

Sebastian De Haro

Curriculum Vitae

Science Park 107
1098 XG Amsterdam, the Netherlands
✉ s.deharo@uva.nl
<http://www.uva.nl/profile/s.deharoolle>

Areas of Expertise

- AOS:** Philosophy of Physics, Philosophy of Science, Philosophy of Technology, Theoretical Physics, Mathematical Physics.
- AOC:** Epistemology, Ethics, Metaphysics, History of Physics, Philosophy of Logic and Language, Philosophy of Mathematics.

Academic Positions

- 2021-present** **Assistant Professor in Philosophy of Science (tenured)**
Institute for Logic, Language and Computation (ILLC) and Institute of Physics (IoP), University of Amsterdam (UvA).
- 2009-2020** **Lecturer (tenured)**, Amsterdam University College, University of Amsterdam.
- 2008-2009** **Research associate and managing editor of Foundations of Physics** on behalf of Gerard 't Hooft, Utrecht University.

Academic Responsibilities and Secondary Affiliations

- 2021-present** **Senior researcher**, QuSoft, research line *Quantum for Society and Business*: <https://qusoft.org>.
- 2018-present** **Associated researcher**, *Dutch Institute for Emergent Phenomena*: an interdisciplinary research centre across fundamental sciences: <https://www.d-iep.org>.
- 2016-present** **Member of the committee**, Fund for History of Science and History of the University of Amsterdam, Faculty of Humanities, UvA.

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 (total: € 1,948,907)

- 2024** € 30,000 **A Responsible Quantum-Safe Cryptography Transition (RQSC)**. Open Call Centre for Quantum & Society.
- 2023** € 30,000 **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. The total award is €800,000.
- 2023** € 36,000 **PhD additional grant in Philosophy and Ethics of Quantum Technology**. QuSoft.
- 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** € 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. Project leader. Project website: <https://projects.illc.uva.nl/quantumimpact>.
- 2019** **Fellow, Netherlands Institute for Advanced Study**. € 45,000: *declined*—grant amount not counted towards the above total.
- 2018** € 17,000 **Visiting fellow in philosophy**. Black Hole Initiative, Harvard University. Invitation by: Peter Galison.
- 2015-20** € 77,000 **Trinity College Turner Studentship in the Philosophy of Science or the History of Scientific Ideas**, University of Cambridge.
- 2019** € 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*—grant amount not counted towards the above total.
- 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.

Publications

Total number of citations (all publications): 3,457. i10-index: 44. h-index: 23.

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

<http://scholar.google.nl/citations?user=rnXDqN4AAAAJ&hl=nl&oi=ao> (accessed 08/02/24).

Books

- (3) **Forthcoming** De Haro, S. and J. Butterfield. *The Philosophy and Physics of Duality*. Oxford University Press, manuscript submitted in September 2023.
- (2) **Forthcoming** De Haro, S. and E. Cinti. *Dualities in Physics*, Elements Series, Cambridge University Press. Manuscript to be submitted in June 2024.
- (1) **In preparation** Van Dongen, J. and S. De Haro. *History and Philosophy of the Black Hole Information Paradox*. Under contract with Cambridge University Press. 2025.

Articles In General Philosophy of Science

- (6) **2023** 'The Empirical Under-determination Argument Against Scientific Realism for Dual Theories'. *Erkenntnis*, 88, pp. 117-145.
- (5) **2020** 'Science and Philosophy: A Love-Hate Relationship'. *Foundations of Science*, 25 (2), pp. 297-314.
- (4) **2019** 'Towards a Theory of Emergence for the Physical Sciences'. *European Journal for Philosophy of Science*, 9, 38, pp. 1-52.
- (3) **2019** 'The Heuristic Function of Duality'. *Synthese*, 196 (12), pp. 5169-5203.
- (2) **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.
- (1) **2016** 'On Artigas and Analytic Philosophy'. *Scientia*, 4 (2), pp. 215-243, invited contribution to special issue on the 10th anniversary of Mariano Artigas' death.

Articles and Book Chapters in Philosophy of Physics

- (19) **2022** '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.
- (18) **2022** Crowther, K. and De Haro, S. '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.
- (17) **2021** 'Theoretical Equivalence and Duality'. *Synthese*, 198 (6), pp. 5139-5177.

- (16) 2021 De Haro, S. and J. N. Butterfield, 'On Symmetry and Duality'. *Synthese*, 198 (4), pp. 2973-3013.
- (15) 2020 'Spacetime and Physical Equivalence'. In: *Beyond Spacetime. The Foundations of Quantum Gravity*, N. Huggett and C. Wüthrich (Eds.), pp. 257-283. Cambridge University Press.
- (14) 2020 '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.
- (13) 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.
- (12) 2020 van Dongen, J., S. De Haro, 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. 112-127.
- (11) 2020 Castellani, E. and De Haro, S. '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.
- (10) 2018 De Haro, S. and H. W. De Regt, 'Interpreting Theories without Spacetime'. *European Journal for Philosophy of Science*, 8 (3), pp. 631-670.
- (9) 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.
- (8) 2017 'The Invisibility of Diffeomorphisms'. *Foundations of Physics*, 47 (11), p. 1464.
- (7) 2017 De Haro, S., D. Mayerson and J. N. Butterfield, 'Conceptual Aspects of Gauge/Gravity Duality'. *Foundations of Physics*, 46 (11), pp. 1381-1425.
- (6) 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.
- (5) 2017 'Dualities and Emergent Gravity: Gauge/Gravity Duality'. *Studies in History and Philosophy of Modern Physics*, 59, pp. 109-125.
- (4) 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.
- (3) 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
- (2) 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.

- (1) 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.

Articles in 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 '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 '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 'Chern-Simons Theory, 2d Yang-Mills, and Lie Algebra Wanderers'. *Nuclear Physics B*, 730, 312.
- (12) 2004 '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 R4 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: 2,008 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

- (3) 2020 '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. Invited review.
- (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. Invited review.
- (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. Invited review.

Publications for a Broad Audience (invited contributions)

- (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.
- (2) 2006 De Haro, S., 'Stringtheorie und das antropisches Prinzip'. *Komma*, 36, pp. 46-49.

Academic articles published in national journals or online

- (5) 2016 '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. The Amsterdam University College (AUC) is the joint UvA-VU honours programme in liberal arts and sciences.

Undergraduate teaching in philosophy

- 2022-present** **Philosophy of Mathematics (Wiskunde als wetenschap)**: mandatory course on the philosophical and societal aspects of mathematical practice, BSc Mathematics, course coordinator and lecturer.
- 2021-present** **Philosophy of Digital Media (Reflecties op de digitale cultuur)**: mandatory course BSc information studies, course coordinator and lecturer.
- 2009-present** **Undergraduate thesis supervision**: 33 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

2021-present Emergence: teacher of the philosophical section, UvA-honours.

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

- 2023-present **Eline de Jong**, supervisor ('copromotor' and daily supervisor).
- 2023-present **Ailsa Robertson**, supervisor ('copromotor' and daily co-supervisor).
- 2023-present **Aude Corbeel**, supervisor ('copromotor' and co-supervisor).

Service in PhD committees

- 2017 **Riccardo Pinosio**, *The Logic of Kant's Temporal Continuum*, ILLC.
- 2014 **Marc Holman**, *The Quest for a Fundamental Theory of Physics*, Utrecht University.
- 2008 **Miguel Tierz**, *Random Matrix Models in Chern-Simons Theory*, U. of Barcelona.

Postdoc supervision

- 2023-present **One postdoc in Spacetime and Experimental Philosophy project.**
- 2023-present **One postdoc in QISS project.**

Organisation of Scientific Meetings

- 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.

Service to the Profession and Professional Memberships

Refereeing

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

Journals: The British Journal for the Philosophy of Science, Synthese, European Journal for Philosophy of Science, 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, Journal of Physics A: Mathematical and General, Physical Review D, Nuclear Physics B, Physics Letters B.

Physics and Mathematics

Professional Responsibilities and Memberships

2021-present **Member 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, **Trinity College Mathematical Society**.

2016-present Member, **Vossius Center for the History of Humanities and Sciences**.

2019 **Member of the Programme Committee**, European Philosophy of Science Association (EPSA19), Biennial Conference, Geneva.

2018 Beyond Spacetime, project funded by the John Templeton Foundation at the University of Chicago at Illinois and the University of Geneva: referee for the 2018 essay contest.

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**.

Languages

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

English, German: fluency in speech and writing.

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

Presentations (recent)

(* = invited speaker)

Presentations at International Scientific Conferences

- 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*. Castiglioncello.
- 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.
- Dec 2014** ***Emergent Time and Emergent Space in Quantum Gravity,** Max Planck Institute for Gravitational Physics.

- Nov 2014** **Philosophy of Science Association (PSA), Biennial conference**, Chicago. Presentation together with J. N. Butterfield.
- Sept 2014** ***Foundations of Dualities**, Florence.
- Nov 2013** **Reduction and Emergence in the Sciences**, Munich Center for Advanced Studies, Ludwig-Maximilians-Universität München.
- June 2013** **Rethinking Liberal Education**, AUC, UvA.
- Sept 2012** ***Recent Advances in Topological QFT**, University of Lisbon.

Invited Talks: Colloquia and Seminars

- 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.

Oct 2012 École Polytechnique, Paris.

Invited Talks: Schools, National Meetings and Conferences

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 4-minute pitch on Philosophy of Spacetime.

Nov 2011 **Symposium Op de rand van de wetenschap**, De Leische Flesch, Universiteit Leiden. *Informatie in de natuurkunde. De zoektocht naar een unificerende theorie.*

Apr 2011 **Annual National Physics Conference Fysica 2011**, Vrije Universiteit, Amsterdam. Hiërarchisch of democratisch? Over de eenheid van de natuurwetenschap.

Research Visits and Workshops

(* = invited visit)

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).

**From Physics to Metaphysics*, Conference for Jeremy Butterfield's 60th birthday (02/15).

**Emergent Time and Emergent Space in Quantum Gravity*, Potsdam (15-18/12/14). *String Theory Workshop*, University of Amsterdam (30 June-7 July, 2014).

Foundations of Quantum Mechanics and Q. Gravity, Imperial College London, 04/14.

*ITP, Aristotle University of Thessaloniki (26 Apr - 4 May 2014).

*Group of Mathematical Physics, University of Lisbon (Jul 2012).

Historical Roots of Q. Gravity Research, MPI-Wissenschaftsgeschichte, Berlin 06/11.

Public Talks and Outreach

- 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.
- Apr 2014 **Masterclass for high-school students.** *The Strange World of Quantum Mechanics*, Masters in Teaching, AUC, UvA.
- Jan 2014 **16th International Interdisciplinary Seminar.** *A Universe from Information?*, researcher and student conference, London.
- Jan 2013 **Excellence in Teaching for secondary school science teachers**, organized by Betaplatform, workshop taught: *Big Questions in Science*.
- Jan 2013 **15th International Interdisciplinary Seminar**, Institute for Interdisciplinary Studies, Madrid. *Defining 'nothing'. On the Philosophy of Lawrence M. Krauss*.
- Jan 2012 **Open day lecture**, Institute for Interdisciplinary Studies, Madrid. *From Einstein to Quantum Cryptography*, AUC, UvA.
- Mar 2011 **CREA series of lectures Physics and Philosophy**, Institute for Interdisciplinary Studies, Madrid. *Black Hole Horizons: The Gravity of Paradigms*, UvA.
- Jan 2011 **StudieMarathon.** *Wat rechtvaardigt de eenheid van de wetenschap? Waar alfa, bèta en gamma samenkomen*, UvA.