

CURRICULUM VITAE OF RODERICH TUMULKA

1 Education and Employment

Birthdate: 12 January 1972 **Place:** Frankfurt am Main, Germany

Appointments

Institution	Dates	Position
Rutgers University	7/2010–present	Associate Professor
Rutgers University	7/2007–6/2010	Assistant Professor
Eberhard-Karls-Universität Tübingen, Germany	12/2004–3/2007	Scientific Assistant

Postdoctoral Training, Visiting Positions, Etc.

Institution	Dates	Title, Sponsor
Eberhard-Karls-Universität Tübingen, Germany	7/2016–present	Akademischer Rat
Eberhard-Karls-Universität Tübingen, Germany	4/2007–6/2007	Scholar, FQXi
IHÉS, Paris, France	2/2005–4/2005	Visiting Scientist
Università di Genova, Italy	5/2003–11/2004	Postdoc, Italian SF
Rutgers University	9/2002–4/2003	Postdoc, German SF
Ludwig-Maximilians-Universität Munich, Germany	11/2001–8/2002	Postdoc, German SF

Education and Degrees

Institution	Dates	Degree
Eberhard-Karls-Universität Tübingen, Germany	1/2008	Habilitation
Ludwig-Maximilians-Universität Munich, Germany	10/1998–10/2001	Doctor rerum naturalium
Johann-Wolfgang-Goethe-Univ. Frankfurt am Main, Germany	10/1992–6/1998	Diplom-Mathematiker

2 Publications

Publications in peer-reviewed journals.

1. Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“Is the hypothesis about a low entropy initial state of the universe necessary for explaining the arrow of time?,” 13 pages.

To appear in *Physical Review D* (2016)

<http://arxiv.org/abs/1602.05601>

(According to researchgate.net, this article was the most read article from the Rutgers math department in the week of May 2, 2016.)

2. Sheldon Goldstein, Joel L. Lebowitz, Roderich Tumulka, and Nino Zanghì:
“Any Orthonormal Basis in High Dimension is Uniformly Distributed over the Sphere,” 22 pages.
To appear in *Annales de l’Institut Henri Poincaré (B) Probabilités et Statistiques* (2016)
<http://arxiv.org/abs/1406.2576>
3. Sheldon Goldstein, Joel L. Lebowitz, Christian Mastrodonato, Roderich Tumulka, and Nino Zanghì:
“Universal Probability Distribution for the Wave Function of a Quantum System Entangled with Its Environment”
Communications in Mathematical Physics **342**: 965–988 (2016)
<http://arxiv.org/abs/1104.5482>
4. Charles Wesley Cowan and Roderich Tumulka:
“Epistemology of Wave Function Collapse in Quantum Physics”
British Journal for the Philosophy of Science **67(2)**: 405–434 (2016)
<http://arxiv.org/abs/1307.0827>
5. Roderich Tumulka:
“Long-Time Asymptotics of a Bohmian Scalar Quantum Field in de Sitter Space-Time,” 8 pages.
General Relativity and Gravitation **48**: 2 (2016)
<http://arxiv.org/abs/1507.08542>
6. Sheldon Goldstein, David A. Huse, Joel L. Lebowitz, and Roderich Tumulka:
“Thermal equilibrium of a macroscopic quantum system in a pure state,” 5 pages.
Physical Review Letters **115**: 100402 (2015)
<http://arxiv.org/abs/1506.07494>
(Included among the “Editors’ Suggestion” of Physical Review Letters.)
7. Charles Wesley Cowan and Roderich Tumulka:
“Detecting Wave Function Collapse Without Prior Knowledge,” 15 pages.
Journal of Mathematical Physics **56**: 082103 (2015)
<http://arxiv.org/abs/1312.7321>
8. Ward Struyve and Roderich Tumulka:
“Bohmian Mechanics for a Degenerate Time Foliation”
Quantum Studies: Mathematics and Foundations **2**: 349–358 (2015)
<http://arxiv.org/abs/1505.02844>

9. Ward Struyve and Roderich Tumulka:
“Bohmian Trajectories for a Time Foliation with Kinks”
Journal of Geometry and Physics **82**: 75–83 (2014)
<http://arxiv.org/abs/1311.3698>
10. Charles Wesley Cowan and Roderich Tumulka:
“Can One Detect Whether a Wave Function Has Collapsed?” 19 pages.
Journal of Physics A: Mathematical and Theoretical **47**: 195303 (2014)
<http://arxiv.org/abs/1307.0810>
11. Sören Petrat and Roderich Tumulka:
“Multi-Time Wave Functions for Quantum Field Theory”
Annals of Physics **345**: 17–54 (2014)
<http://arxiv.org/abs/1309.0802>
12. Valia Allori, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“Predictions and Primitive Ontology in Quantum Foundations: A Study of Examples”
British Journal for the Philosophy of Science **65**: 323–352 (2014)
<http://arxiv.org/abs/1206.0019>
13. Sören Petrat and Roderich Tumulka:
“Multi-Time Schrödinger Equations Cannot Contain Interaction Potentials,”
45 pages.
Journal of Mathematical Physics **55**: 032302 (2014)
<http://arxiv.org/abs/1308.1065>
14. Sören Petrat and Roderich Tumulka:
“Multi-Time Formulation of Pair Creation,” 14 pages.
Journal of Physics A: Mathematical and Theoretical **47**: 112001 (2014)
<http://arxiv.org/abs/1401.6093>
15. Viraj Pandya and Roderich Tumulka:
“Spin and the Thermal Equilibrium Distribution of Wave Functions”
Journal of Statistical Physics **154**: 491–502 (2014)
<http://arxiv.org/abs/1306.1659>
16. Daniel Bedingham, Detlef Dürr, GianCarlo Ghirardi, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“Matter Density and Relativistic Models of Wave Function Collapse”
Journal of Statistical Physics **154**: 623–631 (2014)
<http://arxiv.org/abs/1111.1425>

17. Sören Petrat and Roderich Tumulka:
 “Multi-Time Equations, Classical and Quantum,” 7 pages.
Proceedings of the Royal Society A **470(2164)**: 20130632 (2014)
<http://arxiv.org/abs/1309.1103>
18. Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
 “The Quantum Formalism and the GRW Formalism”
Journal of Statistical Physics **149**: 142–201 (2012)
<http://arxiv.org/abs/0710.0885>
19. William Feldmann and Roderich Tumulka:
 “Parameter Diagrams of the GRW and CSL Theories of Wave Function Col-
 lapse,” 13 pages.
Journal of Physics A: Mathematical and Theoretical **45**: 065304 (2012)
<http://arxiv.org/abs/1109.6579>
20. Pedro L. Garrido, Sheldon Goldstein, Jani Lukkarinen, and Roderich Tumulka:
 “Paradoxical Reflection in Quantum Mechanics”
American Journal of Physics **79(12)**: 1218–1231 (2011)
<http://arxiv.org/abs/0808.0610>
21. Roderich Tumulka:
 “Comment on ‘Hidden Variable Interpretation of Spontaneous Localization
 Theory’”, 3 pages.
Journal of Physics A: Mathematical and Theoretical **44**: 478001 (2011)
<http://arxiv.org/abs/1108.1520>
22. Valia Allori, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
 “Many-Worlds and Schrödinger’s First Quantum Theory.”
British Journal for the Philosophy of Science **62(1)**: 1–27 (2011)
<http://arxiv.org/abs/0903.2211>
23. Daniel V. Tausk and Roderich Tumulka:
 “Can We Make a Bohmian Electron Reach the Speed of Light, at Least for
 One Instant?” 12 pages.
Journal of Mathematical Physics **51**: 122306 (2010)
<http://arxiv.org/abs/0806.4476>
24. Roderich Tumulka:
 “English Translation of John von Neumann’s Article ‘Proof of the Ergodic
 Theorem and the H -Theorem in Quantum Mechanics”
European Physical Journal H: Historical Perspectives on Contemporary Physics
35: 201–237 (2010)
<http://arxiv.org/abs/1003.2133>

25. Sheldon Goldstein, Joel L. Lebowitz, Roderich Tumulka, and Nino Zanghì:
 “Long-Time Behavior of Macroscopic Quantum Systems: Commentary Accompanying the English Translation of John von Neumann’s 1929 Article on the Quantum Ergodic Theorem”
European Physical Journal H: Historical Perspectives on Contemporary Physics **35**: 173–200 (2010)
<http://arxiv.org/abs/1003.2129>
26. Sheldon Goldstein, Joel L. Lebowitz, Christian Mastrodonato, Roderich Tumulka, and Nino Zanghì:
 “Normal Typicality and von Neumann’s Quantum Ergodic Theorem”
Proceedings of the Royal Society A **466**: 3203–3224 (2010)
<http://arxiv.org/abs/0907.0108>
27. Sheldon Goldstein, Daniel V. Tausk, Roderich Tumulka, and Nino Zanghì:
 “What Does the Free Will Theorem Actually Prove?”
Notices of the American Mathematical Society **57**: 1451–1453 (2010)
<http://arxiv.org/abs/0905.4641>
28. Roderich Tumulka:
 “Bohmian Mechanics at Space-Time Singularities. II. Spacelike Singularities”
General Relativity and Gravitation **42**: 303–346 (2010)
<http://arxiv.org/abs/0808.3060>
29. Sheldon Goldstein, Joel L. Lebowitz, Christian Mastrodonato, Roderich Tumulka, and Nino Zanghì:
 “Approach to Thermal Equilibrium of Macroscopic Quantum Systems,” 9 pages.
Physical Review E **81**: 011109 (2010)
<http://arxiv.org/abs/0911.1724>
30. Roderich Tumulka:
 “Comment on ‘A New Proof of Bell’s Theorem Based on Fourier Series Analysis’ by H. Razmi”
Annales de la Fondation Louis de Broglie **34(1)**: 39–41 (2009)
31. Roderich Tumulka:
 “The Point Processes of the GRW Theory of Wave Function Collapse”
Reviews in Mathematical Physics **21**: 155–227 (2009)
<http://arxiv.org/abs/0711.0035>
32. Roderich Tumulka, Andrea Viale, and Nino Zanghì:
 “Reply to Sanz and Borondo,” 2 pages.
Physical Review A **77**: 057602 (2008)

33. Roderich Tumulka:
“A Kolmogorov Extension Theorem for POVMs”
Letters in Mathematical Physics **84**: 41–46 (2008)
<http://arxiv.org/abs/0710.3605>
34. Valia Allori, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“On the Common Structure of Bohmian Mechanics and the Ghirardi–Rimini–Weber Theory”
British Journal for the Philosophy of Science **59**: 353–389 (2008)
<http://arxiv.org/abs/quant-ph/0603027>
35. Christian Mastrodonato and Roderich Tumulka:
“Elementary Proof for Asymptotics of Large Haar-Distributed Unitary Matrices”
Letters in Mathematical Physics **82**: 51–59 (2007)
<http://arxiv.org/abs/0705.3146>
36. Roderich Tumulka, Andrea Viale, and Nino Zanghì:
“Reduced coherence in double-slit diffraction of neutrons,” 4 pages.
Physical Review A **75**: 055602 (2007)
<http://arxiv.org/abs/quant-ph/0608021>
37. Roderich Tumulka:
“Determinate Values for Quantum Observables”
British Journal for the Philosophy of Science **58**: 355–360 (2007)
<http://arxiv.org/abs/quant-ph/0605130>
38. Roderich Tumulka:
“Comment on The Free Will Theorem”
Foundations of Physics **37**: 186–197 (2007)
<http://arxiv.org/abs/quant-ph/0611283>
39. Detlef Dürr, Sheldon Goldstein, James Taylor, Roderich Tumulka, and Nino Zanghì:
“Quantum Mechanics in Multiply-Connected Spaces”
Journal of Physics A: Mathematical and Theoretical **40**: 2997–3031 (2007)
<http://arxiv.org/abs/quant-ph/0506173>
40. Roderich Tumulka:
“The ‘Unromantic Pictures’ of Quantum Theory”
Journal of Physics A: Mathematical and Theoretical **40**: 3245–3273 (2007)
<http://arxiv.org/abs/quant-ph/0607124>

41. Roderich Tumulka:
 “A relativistic version of the Ghirardi–Rimini–Weber model”
Journal of Statistical Physics **125**: 821–840 (2006)
<http://arxiv.org/abs/quant-ph/0406094>.
42. Sheldon Goldstein, Joel L. Lebowitz, Roderich Tumulka, and Nino Zanghì:
 “On the Distribution of the Wave Function for Systems in Thermal Equilibrium”
Journal of Statistical Physics **125**: 1193–1221 (2006)
<http://arxiv.org/abs/quant-ph/0309021>
43. Samuel Colin, Thomas Durt, and Roderich Tumulka:
 “On Superselection Rules in Bohm–Bell Theories”
Journal of Physics A: Mathematical and General **39**: 15403–15419 (2006)
<http://arxiv.org/abs/quant-ph/0509177>
44. Detlef Dürr, Sheldon Goldstein, James Taylor, Roderich Tumulka, and Nino Zanghì:
 “Topological Factors Derived From Bohmian Mechanics”
Annales Henri Poincaré **7**: 791–807 (2006)
<http://arxiv.org/abs/quant-ph/0601076>
 Reprinted as chapter 8 in D. Dürr, S. Goldstein, and N. Zanghì: *Quantum Physics Without Quantum Philosophy*, Berlin: Springer-Verlag (2013)
45. Roderich Tumulka:
 “On Spontaneous Wave Function Collapse and Quantum Field Theory”
Proceedings of the Royal Society A **462**: 1897–1908 (2006)
<http://arxiv.org/abs/quant-ph/0508230>
46. Sheldon Goldstein, Joel L. Lebowitz, Roderich Tumulka, and Nino Zanghì:
 “Canonical Typicality,” 4 pages.
Physical Review Letters **96(5)**: 050403 (2006)
<http://arxiv.org/abs/cond-mat/0511091>
47. Roderich Tumulka:
 “The Analogue of Bohm–Bell Processes on a Graph”
Physics Letters A **348(3-6)**: 126–134 (2005)
<http://arxiv.org/abs/quant-ph/0508109>
48. Jonathan Barrett, Matthew Leifer, and Roderich Tumulka:
 “Bell’s Jump Process in Discrete Time”
Europhysics Letters **72**: 685–690 (2005)
<http://arxiv.org/abs/quant-ph/0506066>

49. Roderich Tumulka and Nino Zanghì:
“Smoothness of Wave Functions in Thermal Equilibrium,” 12 pages.
Journal of Mathematical Physics **46**: 112104 (2005)
<http://arxiv.org/abs/math-ph/0509028>
50. Roderich Tumulka:
“Feynman’s Path Integrals and Bohm’s Particle Paths”
European Journal of Physics **26**: L11–L13 (2005)
<http://arxiv.org/abs/quant-ph/0501167>
51. Stefan Teufel and Roderich Tumulka:
“Simple Proof for Global Existence of Bohmian Trajectories”
Communications in Mathematical Physics **258** 349–365 (2005)
<http://arxiv.org/abs/math-ph/0406030>
52. Hans-Otto Georgii and Roderich Tumulka:
“Global Existence of Bell’s Time-Inhomogeneous Jump Process for Lattice Quantum Field Theory”
Markov Processes and Related Fields **11**: 1–18 (2005)
<http://arxiv.org/abs/math.PR/0312294>
53. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“Bell-Type Quantum Field Theories”
Journal of Physics A: Mathematical and General **38**: R1–R43 (2005)
<http://arxiv.org/abs/quant-ph/0407116>
54. Sheldon Goldstein, James Taylor, Roderich Tumulka, and Nino Zanghì:
“Are all particles identical?”
Journal of Physics A: Mathematical and General **38**: 1567–1576 (2005)
<http://arxiv.org/abs/quant-ph/0405039>
55. Sheldon Goldstein, James Taylor, Roderich Tumulka, and Nino Zanghì:
“Are all particles real?”
Studies in History and Philosophy of Modern Physics **36** 103–112 (2005)
<http://arxiv.org/abs/quant-ph/0404134>
56. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“On the Role of Density Matrices in Bohmian Mechanics”
Foundations of Physics **35**: 449–467 (2005)
<http://arxiv.org/abs/quant-ph/0311127>
57. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“Quantum Hamiltonians and Stochastic Jumps”
Communications in Mathematical Physics **254**: 129–166 (2005)
<http://arxiv.org/abs/quant-ph/0303056>

58. Roderich Tumulka:
 “Understanding Bohmian Mechanics: A Dialogue”
American Journal of Physics **72(9)**: 1220–1226 (2004)
<http://arxiv.org/abs/quant-ph/0408113>
59. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
 “Bohmian Mechanics and Quantum Field Theory,” 4 pages.
Physical Review Letters **93**: 090402 (2004)
<http://arxiv.org/abs/quant-ph/0303156>
 Reprinted as chapter 10 in D. Dürr, S. Goldstein, and N. Zanghì: *Quantum Physics Without Quantum Philosophy*, Berlin: Springer-Verlag (2013)
60. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
 “Trajectories and Particle Creation and Annihilation in Quantum Field Theory”
Journal of Physics A: Mathematical and General **36**: 4143–4149 (2003)
<http://arxiv.org/abs/quant-ph/0208072>
61. Sheldon Goldstein and Roderich Tumulka:
 “Opposite Arrows of Time Can Reconcile Relativity and Nonlocality”
Classical and Quantum Gravity **20**: 557–564 (2003)
<http://arxiv.org/abs/quant-ph/0105040>
62. Roderich Tumulka:
 “Comment on “Time-like flows of energy-momentum and particle trajectories for the Klein-Gordon equation””
Journal of Physics A: Mathematical and General **35**: 7961–7962 (2002)
<http://arxiv.org/abs/quant-ph/0202140>

Encyclopedia articles.

63. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
 “Bohmian Mechanics” (7 pages)
 Roderich Tumulka:
 “POVM” (5 pages), “Trace”, “Pauli spin matrices”, and other entries
 In Friedel Weinert, Daniel Greenberger, and Klaus Hentschel (editors), *Compendium of Quantum Physics*, Springer-Verlag (2009).
64. Detlef Dürr, Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
 “Bohmian Mechanics” (8 pages)
 “David Bohm” (2 pages)
 “John Bell and Bell’s Theorem” (6 pages)
 In D. M. Borchert (editor), *Encyclopedia of Philosophy, Second Edition*. Macmillan Reference USA (2006).

65. Roderich Tumulka:
“Quantenmechanik”, “Schrödingers Katze”, “Maxwell–Boltzmann-Statistik”,
“Stern–Gerlach-Experiment”, “Soliton”, “Wellengleichung” and other entries
in the area of physics (all in German).
In *Microsoft Encarta*, CD-ROM encyclopedia, German editions 2000–2002.

Book chapters and proceedings.

66. Sheldon Goldstein, Ward Struyve, and Roderich Tumulka:
“The Bohmian Approach to the Problems of Cosmological Quantum Fluctua-
tions,” 24 pages.
To appear in A. Ijjas and B. Loewer (editors), *Guide to the Philosophy of Cos-
mology*, Oxford University Press (2016)
<http://arxiv.org/abs/1508.01017>
(This article was “the most often viewed article from the Rutgers math depart-
ment” on researchgate.net during the week ending 23 August 2015.)
67. Roderich Tumulka:
“The Assumptions of Bell’s Proof,” 13 pages.
Pages 79–90 in M. Bell and S. Gao (editors), *Quantum Nonlocality and Reality
– 50 Years of Bell’s Theorem*, Cambridge University Press (2016)
<http://arxiv.org/abs/1501.04168>
68. Stefan Teufel and Roderich Tumulka:
“Avoiding Ultraviolet Divergence by Means of Interior–Boundary Conditions”
Pages 293–311 in F. Finster, J. Kleiner, C. Röken, and J. Tolksdorf (editors),
Quantum Mathematical Physics – A Bridge between Mathematics and Physics.
Basel: Birkhäuser (2016)
<http://arxiv.org/abs/1506.00497>
69. Roderich Tumulka:
“Two Arrows of Time in Nonlocal Particle Dynamics”
Pages 57–62 in: S. Albeverio and Ph. Blanchard (editors), *The Direction of
Time*, Springer-Verlag (2014). (Proceedings of a conference at Bielefeld, Ger-
many, 13–18 January 2002.)
<http://arxiv.org/abs/quant-ph/0210207>
70. Sheldon Goldstein and Roderich Tumulka:
“On the Approach of Macroscopic Quantum Systems to Thermal Equilibrium”
Pages 155–163 in P. L. Garrido, J. Marro, F. de los Santos (editors), *Non-
Equilibrium Statistical Physics Today: Proceedings of the 11th Granada Sem-
inar on Computational and Statistical Physics* (La Herradura, Spain, 13–17
September 2010), AIP Conference Proceedings **1332**, Melville, NY: American
Institute of Physics (2011).

71. Sheldon Goldstein, Roderich Tumulka, and Nino Zanghì:
“Bohmian Trajectories as the Foundation of Quantum Mechanics”
Pages 1–15 in P. Chattaraj (editor), *Quantum Trajectories*, Boca Raton: Taylor & Francis (2010).
<http://arxiv.org/abs/0912.2666>
72. Martin Daumer, Detlef Dürr, Sheldon Goldstein, Tim Maudlin, Roderich Tumulka, and Nino Zanghì:
“The Message of the Quantum?”
Pages 129–132 in A. Bassi, D. Dürr, T. Weber, N. Zanghì (editors), *Quantum Mechanics: Are there Quantum Jumps? and On the Present Status of Quantum Mechanics*, AIP Conference Proceedings **844**. (Proceedings of a conference at Mali Losinj, Croatia, 7-9 September 2005.) American Institute of Physics (2006).
<http://arxiv.org/abs/quant-ph/0604173>
73. Roderich Tumulka:
“Collapse and Relativity”
Pages 340–352 in A. Bassi, D. Dürr, T. Weber, N. Zanghì (editors), *Quantum Mechanics: Are there Quantum Jumps? and On the Present Status of Quantum Mechanics*, AIP Conference Proceedings **844**. (Proceedings of a conference at Mali Losinj, Croatia, 7-9 September 2005.) American Institute of Physics (2006).
<http://arxiv.org/abs/quant-ph/0602208>
74. Hans-Otto Georgii and Roderich Tumulka:
“Some Jump Processes in Quantum Field Theory”
Pages 55–73 in J.-D. Deuschel and A. Greven (editors), *Interacting Stochastic Systems*, Berlin: Springer-Verlag (2004).
<http://arxiv.org/abs/math.PR/0312326>

Book reviews.

75. Roderich Tumulka and Nino Zanghì:
“John Bell Across Space and Time”
American Scientist **91(5)**: 461–462 (2003)
<http://arxiv.org/abs/quant-ph/0309020>