'De zwaartekracht van paradigma's'. *De Gids*, 8, pp. 993-1003.
- (3) 2009 De Haro, S. 'Snaartheorie: een filosofische rechtvaardiging'. *Scientific American*, 1, 40.
- (2) 2008 De Haro, S. 'Stephen Hawking'. *Kritisch Denkers Lexicon*, 41.
- (1) 2006 De Haro, S. 'Stringtheorie und das antropisches Prinzip'. *Komma*, 36, pp. 46-49.

Academic articles published in national journals or online

- (5) 2016 De Haro, S. 'Reply to James Read on Background-Independence'. Published together with J. Read, 'Reply to Sebastian De Haro on Background-Independence'. 2016. Published online at Beyond Spacetime: <https://beyondspacetime.net/2016/06/15/reply-to-read>.
- (4) 1999 De Haro, S. '2000: Shall We Come Back from the Space-time Odyssey?'. *Nederlands Tijdschrift voor Natuurkunde*, 5/12, pp. 354-355. Special Issue 1999 Nobel Prize in Physics.
- (3) 1998 De Haro, S. 'Dualities of string theory, or how to get a single flower by putting mirrors in the jungle'. *Nederlands Tijdschrift voor Natuurkunde*, 5/12, pp. 354-355. Special Issue 1999 Nobel Prize in Physics.
- (2) 1998 van Dongen, J. and S. De Haro, 'Achter de horizon van zwarte gaten: vermoedens'. *Nederlands Tijdschrift voor Natuurkunde*, 64/11.
- (1) 1997 van Dongen, J. and S. De Haro, 'Een nieuwe complementariteit'. *Nederlands Tijdschrift voor Natuurkunde*, 63/9 and *De Afleiding*, 5/2 (1997).

Teaching and Supervising Experience

Where no institution is listed, the relevant institution is the University of Amsterdam (UvA). VU is the Vrije Universiteit Amsterdam. AUC is the English-language Honours degree in liberal arts and sciences, jointly run by UvA and VU.

Undergraduate teaching in philosophy

- 2022-present Mathematics: A Reflective Perspective (Reflectie op wiskunde):** mandatory course on the philosophical and societal aspects of mathematical practice, BSc Mathematics, course coordinator and lecturer.
- 2021-present Digital Culture: A Reflective Approach (Reflectie op de digitale cultuur):** mandatory course BSc Information Science, course coordinator and lecturer.
- 2009-present Undergraduate thesis supervision:** 36 theses, AUC.
- 2022 Philosophy of Science, reflections on robust knowledge:** mandatory course BSc Natural and Social Sciences, course coordinator and lecturer.
- 2019-2020 Philosophy of Science:** philosophy and non-philosophy majors, 2 times, VU.
- 2018-2020 Philosophy of Science:** students from all majors, 3 times, AUC.
- 2018 Philosophy of Physics:** co-teaching, University of Cambridge.
- 2014-19 Philosophical Problems:** Epistemology and Metaphysics sections, 5 times, AUC.
- 2009-2020 Undergraduate research opportunities:** awarded 5 Educational Development Initiatives for student supervision, 50 students, AUC.

Philosophical sections in undergraduate interdisciplinary courses

- 2019-2020 Quantum Information and Quantum Communication:** 2 times, AUC.
- 2009-2017 Big Questions in Science:** teacher and course coordinator, 16 times, AUC.

Undergraduate teaching in physics

- 2014-2020 Statistical Mechanics:** 4 times, AUC.
- 2011-2020 Mathematics of Physics:** 10 times, AUC.
- 2011-2014 Electrodynamics and Special Relativity:** 3 times.
- 2010-2020 Quantum Physics:** 10 times, AUC.
- 2009-2011 Mechanics:** 2 times, AUC.
- 2002 Physics 1b (Physics for Engineers):** teaching replacement, University of California Los Angeles.
- 1998-2000 Statistical Mechanics and Thermodynamics:** TA, Utrecht University, 2 times.
- 1998 Quantum Mechanics:** TA, Utrecht University.

Graduate teaching in philosophy

- 2022-present Master of Logic, coordinated research projects.**
- 2021-present Philosophy of Physics:** Master Physics & Astronomy, Master of Logic.
- 2021-present Philosophy of Science:** Master of Logic, Master Physics & Astronomy.
- 2012-present Master's thesis supervision:** 12 theses, IoP and ILLC.

2019 Philosophy of Science: MA in Philosophy of Bioethics and Health, Neuroscience, and Law and Governance, VU.

2018 Dutch Research School for Philosophy: workshop for PhD candidates.

Graduate interdisciplinary courses

2025 Quantum in Society: course coordinator, Master Quantum Computer Science.

Graduate teaching in physics

2014 Graduate Seminar on AdS/CFT.

2002 Quantum Field Theory: teaching replacement, University of California Los Angeles.

1998-2000 Advanced Classical Mechanics:TA, Utrecht University.

Supervision of PhD candidates and postdocs

PhD supervision

2025-present Luka Vinck, supervisor ('copromotor' and daily co-supervisor). Promotor: Erik Verlinde. Topic: *Emergence of Time and Laws in Quantum Cosmology*.

2025-present Christian Airikka, co-supervisor with Karen Crowther, University of Oslo, under contract. Topic: *Spacetime functionalism*.

2024-present Linda Hofman, supervisor ('copromotor' and daily supervisor). Promotor: Robert van Rooij. Topic: *Techno-ethical decision making and citizen participation in Smart Cities*.

2023-present Aude Corbeel, supervisor ('copromotor' and daily co-supervisor). Promotor: Erik Verlinde. Topic: *Philosophy of Black Holes and Quantum Information*.

2023-present Eline de Jong, supervisor ('copromotor' and daily supervisor). Promotor: Sonja Smets. Topic: *Technological Understanding and Ethics of Quantum Technology*.

2023-present Ailsa Robertson, supervisor ('copromotor' and daily co-supervisor). Promotor: Christian Schaffner. Topic: *Ecosystem Study and Technical Aspects of Quantum-Safe Cryptography*.

Postdoc supervision

Starting in 2026 One postdoc in John Templeton Foundation project.

Topic: *Emergence of Time from Chaos in Operator Algebras*.

2024-present Two postdocs in QISS project.

2023-2024 One postdoc in Spacetime and Experimental Philosophy project.

Topic: *The Philosophy of Dualities*.

Supervision of award-winning Master's theses

- 2024** Silvester Borsboom, *Spontaneous Breaking of Global Gauge Symmetries in the Higgs Mechanism*.
Thesis Prize of the **Royal Holland Society of Sciences and Humanities**.
Hanneke Janssen Memorial Prize 2024.
- 2023** Aude Corbeel, *AdS/CFT Duality: Insights from Quantum Information Theory (A Conceptual Clarification)*.
Thesis Prize **Dutch Association for Logic and Philosophy of the Exact Sciences**.
- 2022** Sanne Vergouwen, *Emergent Solitons and the Philosophy of Non-Perturbative Quantum Field Theory*.
Hanneke Janssen Memorial Prize 2022.

Curriculum responsibilities and committees

Accreditation of new MSc

- 2024** Member of the teacher panel for the accreditation site-visit of the Master Quantum Computer Science.
- Curriculum development**
- 2009-present** I have designed and taught 15 different new courses.
- 2019** **Position paper:** AUC21 Curriculum Revision Report, Task Force on Interdisciplinarity.
Track development and evaluation
- 2023** Contributed to the design of the Quantum for Society and Business track of the MSc Quantum Computer Science.
- 2020** Member of the BSA (Binding Study Advice) committee.
- 2012** **Position paper:** Physics Track Analysis 2012, i.e. a comprehensive analysis of the effectiveness of the physics track at AUC.
- 2009-2012** Involved in designing the Physics and Mathematics tracks at AUC.

Organisation of Scientific Meetings

- 2025** **How Computing is Changing the World: Exploring Synergies and Challenges of AI and Quantum Technologies for Society**, University of Amsterdam.
- 2025** **History and Philosophy of Physics in the Netherlands (HPP-NL)**, UvA.
- 2024** **Understanding Science and Technology: From Fundamental Science to Technology and Society**, Institute for Advanced Study, University of Amsterdam.
- 2022** **The Quantum, the Thermal and the Gravitational Reconciled: Physics and Philosophy in the Varied Landscape of the Intersections**, MCMP. Co-organised with Erik Curiel, Bryan Roberts and Katie Robertson.

- 2019** **Black Hole Philosophy**, symposium at the conference of the European Philosophy of Science Association biennial conference.
- 2019** **Gerard 't Hooft's 1999 Nobel Prize in Physics**, 20th Anniversary Conference, Utrecht, July 2019. Member of the organising committee.
- 2019** **Emergence: Conceptual and Philosophical Aspects**, workshop of the Dutch Institute for Emergent Phenomena, Amsterdam.
- 2018** **Equivalence, Duality, and the Interpretation of Physical Theories**, symposium organiser at the Biennial Meeting of the Philosophy of Science Association.
- 2018** **Foundations 2018**, member of the Programme Committee, UK and European Conference on Foundations of Physics.
- 2017** **Can Science and Technology Shape a New Humanity?** Organiser of the workshop at Trinity College, Cambridge.
- 2017** **Duality, Equivalence and Emergence**, organiser of the symposium at the European Congress of Analytic Philosophy, Munich (co-organiser: Elena Castellani).
- 2016** **New Perspectives on Quantum Gravity**, organiser of the symposium at Foundations 2016 Conference, LSE London (co-organisers: D. Dieks, J. van Dongen).
- 2015** **Beginnings. The Universe Out of Information?** Member of the organising committee, 17th International Interdisciplinary Seminar, London, UK.
- 2013** **Relational Realism and Quantum Gravity**. Member of the organising committee, University of Amsterdam.

Professional Responsibilities and Service to the Profession

Professional Responsibilities and Memberships

- 2021-present** **Member of the Editorial Board**, *Philosophies*.
- 2017-present** **Member of the Board**, section Philosophy of Physics, Dutch Physics Association.
- 2015-present** Member, **Trinity College, Cambridge**.
- 2016-present** Member, **Vossius Center for the History of Humanities and Sciences**.
- 2013-2014** **Science Faculty representative** at the College Council and Board of Studies, AUC.
Member, **British Society for the Philosophy of Science**.
Member, **European Philosophy of Science Association**.

Refereeing

External Evaluator **Czech Academy of Sciences**, evaluation of research and professional activity of research-oriented institutes, period 2020–2024.

Grants John Templeton Foundation, EU COST, NWO (Dutch Research Council), Swiss National Science Foundation (SNSF), Fonds de la Recherche Scientifique (FRS-FRNR, Belgium), National Science Centre (NCN, Poland), New York University Abu Dhabi Institute.

Journals: The British Journal for the Philosophy of Science, Philosophy of Science, Synthese, European
Philosophy Journal for Philosophy of Science, Philosophy of Physics, Techné: Research in Philosophy
and Technology, Studies in History and Philosophy of Science Part B: Studies in History and
Philosophy of Modern Physics, Philosophy Compass, Foundations of Physics, Foundations of
Science, Ethics and Information Technology.

Journals: Physical Review Letters, Journal of High-Energy Physics, Classical and Quantum Gravity,
Physics and Journal of Physics A: Mathematical and General, Physical Review D, Nuclear Physics B,
Mathematics Physics Letters B.

Languages

Dutch, Spanish, Catalan: (near-) native proficiency.

English: fluency in speech and writing. German: proficiency in speech and writing.

French: reading, basic speaking skills. Latin: reading skills.

Presentations (since 2015)

(* = invited speaker)

Presentations at International Scientific Conferences

- December 2025** ***Philosophy and Metaphysics of String Theory**, University of Geneva.
- November 2025** ***Emergent Geometries**, Inaugural Workshop EmerGe collaboration, Stockholm.
- August 2025** **European Philosophy of Science Association biennial conference**, symposium
'Quantum Gravity Beyond Spacetime Emergence'. *Quasi-dualities and the Geometric
View of Theories*. Groningen.
- July 2025** **The Geometric View of Theories**, Foundations 2025, Gdansk.
- July 2023** ***Perspectives on Time and Atemporality in Cosmology and Natural Sciences**,
final conference of the Proteus project, Milan.
- Sept 2021** **European Philosophy of Science Association biennial conference**, symposium
Philosophizing about the Unknown: Black Holes, with J. van Dongen, Turin.
- Oct 2019** ***Galilei Institute for Advanced Studies**, programme Beyond the Standard Model:
historical-critical perspectives.
- Sept 2019** **European Philosophy of Science Association biennial conference**, symposium
'Black Hole Philosophy'. *A Conceptual Analysis of Black Holes in String Theory*.
Geneva.
- July 2019** ***Opening speaker 't Hooft Conference 2019: From Weak Force to Black
Hole Thermodynamics and Beyond**, 1999 Nobel Prize in Physics 20th anniversary
celebration, Utrecht.
- May 2019** ***New Directions in the Foundations of Physics**, Viterbo, Italy.

- Jan 2019** *Tsinghua Sanya International Mathematics Forum (TSIMF), Sanya, Hainan, China. Workshop 'Black Holes and Holography', *Conceptual Aspects of Black Holes in String Theory*.
- Jan 2019** *HKUST Jockey Club Institute for Advanced Study (IAS), Hong Kong. Workshop 'Black Holes, Inflation and Gravitational Waves'. *Conceptual Aspects of Black Holes in String Theory*.
- Nov 2018** Biennial Meeting of the Philosophy of Science Association. *Interpreting Dualities*. Seattle.
- Oct 2018** *Black Hole Initiative, Harvard University. Miniworkshop focussing on my PhD work. *Duality and Emergence*.
- Oct 2018** *Boston Colloquium for Philosophy of Science. *Towards a Theory of Emergence in the Physical Sciences*.
- Oct 2018** *Symmetries, Observables, and the Noether's Theorems: A 100th Anniversary Conference for the Work of Emmy Noether, London School of Economics. *Noether's Theorem and Gauge-Gravity Duality*.
- July 2018** Hundred Years of Gauge Theory, Bad Honnef. *Duality, Symmetry, and Gauge*.
- July 2018** 19th UK and European Meeting Foundations. *Formulating Emergence in the Physical Sciences*. Utrecht University.
- June 2018** Ninth Workshop on the Philosophy of Information. *Visualisation and Interpretation in Theories with and without a Spacetime*. Brussels.
- Apr 2018** Philosophy of Science conference, Inter-University Centre Dubrovnik. *Formulating Emergence in the Physical Sciences*.
- Oct 2017** *Quantum Gravity: Physics and Philosophy, IHES Paris. *Duality and Emergence*.
- Aug 2017** European Congress of Analytic Philosophy. Symposium on 'Duality and Emergence'. *Duality, Equivalence, and Emergence*. Munich.
- July 2017** *Probing the spacetime fabric: from concepts to phenomenology. *On the Emergence of Space, Illustrated by Random Matrix Models*. Trieste.
- July 2017** *Symmetries in Physics, with J. Butterfield. *Dualities and Symmetries*. Hannover.
- May 2017** *Seven Pines Symposium. *On the History and Philosophy of the Black Hole Information Paradox*. Minnesota.
- April 2017** *The Continuum in the Foundations of Mathematics and Physics. *On the Emergence of Time in Quantum Gravity*. ILLC, UvA.
- Sept 2016** *DICE 2016 Spacetime – Matter – Quantum Mechanics. *Dualities and Emergence of Space*. Castiglione Cella.
- July 2016** *Hopeless hopes? Conference on the history of quantum gravity at the Max-Planck-Institut für Gravitationsgeschichte, Berlin.
- July 2016** Foundations 2016, LSE London.

- July 2016** **British Society for the Philosophy of Science, Annual Conference**, Cardiff UK.
- July 2016** **Sixth International Conference Integrated History and Philosophy of Science, Edinburgh**, Scotland, UK. Joint talk with J. van Dongen.
- May 2016** **Carlofest**, Carlo Rovelli's 60th birthday conference, Marseille. Joint talk with J. Butterfield.
- May 2016** **Philosophy of Science in a Forest**, three-yearly conference of the Dutch Association for Philosophy of Science.
- May 2016** **Conference on emergence** at the Université Catholique de Louvain, Louvain-la-Neuve. Joint talk with Elena Castellani.
- Oct 2015** **Effective Theories, Mixed Scale Modeling, and Emergence**, Pittsburgh, USA.
- Sept 2015** **Liberal Arts and Sciences and Core Texts in the European Context**. *Talk on Core Texts in Natural Science*. AUC, UvA
- Sept 2015** ***Duality in Contemporary Mathematics – Philosophical Aspects**, workshop at the Bergische Universität Wuppertal.
- Mar 2015** ***Equivalent Theories in Physics and Metaphysics**, Princeton University.
- Apr 2015** **Philosophy of Physics, Science, Technology, and Values Conference**, Inter University Centre Dubrovnik, Croatia.
- Apr 2015** **1st Munich Workshop on Mathematical Philosophy: Philosophy of Physics**, Munich Center for Mathematical Philosophy, LMU.

Invited Talks: Colloquia and Seminars

- September 2025** **Dualities and a Geometric View of Theories**, Philosophy of Science Seminar, University of Stockholm.
- May 2025** **A Conceptual Analysis of Black Hole Entropy in String Theory**, UPAC Colloquium, Utrecht.
- January 2025** **Noether's Theorems and Energy in General Relativity**. Consortium for History of Science, Technology and Medicine.
- May 2024** **Dualities, Seiberg-Witten Theory and a Geometric View of Theories**, Radboud University Nijmegen.
- March 2024** **Dualities, Seiberg-Witten Theory and a Geometric View of Theories**, Utrecht University.
- June 2023** **Midsummer Colloquium ILLC**, Wild Idea Talk.
- June 2023** **Respondent to Jill North**, Symmetry Workshop.
- Apr 2023** **Philosophy of Physics Seminar**, University of Oxford.
- June 2022** **Quantum & Society Research Colloquium**, Institute for Information Law, UvA.
- Nov 2021** **Logic and Interactive Rationality (LIRa)**, ILLC, UvA.

- Nov 2021** **Max Planck Institute for Evolutionary Biology**, Plön.
- Jan 2021** **Dutch Institute for Emergent Phenomena**.
- Nov 2020** **Warsaw University of Technology**, Spacetime Colloquium, with Karen Crowther.
- Oct 2019** **University of Florence**, Department of Physics.
- June 2019** **University of Cambridge**, Cambridge Simplex seminar.
- Apr 2019** **University of Oslo**, Department of Philosophy.
- Jan 2019** **University of Notre Dame**, Department of Philosophy, colloquium.
- Nov 2018** **University of Chicago at Illinois**, Department of Philosophy, essay prize seminar Beyond Spacetime Project.
- Nov 2018** **Colloquium**, Harvard University, Black Hole Initiative.
- Feb 2018** **The Faraday Institute**, University of Cambridge, research seminar.
- May 2017** **Universitat Autònoma de Barcelona**, Faculty of Philosophy, seminar.
- May 2017** **University of Cambridge**, HPS group.
- Nov 2016** **Seminar Philosophy of Physics**, Utrecht.
- June 2016** **Oxford Philosophy of Physics Seminar**.
- June 2016** **LSE Sigma Club lecture**, London School of Economics.
- June 2016** **Colloquium in Philosophy, Logic and Philosophy of Science**, Munich Center for Mathematical Philosophy.
- Jan 2016** **Department of Philosophy, University of Geneva**, Chicago-Geneva joint seminar series of the project Beyond Spacetime.
- June 2015** **Interdisciplinary Excellence Cluster Image Knowledge Gestaltung**, Humboldt University Berlin, Research Seminar.
- May 2015** **Aristotle University of Thessaloniki**.

Invited Talks: Schools, National Meetings and Conferences

- May 2025** **New Directions in Philosophy of Physics**, 5th HPP-NL workshop, Amsterdam.
- May 2023** **Exploring Emergence**, workshop at the Institute for Advanced Study, UvA.
- June 2022** **XXV International Summer School in Philosophy of Physics: Dualities between Philosophy and Physics**, University of Urbino.
- June 2021** **XXIV International Summer School in Philosophy of Physics: Black Holes and the Information Loss Paradox**, University of Urbino.
- Apr 2018** **Dutch Institute for Emergent Phenomena**, constitutive discussion session. Presentation on the Philosophy of Emergence.
- Mar 2016** **Meeting of the National Science Agenda**, workshop Route 2, Amsterdam. Invited pitch on Philosophy of Spacetime.

Research Visits and Workshops

(* = invited visit)

- *University of Stockholm (7-14 September 2025).
- *New Directions in the Foundations of Physics, Logar Valley, Slovenia (29/5 – 1/6/25).
University of Cambridge and University of Oxford (29 May – 7 June 2024).
- *Galilei Institute for Advanced Studies, programme *Beyond the Standard Model: Historical-Critical Perspectives*, October-November 2019.
- *University of Cambridge, *München-Cambridge Workshop on Black Holes* (9-10/19).
- *Visit to Massimo Bianchi's String Theory Group at Tor Vergata, Rome (10-13 Nov. 2015).
- *Interdisciplinary Cluster, Humboldt University, Berlin (May 2015).

Grant Acquisition Presentations and Workshops

- March 2025 **Philosophy Meets Science: An overview of my projects**, Presentation for the Projects Office Team, UvA Science Park, Amsterdam.
- January 2025 **Getting Your Ideas Funded**, ILLC Away Day, Amsterdam.

Public Talks and Outreach

- May 2025 **Quantum Computers and the Societal Impact of Quantum-Safe Cryptography**, Quantum to Cosmos: A Pint of Science event, Poesiat & Kater, Amsterdam.
- April 2025 **The Societal Impact of Quantum-Safe Cryptography: Opportunities, Risks and the Path Forward**, Fysica 2025, Leiden.
- June 2024 **Quantum Computing and Cybersecurity: Cryptocalypse or Overhype?**, QISS launch meeting, Quantum Meets 2024, Amsterdam.
- Apr 2024 **Atlantic Assembly – Past, Present and Future**, Jonge Atlantici, Atlantische Commissie, the Hague.
- Jan 2022 **Governmental Quantum Symposium (Rijksoverheid)**, Ministry of Justice and Security, the Hague.
- Jan 2022 **Working Group Security (Werkgroep Beveiligingsoverleg)**, Dutch Banking Association.
- Jan 2018 **20th International Interdisciplinary Seminar: Can Science and Technology Shape a New Humanity?** *Physics, Metaphysics, and Emergence*, London.
- May 2017 **Amsterdam Philosophy Festival Drift** *Changing Views on Space, Time and Space-time*, joint presentation with F.A. Muller.
- Jan 2017 **19th International Interdisciplinary Seminar** *Emergence and Reduction in Physics*, London and Cambridge.

- Jan 2015 **Open day lecture.** *Big Questions in Science: From the Very Small to the Very Large*, AUC, UvA.
- Jan 2015 **17th International Interdisciplinary Seminar.** *A Holographic Universe?*, researcher and student conference, London.