

Curriculum Vitae

Dr. Wolfgang Pietsch, Dipl.-Phys.

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RESEARCH INTERESTS

Philosophy of big data and machine learning
Philosophy of technology and engineering science
Philosophy of physical science
Causation, probability, induction

EMPLOYMENT

**Technical University Munich, Philosophy & Munich
Center for Technology in Society** (4/2008 – 1/2018)
Wissenschaftlicher Mitarbeiter (~ assistant professor
without tenure)

Dilg, Haeusler, Schindelmann Patent Attorneys
(2/2018 – present), training as German and European
patent attorney

ACADEMIC EDUCATION

New York University, Institute for Public Knowledge
(8/2011)
Visiting Scholar

**University of Pittsburgh
Center for Philosophy of Science**
(20/3/2010-15/4/2010)
Short-term visit

**London School of Economics,
Centre for Philosophy of Natural and Social Science**
(10/2006-6/2007)
Visiting Research Associate

University of Augsburg (11/2004-5/2008)

PhD (Philosophy)

Grade: magna cum laude

Thesis: Der Zeitpfeil – philosophische und physikalische
Grundlagen (The arrow of time—philosophical
and physical foundations)

Supervisor: Prof. Klaus Mainzer

Freie Universität Berlin (2003-4)

Studies in Science Writing

Degree: University Certificate

Humboldt-Universität zu Berlin (1997-2003)

Diplom Physik (M.Sc. Physics)

Grade: 1,0 (with distinction)

Thesis in statistical physics: Correlations and percolation
in scale-free networks

Examiners: Prof. Igor Sokolov, Prof. Werner Ebeling

Université Paul Sabatier of Toulouse (F) (2000)

Exchange semester with the Erasmus Program of the EU

Lessing-Gymnasium Neu-Ulm

Abitur

Grade: 1,0

FUNDING & AWARDS

Vice chairman of AG Phil, working group on philosophy
of physics of the German Physical Society (2012 - 2018)

POIESIS Fellow (New York Institute for Public
Knowledge, BMW Stiftung Herbert Quandt, Gerda
Henkel Stiftung) with an annual stipend of
5000 Euro (2010, 2011, 2012)

Best graduate paper award for a paper presented at the
conference *Reduction and the Special Sciences* (Tilburg,
April 2008)

Fellow of the Evangelisches Studienwerk Villigst e.V.
PhD-Scholarship for full time study (1/2006-12/2007)

Bonus for special achievements in 2013, 2017 (Carl von Linde-Akademie)

Participation in SFB application “Statistical Modelling and Inference for Big Data” (with statisticians and computer scientists from various institutions in Munich)

Participation in MICE-research group with historians and sociologists of science (funding for workshops)

Funding for several workshops by German Physical Society, TU München

Travel stipends from Evangelisches Studienwerk, DAAD, DFG

PUBLICATIONS

WP, „A Causal Approach to Analogy“, *Journal for General Philosophy of Science* (2019), <https://doi.org/10.1007/s10838-019-09463-9>.

WP, “Von der Erkenntnistheorie zur Ethik von Big Data und maschinellem Lernen“, *Digitalisierung der Prüfung: Datenanalyse im Aufbruch*. Berlin: Erich Schmidt Verlag, pp. 101-122 (2018).

Sabine Maasen, Ignacio Farías, Uli Meyer, Ruth Müller, Jan-Hendrik Passoth, Sebastian Pfotenhauer, WP, Karin Zachmann, “The Munich Center for Technology in Society (MCTS): Raising the stakes for STS in Germany”, *EASST Review 2017*, pp. 16-24.

WP, “Causation, probability and all that: Data science as a novel inductive paradigm”, in M. Dehmer and F. Emmert-Streib (eds.), *Frontiers in Data Science*, pp. 329-353. Boca Raton, FL: CRC (2017).

WP, “Datenintensive Wissenschaft als exploratives Experimentieren“, in S. Heinicke, S. Peters and S. Schmitt (eds.), *Was ist Experimentieren? Ein Diskurs der Perspektiven im naturwissenschaftlichen Unterricht*. Münster: Waxmann (forthcoming).

WP, Jörg Wernecke, „Ten Theses on Big Data and Computability“, in W. Pietsch, J. Wernecke and M. Ott (eds.), *Berechenbarkeit der Welt? Philosophie und Wissenschaft im Zeitalter von Big Data*. Wiesbaden: Springer VS, pp. 37-57 (2017).

Michael Kuhn, WP, Heiko Briesen, „Clarifying Thoughts About the Clarification of Liquids – Filtration and the Philosophy of Science”, *Chemie Ingenieur Technik* 2017, 89(9), 1126-1132.

Mathias Frisch, WP, “Reassessing the Ritz-Einstein debate on the radiation asymmetry in classical electrodynamics”, *Studies in History and Philosophy of Modern Physics* 55, pp. 13-23 (2016).

WP, “Two modes of reasoning with case studies”, in T. Sauer and R. Scholl (eds.), *Philosophy of Historical Case Studies. Boston Studies in the Philosophy of Science*. Dordrecht: Springer, pp. 49-67 (2016).

WP, “The Causal Nature of Modeling with Big Data”, *Philosophy & Technology* 29(2), pp. 137-171 (2016).

WP, “Aspects of theory-ladenness in data-intensive science”, *Philosophy of Science* 82(5), pp. 905-916 (2015).

WP, “A revolution without tooth and claw. Redefining the physical base units”, *Studies in History and Philosophy of Science A* 46, pp. 85-93 (2014).

WP, “Wie wissenschaftlich sind die Ingenieurwissenschaften?“, *fatum* 1, pp. 21-25 (2014).

WP, “The Nature of Causal Evidence Based on Eliminative Induction”, *Topoi* 33(2), pp. 421-435 (2014).

WP, „Die Datafizierung der Gesellschaft – zwischen Entscheidungsfreiheit und sozialem Engineering“, in F. Steger (ed.), *Bedroht Entscheidungsfreiheit Gesundheit und Nachhaltigkeit? Zwischen notwendigen Grenzen und Bevormundung. Reihe Ethik und Praxis*, Paderborn: mentis, pp. 165-182 (2014).

WP, “Big Data – über Chance und Risiken einer neuen Wissenschaft des Komplexen”, *Universitas* 8/2013, pp. 54-66.

WP, “The limits of probabilism”, in V. Karakostas and D. Dieks (eds.), *EPSA Philosophy of Science: Athens 2011*. Dordrecht: Springer (2013).

WP, “Data and control – a digital manifesto”, *Public Culture* 25(2 70), pp. 307-310 (2013).

Meinard Kuhlmann, WP, “What is and why do we need philosophy of physics”, *Journal for General Philosophy of Science*, 43(2), pp. 209-214, introduction to edited volume on philosophy of physics (2012).

WP, “Hidden underdetermination: A case study in classical electrodynamics”, *International Studies in the Philosophy of Science* 26(2), pp. 125-151 (2012).

WP, “Pluralistische Interpretationen von Wahrscheinlichkeit”, in O. Petersen, D. Borchers, T. Spitzley, and M. Stöckler (eds.), *Proceedings of the 7th International Conference of the German Society for Analytic Philosophy (GAP)*. Duisburg-Essen: DuEPublico, pp. 135-154 (2012).

WP, “Underdetermination or why the historical perspective makes a difference”, in H. W. de Regt, S. Hartmann and S. Okasha (eds.), *EPSA Philosophy of Science: Amsterdam 2009*. Dordrecht: Springer, pp. 303-313 (2012).

WP, “Wie die Monarchie so auch die Kausalität in der Physik”, *Proceedings XXII. Deutscher Kongress für Philosophie*, 11. - 15. September 2011, Ludwig-Maximilians-Universität München. <http://epub.ub.uni-muenchen.de/12585/>

WP, “The underdetermination debate: How lack of history leads to bad philosophy”, in T. Schmaltz & S. Mauskopf (eds.), *Integrating History and Philosophy of Science. Boston Studies in the Philosophy of Science (Vol. 263)*. Dordrecht: Springer, pp. 83-106 (2011).

WP, “On conceptual issues in classical electrodynamics: Prospects and problems of an action-at-a-distance interpretation”, *Studies in History and Philosophy of Modern Physics* 41(1), pp. 67-77 (2010).

WP, “Limiting frequencies in scientific reductions” in Leitgeb, H. and A. Hieke, *Reduction and Elimination in Philosophy and the Sciences. Proceedings of the 31st International Ludwig Wittgenstein-Symposium*, 256-258. Kirchberg: ÖLWG (2008).

WP, “Derivation of the percolation threshold for the network model of Barabási and Albert”, *Phys. Rev. E* 73, 066112 (2006).

Ramon Xulvi-Brunet, WP, & Igor Sokolov,
“Correlations in scale-free networks: tomography and percolation”, *Phys. Rev. E* 68, 036119 (2003).

MONOGRAPHS

WP, “On the epistemology of machine learning and data science – conceptual tools for a new empiricism”, monograph, under contract with Springer, manuscript submitted in October 2018

WP, “Big Data”, monograph, under contract with Cambridge University Press, Elements Series

EDITED VOLUMES

Berechenbarkeit der Welt? Philosophie und Wissenschaft im Zeitalter von Big Data. Wiesbaden: Springer VS (2017). (with Jörg Wernecke, Max Ott)

“Philosophy of Physics in Germany”. Edited Volume (2/2012) of *Journal for General Philosophy of Science*. (with Meinard Kuhlmann)

PRESENTATIONS

“On the Epistemology of Data Science – the Rise of a New Inductivism”, invited talk at a symposium organized by the Commission for the History and Philosophy of Computing, 16th International Congress on Logic, Methodology and Philosophy of Science and Technology (Prague, August 2019)

“A Causal Approach to Analogical Inference”, talk at ‘Analogical Reasoning in Science and Mathematics’ (Munich, October 2018)

„Objective Probabilities based on Causal Symmetries”, invited talk at workshop ‘The Method of Arbitrary Functions’ (Madrid, September 2018)

“Ende der Theorie und Abgesang auf Kausalität - Neue Erkenntnisse und Erkenntnismethoden durch Big Data und maschinelles Lernen?“, invited talk at ‘Big Data & Ethik’ (ITAS Karlsruhe, November 2017)

„On Theory-Ladenness in Data-Intensive Science“, invited talk at ‘Making Sense of Data in the Sciences’ (Hannover, October 2017)

“On Theory-Ladenness in Data-Intensive Science”, invited talk at “Values and AI in Medicine and Healthcare” (Cambridge, September 2017)

“A Difference-Making Approach to Analogical Inference”, ECAP 9 (Munich, August 2017)

“Towards an epistemology of data science”, invited talk at High Performance Computing Center Stuttgart (July 2017)

„Causation, probability and all that: Data science as a novel inductive paradigm”, invited talk at ‘Big Data in the social sciences’ (Canterbury, June 2017)

“Epistemological perspectives on data-intensive science“, seminar on ‘data and identity’ (Salzburg, May 2017)

„Causation, probability and all that: Data science as a novel inductive paradigm”, DPG spring conference (Bremen, March 2017)

“Zwischen Empirie und Setzung. Wellen in der Raumzeit aus Sicht des geometrischen Konventionalismus.“ Astroseminar 2016 (Münster, October 2016)

„The Role of Ethics in Artificial Intelligence Research“, Honda Research Institute (Frankfurt a.M., August 2016)

„Wozu Philosophie der Physik.“ Berufungsvortrag (IZWT Wuppertal, July 2016)

“Engineering complex phenomena using big data. Some methodological reflections”, in a symposium on “ethics of big data: the engineering of the ‘not yet’” at IACAP 2016 (Ferrara, June 2016)

“A causal perspective on analogical inference”, MuST Conference (Munich, March 2016)

“A causal perspective on analogical inference”, invited talk at a workshop on the history of statistics at the Institute of Statistics (LMU, March 2016)

“A causal perspective on modelling in the engineering sciences”, Gesellschaft für Wissenschaftsphilosophie (Düsseldorf, March 2016)

„Kausale Modellierung mit Big Data“, Seminar ‚Idealisierung und Modelle‘ (Mainz, January 2016)

“Erkenntnistheoretische Perspektiven auf datenintensive Wissenschaft“, Berufungsvortrag (Bielefeld, December 2015)

“Epistemology of data-intensive science”, invited talk at AgreeSkills Annual Meeting (Barcelona, October 2015)

“A difference making account of causation”, EPSA 2015 (Düsseldorf, September 2015)

“The causal nature of modeling in data-intensive science”, invited talk at MCMP colloquium (Munich, June 2015)

“Datenintensive Wissenschaft – eine Variante explorativen Experimentierens?“, invited talk at Schwerpunkttagung zum Experiment der Gesellschaft für Didaktik der Chemie und Physik (Münster, May 2015)

„The causal nature of modeling in data-intensive science“, invited talk at Kolloquium Wissenschafts- und Technikforschung of IZWT (Wuppertal, May 2015)

“Difference-making as a notion of causation for data-intensive science“, 7th Workshop on the Philosophy of Information (London, March 2015)

“What is and why do we need philosophy of physics?“, invited talk at the Interdisciplinary Colloquium Physics – Philosophy (Florence, February 2015)

“Aspect of theory-ladenness in data-intensive science“, PSA (Chicago, November 2014)

“Data-intensive science as a new approach for dealing with causal complexity“, invited talk at Fourth Sino-German Symposium on Philosophy of Science and Technology (Bielefeld, September 2014)

“The prospects of data-intensive science for dealing with causal complexity“, Causality and Complexity in the Sciences (Cologne, September 2014)

“Is the radiation asymmetry of causal nature?“, invited talk at Causality and Causal Reasoning in Physics (Bern, June 2014)

“The radiation arrow of time is not a statistical arrow“, DPG Frühjahrstagung (Berlin, March 2014)

“Big data – the new science of complexity”, invited talk at Delft Philosophy Colloquium (Delft, December 2013)

“Reflections on big data science”, Poiesis concluding event (New York, December 2013)

“Underdetermination in 19th-century electrodynamics: Developing a philosophical position based on a historical case study”, invited talk at The Philosophy of Historical Case Studies (Bern, November 2013)

“How probable is physics?”, Invited talk at Science Rocks! (Munich, July 2013)

“Natural and causal laws in physics and engineering”, Founding Conference of Gesellschaft für Wissenschaftsphilosophie (Hannover, March 2013)

“A revolution without tooth and claw – Redefining the physical base units”, Dimensions of Measurement (Bielefeld, March 2013)

“What is and why do we need philosophy of physics?”, DPG Frühjahrstagung (Jena, March 2013)

“Big data – Is more different?”, invited talk at Science Technology and Policy Studies colloquium (Twente, February 2013)

“The networked society of the future”, invited talk at Urban Age Electric City Conference (London, December 2012)

“The structure of causal evidence in deterministic settings”, *Causality and Evidence in the Sciences* (Canterbury, September 2012)

“The structure of causal evidence in deterministic settings”, *DPG Sommerworkshop* (TU München, August 2012)

“Two problems of induction”, *Annual Meeting of the British Society for Philosophy of Science* (Stirling, July 2012)

“Zwei Probleme der Induktion”, invited talk at *IZWT* (Wuppertal, June 2012)

“The limits of probabilism”, *WIP seminar of MCMP* (LMU Munich, June 2012)

“A revolution without tooth and claw – redefining the physical base units”, *Progress in Science* (Tilburg, April 2012, with Christof Gaiser)

“An odd piece of progress: On proposals for a new SI”, *DPG-Frühjahrstagung* (Dresden, March 2012)

“The limits of probabilism”, *EPSA11 - 3rd Congress of the European Philosophy of Science Association* (Athens, October 2011)

“The limits of probabilism”, *14th Congress of Logic, Methodology and Philosophy of Science* (Nancy, July 2011)

“The neglect of analogy”, *Biennial Conference of Society for Philosophy of Science in Practice* (Exeter, June 2011)

“Are physical theories probable?”, *DPG-Frühjahrstagung* (Dresden, March 2011)

“The heuristic value of underdetermination: On discovery by theoretical analogy”, *Heuristiken in der Physik* (Bad Honnef, December 2010)

“How robots think? On inductive logic”, *PhiBot10 – Philosophy Meets Robotics* (München, October 2010)

“Transient underdetermination and 19th century electrodynamics”, *16th UK and European Meeting on the Foundations of Physics* (Aberdeen, July 2011)

“Wozu Philosophie der klassischen Physik und warum gerade in Deutschland”, *Philosophie der Physik in Deutschland – Bestandsaufnahme und Perspektiven* (Bremen, June 2010)

“Transient underdetermination and 19th century electrodynamics”, *Pittsburgh Center for Philosophy of Science* (March 2010)

“Underdetermination or why the historical perspective makes a difference”, *EPSA 2009* (Amsterdam, October 2009)

“Varieties of pluralism in the interpretation of probability”, *Foundations of Uncertainty: Probability and its Rivals* (Prague, September 2009)

“Varieties of pluralism in the interpretation of probability”, *GAP7* (Bremen, September 2009)

“Reversibility as regulative principle”, invited talk at the Institute of Philosophy, TU Dortmund (July 2009)

“Commentary on Bengt Autzen: Bayesianism and the Principal Principle”, *Philosophy of Probability II* Graduate Conference (London School of Economics, June 2009)

“Underdetermination or why &HPS makes a difference”, *2nd Conference on Integrated History and Philosophy of Science (&HPS2)* (Univ. of Notre Dame, March 2009)

“Metaphysics and the interpretation of probability”, *Frühjahrskonferenz der Deutschen Physikalischen Gesellschaft / AK Philosophie der Physik* (München, März 2009)

“Limiting frequencies in scientific reductions”, *31st International Ludwig Wittgenstein-Symposium* (Kirchberg, August 2008)

“Warum die Frage nach der Reversibilität der physikalischen Grundgleichungen eine physikhistorische ist.”, invited talk at the *Oberseminar zur Philosophie der Naturwissenschaften*, University of Bremen (July 2008)

“Reversibility reconsidered—a role for history”, presented at *Third International Conference on the Nature and Ontology of Spacetime* (Montreal, June 2008)

“Two electrodynamicisms between plurality and reduction”, presented at *Reduction and the Special Sciences* (Tilburg, April 2008)

“Why boundary conditions can be laws”, presented at *Spring Conference of the German Physical Society AK Philosophie der Physik* (Freiburg, March 2008)

“Boltzmanns Zeitpfeil”, invited talk at *Kolloquium zur Geschichte der Naturwissenschaften, Mathematik und Technik*, Universität Hamburg (January 2008)

“Boltzmann's H-theorem and the subjectivity of statistical dependence”, presented at *13th International Congress of Logic, Methodology, and Philosophy of Science* (Beijing, August 2007)

“The subjectivity of statistical dependence”, presented at the *annual conference of the British Society for the Philosophy of Science* (Bristol, July 2007)

“Equilibrium and non-equilibrium. What’s the difference and what can we learn from it?”, presented at a *mini-workshop on the philosophical foundation of statistical mechanics* at London School of Economics (January 2006)

TEACHING

Technische Universität München

Introduction to Philosophy of Science (WS16/17, SS16, WS 15/16, SS 15, WS 14/5, WS 13/14, SS 13, WS 12/13, WS 11/12, SS 11, WS 10/11, SS 10, WS 09/10, SS 09, WS 08/09, SS 08)

Epistemology of the Engineering Sciences (SS15, WS 14/15, SS14, WS 12/13, SS12)

Philosophy and History of Probability (SS17, WS14/15, WS 08/09, SS 08)

Philosophy of Experiment (SS14, WS13/14)

Philosophy of Time (SS12)

Causation and Explanation (WS 15/16, WS 11/12)

On Probability and Induction (WS 10/11, WS 09/10)

Physics and Metaphysics (SS 10)

What is Space? (WS16/17, SS 09)

Kant's Philosophy of Natural Science (WS 08/09)

Philosophy of Engineering (SS17, WS 14/15, WS 13/14, WS 12/13, WS 11/12, WS 10/11) (with Klaus Mainzer and Fred Slanitz)

Introduction to Academic Research for Architects (WS 14/15, WS 13/14, WS 12/13, WS 11/12, WS 10/11) (with Alain Thierstein)

Research Methods (Trainings for PhD-students of the TUM Graduate School, November 2009, and for PhD-students of the International Graduate School of Science and Engineering (IGSSE), June 2009)

Philosophy of Science for Engineers (Workshop for PhD students at a chair of mechanical engineering at TU München, February 2009)

Universität Augsburg

Introduction to Philosophy of Science (WS 07/08)

WORKSHOPS ETC.

Co-Organizer of “Epistemology of Big Data in Physics”, Workshop at the DPG Spring Conference 2017, Bremen (with Meinard Kuhlmann)

Co-Organizer of Philosophy of Physics Section at Spring Conference 2016, Hamburg (with Meinard Kuhlmann, Dennis Lehmkuhl)

Co-Organizer of “100 years of General Relativity: On the Foundations of Spacetime Theories”, Workshop at the Spring-Conference 2015 of the Deutsche Physikalische Gesellschaft, Berlin (with Meinard Kuhlmann, Dennis Lehmkuhl)

Co-Organizer of “Argumente und Rhetorik in der Physik”, Erlangen, 12.-14.12.2014 (AGPhil with FV Geschichte der Physik and ELINAS)

Co-Organizer of “The Quantum-Classical Divide”, Workshop at the Spring-Conference 2014 of the Deutsche Physikalische Gesellschaft, Berlin (with Meinard Kuhlmann, Dennis Lehmkuhl)

Co-Organizer of Section “Philosophy of Physics” at the Spring-Conference 2013 of the Deutsche Physikalische Gesellschaft, Jena (with Meinard Kuhlmann, Dennis Lehmkuhl)

Co-Organizer of “Laws of Nature”, Workshop of the Munich Center for Mathematical Philosophy in Cooperation with the Munich Center for Technology in Society, München, 17.12.2012 (with Mathias Frisch)

Co-organizer of “Causality and Physics”, Workshop of Working Group on Philosophy of Physics of German Physical Society, TU München, 23.8.2012 (with Meinard Kuhlmann, Dennis Lehmkuhl)

Co-organizer of “Herbstworkshop der Arbeitsgruppe Philosophie der Physik (AG Phil) der Deutschen Gesellschaft für Physik (DPG)”, Working Group on

Philosophy of Physics of German Physical Society, TU München, 10.-11.9.2011 (with Meinard Kuhlmann)

Organization of a Workshop “Philosophy of Probability in Physics”, TU München, 20.7.2009

Co-organizer of a student reading group on the foundations of quantum mechanics at LSE (with Foad Dizadji-Bahmani)

SUPERVISIONS

Master's Theses:

“Extending the Conserved Quantity Theory of Causation to a Level-Dependent Theory” (Martin Voggenauer)

“Explanatory power of big-data methods” (Sylvester Tremmel)

“Methodologische Perspektiven einer anwendungsorientierten Forschung im Leistungssport” (Kornelius Kraus)

“Aesthetical criteria for theory evaluation” (Paul Zäsche)

“Mechanisms of innovation” (Marco Schieber)

“Explanation and Understanding” (Paul Grünke)

“Die Tumorgenese als komplexer Prozess“ (Sarah Bechtold)

REFEREE

European Journal for Philosophy of Science, Philosophy of Science, Synthese, Philosophy & Technology, Journal for General Philosophy of Science, Foundations of Science, Philosophia Naturalis, Lato Sensu, Progress in Electromagnetics Research, British Journal for Philosophy of Science

Netherlands Organisation for Scientific Research, Swiss National Science Foundation

SCIENCE WRITING

Freelance science writing (occasionally 2004-6, 2013)

for Spiegel Online, Inforadio of Rundfunk Berlin Brandenburg, Deutschlandfunk, Berliner Zeitung, Südwest Presse

Editorial assistance with “100x Einstein”, a year-long series covering all aspects of Einstein’s life and work in features, quotes, and original documents on rbb Inforadio (World Year of Physics, Einsteinjahr 2004-5)

Internship as a science writer at rbb Inforadio (September/October 2004)

Internship at the regional newspaper Südwest Presse Ulm (March 2004)

LANGUAGE SKILLS

Fluent in German, English, French
Intermediate in Spanish, Russian