Curriculum Vitae for Prof. Mag. Dr. Wolfgang Dür

Personal details

Date of Birth: 25.10.1973
Place of Birth: Innsbruck, Austria
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Research overview

Publications in refereed journals:	>160 (>40 in Phys.Rev.Lett., Nature, Nature Physics)
Citations:	>26500 (Google scholar), h-Index 66
Book contributions/Proceedings:	10
Talks at conferences/workshops	>25

Research Interest

Quantum networks
Quantum metrology
Measurement-based quantum computation
Decoherence and large-scale entanglement
Quantum information theory and multipartite entanglement
Didactic of physics

Scientific education

1993- 1998	Undergraduate studies in physics at the University of Innsbruck
1995 -2000	Undergraduate studies in physics & mathematics (high school teacher education) at the University of Innsbruck
1998 - 2001	Graduate studies in physics at the University of Innsbruck

Career History

1998 – 2001	Scientific staff at ITP, University of Innsbruck, Austria, with I. Cirac
2000 – 2001	High school teacher (1/2 position) at HTL Innsbruck, Austria
2001	Promotion sub. ausp. praes., University Innsbruck, Austria
2001 – 2003	Scientific staff (PostDoc) at University of Munich, Germany
2003 – 2005	Scientific staff (PostDoc) at ITP, University of Innsbruck, Austria
2005 - 2009	Senior Scientist IQOQI (Innsbruck, Austria), group of H.J Briegel
2008	Habilitation at University of Innsbruck
2009-2011	Ass. Prof. at ITP, University of Innsbruck; responsible for teacher education
Since 2011	Associate Professor at ITP, University of Innsbruck; responsible for teacher education
Since 2023	Full professor at ITP, University of Innsbruck, head of Quantum communication and quantum networks group

Fellowship and Awards:

2001	Würdigungspreis des Bundesministeriums für BWK Austria
2001-2003	Marie-Curie individual fellowship of the European Union
2003-2005	APART fellowship of Austrian Academy of Sciences
2007	Felix Kuschenitz award 2007 of Austrian Academy of Sciences
2009	Outstanding referee award of the American Physical Society
2010	Number 12 in world-wide ranking “Quantum computer 1999 – 2010” - category “Citations/Paper“ - see http://archive.sciencewatch.com/ana/st/quantum/authors/

Projects

2005-2011	Participation in EU projects PROSECCO,QUPRODIS, SCALA, QICS, NAMEQUAM, national partner in FWF project "Entanglement purification as a fundamental tool in quantum information processing"
2005-2008	workpackage leader and associate partner in EU project "Optical Lattices and Quantum Information (OLAQUI)"
2005–2008	Project leader of FWF project 'Classical and quantum simulation of quantum systems'
2008-2012	Project leader of FWF project "Simulation of strongly correlated systems"
2009-2012	co-PI of project P12 "Measurement-based quantum computation" in SFB FOQUS
2012-2016	Project leader of FWF project "Large scale entanglement"
Since 2014	Leader of Regional Educational Competence Centre Physik West
2015-2019	Project leader of FWF project "Hybrid quantum information processing under noise"
2018-2022	Project leader of FWF project "Quantum communication networks: design and applications"
2021-2024	Erasmus+ project "Quantum teaching"
Since 2022	Project leader of FWF project "Limits and potential of distributed quantum metrology"
Since 2022	Project leader of FWF project "Quantum- and classical simulation of quantum networks"
Since 2023	PI at core project "Optimal quantum sensors & quantum sensing networks", Excellence Cluster QuantA
Since 2024	PI of FFG project "Quantum simulation of quantum networks"
Since 2024	PI of FFG project "Multi state logic in cluster state quantum computing"

Referee activities

Outstanding referee award of American Physical Society, 2009
referee activities for following journals: Nature Physics, Nature Photonics, Physical Review Letters (PRL), Physical Review A (PRA), New Journal of Physics (NJP), Journal Physics A – Mathematical and Theoretical , Quantum Information and Computation, Phys. Lett. A, Quantum Information and Computation, njp Quantum Information, PRX, Quantum

Peer Review of project proposals for EPSRC (Research Councils UK), Estonian Research Council, Swiss National Science Fund, European Research Council, Slovak Academy of Sciences, Foundation for Polish Science

Selected international cooperations

Prof. Christine Muschik, University of Waterloo, Canada
Dr. Pavel Sekatski, GAP, University of Geneva, Switzerland
Prof. Nicolas Sangouard, Paris Sacley, France
Prof. Luca Dellantonio, University of Exeter, UK
Prof. Stefan Heusler, Münster, Germany (Didactics of Physics)
Prof. Kim Splittorff, NBI Kopenhagen, Denmark
Prof. Nicolas Gisin, GAP, University of Geneva, Switzerland
Prof. Robert Raussendorf, University of British Columbia, Vancouver, Canada
Prof. Jens Eisert, Berlin, Germany
Dr. Sabine Wölk, DLR Ulm, Germany
Prof. Michalis Skotiniotis, Granada, Spain

Invited talks and Seminar talks

- 12/1998, ``Quantum Repeaters''
  Seminar talk at ``Treffen QIKI'', Karlsruhe, Germany, 22/12/1998
- 05/1999, ``Separability and distillability of multiparticle quantum systems''
  Talk at SFB meeting, Innsbruck, 28/05/1999
- 07/1999, ``Separability and distillability of multiparticle quantum systems''
  Invited talk at ``Complexity, Computation and the Physics of Information'', Cambridge, U.K.; 13/07/1999
- 04/2000 `` Activating bound entanglement in multiparticle systems''
  Talk at University Barcelona, Spain,13/04/2000
- 05/2000, ``Activating bound entanglement in multiparticle systems''
  talk at Hewlett Packard, BRIMS, Bristol, 10/05/2000,
- 07/2000, “Multipartite entanglement and optimal entanglement production”
  Talk at ``Workshop on Quantum Information'', Benasque Center for Science, Spain; 04/07/2000
- 01/2001, ``Non-local operations''
  talk at Ludwig-Maximilians-University Munich, Institute for Theoretical Physics,
- 12/2001, ``Entanglement properties of physical actions''; Invited talk at “Quantum Entropies: Information and Dynamics”, S.I.S.S.A, Trieste, Italy,12/12/2001
- 05/2002, ``Universal simulation of quantum dynamics with quantum optical systems''
  Talk at Max Planck Institute for Quantum Optics, Garching, Germany, 15/05/2002
- 01/2003, ``Quantum Information Theory meets Quantum Optics - recent developments and future perspectives''; invited presentation talk, Innsbruck, Austria, 23/01/2003
- 02/2003, ``Entanglement purification for quantum computation''
  Talk at Mini-Symposium MPQ-LMU, Garching, Germany, 04/02/2003
- 06/2003, ``Stability of macroscopic entanglement under decoherence''; talk at ``Workshop on Quantum Information'', Benasque Center for Science, Spain
- 12/2003, ``Multiparticle Entanglement'', Invited tutorial talk at “IQING”, Max Planck Institute for Quantum Optics, Garching, Germany, 02/12/2003
- 09/2004, “Graph states - stability under decoherence, entanglement purification and possible applications”, invited talk at “Quantum Information Science – special week on quantum cryptography”, Newton Institute, Cambridge, UK
- 03/2005, “Entanglement in spin chains and spin gases”,
  Invited talk at “Quantum Optics Conference”, Obergurgl, Austria
- 10/2005, “Quantum Repeater”, Invited talk at Colloque thématique du GdR, “Communication Quantique”, Thales research center, Palaiseau, France, 19/10/2005
- 02/2006, “Entanglement as a resource for distributed secure application”, Talk at QIPC Cluster review 06, Henry Poincare Institute, Paris, France, Review of PROSECCO
- 02/2006, “Entanglement in many body systems,”, public presentation of QUPRODIS project, QIPC Cluster review 06, Henry Poincare Institute,Paris, France
- 05/2006, “Entanglement in many-body systems”
  Invited talk at “Gordon research conference on Quantum Information Science”, Barga, Italy
- 02/2007, “Quantum Repeaters & applications”
  Invited talk at “QUROPE winter school on quantum information”, Obergurgl, Austria
- 03/2007, “Classical simulation of strongly correlated systems”, Invited talk at “Quantum Information and Many-Body Quantum Systems”, Centro De Giorgi, Pisa, Italy
- 06/2007, “Novel ideas & concepts for measurement based quantum computation” and “Graph states and one-way quantum computation”, talks at “Quantum Information”, Benasque Center for Science, Benasque, Spain

- 01/2008, Graph states and one-way quantum computation, SFB Colloquium, Innsbruck, Austria
- 01/2009, Measurement-based Quantum Computation - recent developments and future perspectives, SFB Conference, Innsbruck, Austria
- 06/2009, Unifying all classical spin systems in a lattice gauge theory, Workshop on “Quantum Information”, Benasque, Spain
- 03/2010, Quanteninformationstheorie – ein Thema für den Schulunterricht, eingeladener Hauptvortrag (Fachbereich Didaktik der Physik), DPG Frühjahrstagung 2010, Hannover, Germany
- 02/2011: „Stable macroscopic quantum superpositions“, Max Planck Institut für Quantenoptik, Garching, Germany (Seminar talk)
- 05/2011: “Stable macroscopic quantum superpositions”, invited talk at Workshop “Entanglement, Quantum Information and the Quantum to Classical Transition”, Accademia dei Lincei, Rome, Italy
- 10/2011: "Quanteninformation als Einstieg in die Quantenphysik", invited talk at DPG Lehrerfortbildung "Quantenphysik", Bad Honnef, Germany
- 02/2013 „Small-scale measurement-based processors for error correction & entanglement purification”, Seminar talk, MPQ Garching
- 04/2013: „Measurement based quantum computation and statistical mechanics“, colloquium talk, University of Münster, Germany
- 06/2013: „Macroscopicity of quantum spin systems“, invited talk at Quantum Theory: Advances and Problems - QTAP, Linnaeus University, Växjö, Sweden
- 07/2013: “Quantum metrology beyond the standard scenario”, Seminar talk, Workshop “Quantum Information”, Benasque, Spain
- 02/2014: “Measurement-based quantum information processing with high error thresholds”, invited talk at “Quantum optics 2014” conference, Obergurgl, Austria
- 03/2015: “Measurement-based quantum information processing with high error thresholds”, seminar talk, group of applied physics (GAP), University of Geneva, Switzerland
- 07/2015: “Quanteninformation – von den Wesenszügen der Quantenphysik bis zur aktuellen Forschung”, invited talk at DPG Lehrerfortbildung „Quanteninformation”, Bad Honnef, Germany
- 09/2015: “Visualizing the invisible: The qubit as a key to quantum physics”, talk at Multimedia Physics teaching and Learning (MPTL), Munich, Germany
- 09/2015: "Ultimate limits in quantum metrology", seminar talk, University of Basel, Switzerland
- 02/2016: “Visualisierung des Unsichtbaren: Das Qubit als Schlüssel zur Quantenphysik”, talk at DPG spring meeting, Hannover, Germany
- 07/2016: “Macroscopic quantum states“, Seminar talk, Workshop “Quantum Science: Implemenations”, Benasque, Spain
- 07/2016: “Measurement-based quantum information processing and quantum metrology”, Seminar talk, Workshop “Quantum Science: Implemenations”, Benasque, Spain
- 09/2017: “Limitations to detect macroscopic quantum superpositions”, invited talk, Quantum Optics IX conference, Gdansk, Poland
- 09/2017: “Scaling of resources for different repeater protocols”, invited talk, 2nd workshop for Quantum Repeaters and Networks, Seefeld, Austria
- 03/2018: “Limitations to detect macroscopic quantum superpositions”, talk at "Quantum optics 2018" conference, Obergurgl, Austria
- 07/2018: “Macroscopic quantum states: measures and limitations to detect them”, Seminar talk, Workshop “Quantum Science: Implemenations”, Benasque, Spain
- 04/2019: "Macroscopic quantum states: applications and fundamental limitations", Colloquium talk, DQ-mat, University Hannover, Germany. https://www.dq-mat.uni-hannover.de/de/news-veranstaltungen/jour-fixe/
- 09/2019 “Influence of noise on quantum metrology (and ways around)”, talk at “Quantum Simulation”, ESI Vienna, Austria
- 09/2019 “Entangle me! Grundprinzipien der Quantenphysik spielerisch demonstriert“, talk at GDCP Jahrestagung 2019, Vienna, Austria

- 11/2019 „Quantum information: from principles of quantum mechanics to latest research and technologies“ invited talk at Gulbenkian Programme New Talents in Quantum Technologies. School: Introduction to Quantum Technologies, Lisbon, Portugal, 23.11.2019
- 11/2019 "Macroscopic quantum states: applications and fundamental limitations", Seminar talk, Physics of Information and Quantum Technologies Group, Lisbon, Portugal
- 02/2021 “Genuine quantum networks – superposed tasks”, invited talk at SFB-BeyondC meeting, Garching, Germany 17.2.2021 (online).
- 09/2021 “Genuine and optimized entanglement-based quantum networks”, invited talk at Quantum Internet research Group, IRTF, Online (22.9.2021)
- 12/2021 “Genuine and optimized entanglement-based quantum networks”, invited talk at Quantum Innovation 2021, Tokyo, Japan & Online (8.12.2021)
- 09/2022 “Entanglement-based quantum networks”, invited talk at Measurement-based quantum computation, learning and agency, Obergurgl, Austria (2.9.2022)
- 02/2023 “Entanglement-based quantum networks”, seminar talk at GAP, University of Geneva, Switzerland (7.2.2023)
- 02/2023 “Entanglement-based quantum networks”, Seminar talk, Niels-Bohr-Institute, University of Copenhagen, Denmark (23.2.2023)
- 05/2023 “Superposition of quantum processes”, invited talk at QSAIL23, Elba, Italy
- 11/2023 “Quantum and classical simulation of quantum networks”, talk at „Forum Schlüsseltechnologien: Industrielle Anwendungen von Quantentechnologie“, Vienna, Austria
- 03/2024 „Modular computational architecture based on locally controlled logical systems”, hot topic talk at Quantum Optics Conference, Obergurgl, Austria (1.3.2024)
- 11/2024 “Quantum networks utilizing multipartite entanglement”, invited talk at European Quantum Technologies Conference (EQTC 2024), Lisbon, Portugal (19.11.2024)
- 07/2025 “Improved quantum sensing by spectral design”, seminar talk at workshop on Quantum Information, Benasque, Spain (3.7.2025)

Teacher education & public outreach

- 01/2008, “Quanteninformation und Quantencomputer – ein neuer Zugang zur Quantenmechanik für den Schulunterricht”, presentation for high school teachers – Fortbildung: Quantencomputer, Innsbruck, Austria
- 03/2008, “Quantum Information and Quantum Computation”, Presentation for high school students and teachers, High school student workshop (Trient/Innsbruck), Innsbruck, Austria
- 11/2008, “Didaktik der Quantenphysik im Schulunterricht”, Presentation for high school teachers – Fortbildung, Innsbruck, Austria
- 1/2009, „Einführung in die Quantenphysik und aktuelle Forschung“, presentation for high school teachers – Fortbildung, PH Niederösterreich, St. Pölten, Austria
- 11/2009, Haben kleinste Teilchen tatsächlich so seltsame Eigenschaften?, public lecture for high school students, Aktionstag Junge Uni 2009, Universität Innsbruck
- 11/2009, Was hat es mit den Quanten und ihren Sprüngen auf sich?, public lecture, Lange Nacht der Forschung 2009, Universität Innsbruck
- 11/2010, Teleportation – Traum oder Wirklichkeit?, public lecture for high school students, Aktionstag Junge Uni 2010, Universität Innsbruck
- 11/2010, Der Quantencomputer, public evening lecture, Uni.com Programm, Volkshochschule Innsbruck & Universität Innsbruck
- 12/2010, Grundzüge der Quantenphysik, public lecture for high-school students, Paulinum Schwaz
- 1/2011, „Quantenphysik in der Schule“, presentation for high school teachers – Fortbildung (AHS/BHS Lehrer), PH Vorarlberg, Bundesrealgymnasium Dornbirn

- 4/2011, Einführung Quantenphysik, presentation for teachers – Fortbildung (Landesarbeitsgemeinschaft Hauptschullehrer Physik), University of Innsbruck
- 11/2011, Fernwirkung und Teleportation, public evening lecture, Uni.com Programm „"Physik als Grundlage von Zukunftstechnologien: Vom künstlichen Ohr über die Klimaforschung bis zum Quantencomputer",
  Volkshochschule Innsbruck & Universität Innsbruck
- 11/2011, Teleportation – Traum oder Wirklichkeit?, public lecture for high school students, Aktionstag Junge Uni 2011, Universität Innsbruck
- 11/2012, Teleportation – Traum oder Wirklichkeit?, public lecture for high school students, Aktionstag Junge Uni 2012, Universität Innsbruck
- 11/2013, Der Quantencomputer – die Rechenmaschine der Zukunft?, Aktionstag Junge Uni 2013, Universität Innsbruck
- 05/2016, Quantenteleportation und Quantenkommunikation - auf dem Weg zum Quanteninternet, Vortrag bei "A Pint of Science", Das Nax, Innsbruck.
- 01/2018, „Auf dem Weg zum Quanteninternet“, presentation for high school teachers – Fortbildung (AHS/BHS Lehrer), Innsbruck, Austria
- 04/2018, „Ein Kontextorientierter Zugang zur Quantenphysik“, presentation for high school teachers from Salzburg, Innsbruck, Austria
- 11/2019, „Selbständiges Arbeiten im Physikunterricht mit kompetenzfördernden Lernaufgaben“, presentation for high school teachers – Fortbildung (NMS Lehrer), NMS Rum, Austria
- 11/2023, „Quantum communication and teleportation – towards a quantum internet”, talk for high-school students from Austria, Denmark and Netherland within Erasmus+ Quantum Teaching project, Innsbruck, Austria

Organization of conferences & events

- 09/2008 QICS Workshop on "Foundational Structures for Quantum Information and Computation", Obergurgl, Austria, local organization team
- 09/2009, Annual meeting of Austrian Physical Society, Swiss Physical Society and Austrian Society for Astronomy and Astrophysics, University of Innsbruck, scientific program coordination
- 02/2011, SFB Kolloquium, Innsbruck, Austria
- 10/2011, “LehrerInnen und Schülertag”, Week of Physics, Innsbruck, Austria
  (public event for 500 pupil)
- 3/2012, “Day of physics”, Innsbruck, Austria (public event for 180 pupil)
- 07/2012, 1st workshop on “Quantum Information”, Seefeld, Austria
- 09/2012, Quantum Information and Statistical mechanics, Innsbruck, Austria – local organization
- 2/2013, “Day of physics”, Innsbruck, Austria (public event for 300 pupil)
- 2/2014, “Day of physics”, Innsbruck, Austria (public event for 500 pupil)
- 07/2014, 2nd workshop on “Quantum Information”, Seefeld, Austria
- 02/2015, “Day of physics”, Innsbruck, Austria (public event for 300 pupil)
- 02/2016, “Day of physics”, Innsbruck, Austria (public event for 400 pupil)
- 07/2016, 3rd workshop on “Quantum Information”, Seefeld, Austria
- 07/2018, 4th workshop on “Quantum Information”, Seefeld, Austria
- 07/2020, 5th workshop on “Quantum Information”, Seefeld, Austria – cancelled due to Covid-19
- 07/2022, 5th workshop on “Quantum Information”, Seefeld, Austria
- 08/2022, Measurement-based quantum computation, learning and agency, Obergurgl, Austria

Publications

October 2025, total citations >26500, h-Index: 66; i10 Index: 149 (Google Scholar)

Letters

1. H.-J. Briegel, W. Dür, J. I. Cirac, and P. Zoller,
   Phys. Rev. Lett. 81, 5932 (1998).
   ``Quantum repeaters: The role of imperfect local operations in quantum communication''

2. W. Dür, J. I. Cirac, and R. Tarrach,
   Phys. Rev. Lett. 83, 3562 (1999).
   ``Separability and distillability of multiparticle quantum systems''

3. G. Vidal, W. Dür and J. I. Cirac,
   Phys. Rev. Lett. 85, 658 (2000).
   ``Reversible transformation of inequivalent kinds of multipartite entanglement'',

4. A. Acin, E. Jane, W. Dür and G. Vidal,
   Phys. Rev. Lett. 85, 4811 (2000).
   ``Optimal distillation of a GHZ state ''

5. J. I. Cirac, W. Dür, B. Kraus and M. Lewenstein,
   Phys. Rev. Lett. 86, 544 (2001).
   ``Entangling operations and their implementation using a small amount of entanglement''

6. W. Dür , G. Vidal, J. I. Cirac, N. Linden and S. Popescu,
   Phys. Rev. Lett. 87, 137901 (2001).
   ``Entanglement capabilities of non--local Hamiltonians ''

7. W. Dür,
   Phys. Rev. Lett. 87, 230402 (2001).
   ``Multipartite bound entangled states that violate Bell's inequality''

8. G. Vidal, W. Dür and J. I. Cirac,
   Phys. Rev. Lett. 89, 027901 (2002).
   ``Entanglement cost of bipartite mixed states''

9. W. Dür , G. Vidal and J. I. Cirac,
   Phys. Rev. Lett. 89, 057901 (2002).
   ``Optimal conversion of non--local unitary operations'',

10. W. Dür, C. Simon and J. I. Cirac,
    Phys. Rev. Lett. 89, 210402 (2002).
    ``On the effective size of certain macroscopic superpositions''

11. W. Dür and H.-J. Briegel,
    Phys. Rev. Lett. 90, 067901 (2003).
    ``Entanglement purification for quantum computation''

12. T. S. Cubitt, F. Verstraete, W. Dür and J. I. Cirac,
Phys. Rev. Lett. 91, 037902 (2003).
``Separable states can be used to distribute entanglement''

13. W. Dür, H. Aschauer and H.-J. Briegel,
Phys. Rev. Lett. 91, 107903 (2003).
``Multiparticle entanglement purification for graph states''

14. W. Dür and H.-J. Briegel,
Phys. Rev. Lett. 92, 180403 (2004).
``Stability of macroscopic entanglement under decoherence''

15. W. Dür, P. Horodecki and J. I. Cirac,
Phys. Rev. Lett. 93, 020503 (2004).
``Non-additivity of quantum capacity for multiparty communication channels''

16. W. Dür, L. Hartmann, M. Hein, M. Lewenstein and H.-J. Briegel,
Phys. Rev. Lett. 94, 097203 (2005).
``Entanglement in spin chains and lattices with long range Ising-type interactions''

17. J. M. Taylor, W. Dür, P. Zoller, A. Yacoby, C. M. Marcus, and M. D. Lukin,
Phys. Rev. Lett. 94, 236803 (2005).
``Solid-state circuit for spin entanglement generation and purification''

18. J. Calsamiglia, L. Hartmann, W. Dür and H.-J. Briegel,
Phys. Rev. Lett. 95, 180502 (2005).
``Spin gases: Quantum entanglement driven by classical kinematics''

19. H. Häffner, W. Hänsel, C. F. Roos, J. Benhelm, D. Chek-al-kar, M. Chwalla, T. Körber, U. Rapol, M. Riebe, P.O. Schmidt, C. Becher, O. Gühne, W. Dür, and R. Blatt,
Nature 438, 643 (2005).
`` Scalable multi-particle entanglement of trapped ions”

20. S. Anders, M. B. Plenio, W. Dür, F. Verstraete, and H.-J. Briegel,
Phys. Rev. Lett. 97, 107206 (2006)
``Ground state approximation for strongly interacting systems in arbitrary dimension’’

21. M. Van den Nest, A. Miyake, W. Dür, and H.-J. Briegel,
Phys. Rev. Lett. 97, 150504 (2006).
``Universal resources for measurement-based quantum computation’’

22. M. Van den Nest, W. Dür, and H.-J. Briegel,
Phys. Rev. Lett. 98, 117207 (2007).
``Classical spin models and the quantum stabilizer formalism’’

23. M. Van den Nest, W. Dür and H.-J. Briegel,
Phys. Rev. Lett. 100, 110501 (2008).
``Completeness of the classical 2D Ising model and universal quantum computation’’

24. G. De las Cuevas, W. Dür, H. J. Briegel and M. A. Martin-Delgado,
Phys. Rev. Lett. 102, 230502 (2009).
``Unifying all classical spin models in a Lattice Gauge Theory’’

25. J.-M. Cai, W. Dür, M. Van den Nest, A. Miyake and H.-J. Briegel,
Phys. Rev. Lett. 103, 050503 (2009).
``Quantum computation in correlation space and extremal entanglement''

26. F. Fröwis and W. Dür,
Phys. Rev. Lett. 106, 110402 (2011).
`` Stable Macroscopic Quantum Superpositions''

27. W. Dür and M. Van den Nest,
Phys. Rev. Lett. 107, 170402 (2011).
``Quantum simulation of classical thermal states´´

28. F. Fröwis and W. Dür,
Phys. Rev. Lett. 109, 170401 (2012).
`` Are cloned quantum states macroscopic?''

29. M. Zwerger, H. J. Briegel and W. Dür,
Phys. Rev. Lett. 110, 260503 (2013).
`` Universal and optimal error thresholds for measurement-based entanglement purification''

30. B. P. Lanyon, P. Jurcevic, M. Zwerger, C. Hempel, E. A. Martinez, W. Dür, H. J. Briegel, R. Blatt and C. F. Roos ,
Phys. Rev. Lett. 111, 210501 (2013) (Editors' Suggestion).
`` Measurement-based quantum computation with trapped ions''

31. W. Dür, M. Skotiniotis, F. Fröwis and B. Kraus,
Phys. Rev. Lett. 112, 080801 (2014).
`` Improved quantum metrology using quantum error-correction''

32. B. P. Lanyon, M. Zwerger, P. Jurcevic, C. Hempel, E. A. Martinez, W. Dür, H. J. Briegel, R. Blatt and C. F. Roos,
Phys. Rev. Lett. 112, 100403 (2014) (Editors' Suggestion)
`` Experimental violation of multipartite Bell inequalities with trapped ions''

33. W. Dür, P. Sekatski and M. Skotiniotis,
Phys. Rev. Lett. 114, 120503 (2015).
``Deterministic super-replication of one parameter unitary transformations''

34. F. Fröwis, P. Sekatski and W. Dür,
Phys. Rev. Lett. 116, 090801 (2016).
`` Detecting large quantum Fisher information with finite measurement precision ''

35. P. Sekatski, M. Skotiniotis and W. Dür,
Phys. Rev. Lett. 118, 170801 (2017). https://doi.org/10.1103/PhysRevLett.118.170801
``Improved sensing with a single qubit''

36. M. Zwerger, A. Pirker, V. Dunjko, H.J. Briegel and W. Dür,
Phys. Rev. Lett. 120, 030503 (2018). https://doi.org/10.1103/PhysRevLett.120.030503
`` Long-range big quantum-data transmission ''

37. M. Zwerger, W. Dür, J.-D. Bancal and P. Sekatski
Phys. Rev. Lett. 122, 060502 (2019); https://doi.org/10.1103/PhysRevLett.122.060502
`` Device-independent detection of genuine multipartite entanglement for all pure states ''

38. Ryan R. Ferguson, Luca Dellantonio, Karl Jansen, Abdulrahim Al Balushi, Wolfgang Dür,C.Muschik, Phys. Rev. Lett. 126, 220501 (2021); https://link.aps.org/doi/10.1103/PhysRevLett.126.220501 (Editors' suggestion)
`` Measurement-based variational quantum eigensolver ''

39. Ferran Riera-Sabat, Pavel Sekatski, Alexander Pirker and Wolfgang Dür, Phys. Rev. Lett. 127, 040502 (2021); https://doi.org/10.1103/PhysRevLett.127.040502
`` Entanglement-assisted entanglement purification ''

40. Jorge Miguel-Ramiro, Ferran Riera-Sabat and Wolfgang Dür, Phys. Rev. Lett. 129, 190504 (2022); https://doi.org/10.1103/PhysRevLett.129.190504
`` Collective operations can exponentially enhance quantum state verification ''

41. Jorge Miguel-Ramiro, Zheng Shi, Luca Dellantonio, Albie Chan, Christine A. Muschik, and Wolfgang Dür, Phys. Rev. Lett. 131, 230601 (2023); https://link.aps.org/doi/10.1103/PhysRevLett.131.230601
`` Superposed Quantum Error Mitigation´´

42. Albie Chan, Zheng Shi, Luca Dellantonio, Wolfgang Dür and Christine A. Muschik, Phys. Rev. Lett. 132, 240601 (2024) ; https://doi.org/10.1103/PhysRevLett.132.240601
`` Hybrid variational quantum eigensolvers: merging computational models ´´

43. J. Bate, A. Hamann, M. Canteri, A. Winkler, Z. X. Koong, V. Krutyanskiy, W. Dür and B.P. Lanyon, accepted for publication in Phys. Rev. Lett. (2025), E-print arXiv: 2501.08940 `` Experimental distributed quantum sensing in a noisy environment´´

Refereed papers

44. H.-J. Briegel, W. Dür, S. J. van Enk, J. I. Cirac, and P. Zoller,
Phil. Trans. Roy. Soc. Lond. A 356, 1841-1851 (1998).
``Quantum communication and the creation of maximally entangled pairs of atoms over a noisy channel''

45. W. Dür, H.-J. Briegel, J. I. Cirac, and P. Zoller,
Phys. Rev. A 59, 169-181 (1999), Erratum: Phys. Rev. A 60, 725 (1999).
``Quantum repeaters based on entanglement purification''

46. W. Dür and J. I. Cirac,
Journal of Modern Optics, Vol. 47, No. 2/3, 247-255 (2000).
``Multiparty teleportation''

47. W. Dür and J. I. Cirac,
Phys. Rev. A 61, 042314 (2000).
``Classification of multi--qubit mixed states: separability and distillability properties''

48. W. Dür, J. I. Cirac, M. Lewenstein and D. Bruss,
Phys. Rev. A 61, 062313 (2000).
``Distillability and partial transposition in bipartite systems''

49. W. Dür and J. I. Cirac,
Phys. Rev. A 62, 022302 (2000).
``Activating bound entanglement in multiparticle systems''

50. W. Dür , G. Vidal and J. I. Cirac,
Phys. Rev. A 62, 062314 (2000), https://doi.org/10.1103/PhysRevA.62.062314
selected as 50th anniversary milestone paper, https://journals.aps.org/pra/50th
``Three qubits can be entangled in two inequivalent ways''

51. B. Kraus, W. Dür, G. Vidal, J. I. Cirac, M. Lewenstein, N. Linden and S. Popescu,
Z. Naturforsch. 56a, 91-99 (2001)).
``Entanglement capability of two--qubit operations''

52. W. Dür,
Phys. Rev. A 63, 020303(R) (2001).
``Multipartite entanglement that is robust against disposal of particles ''

53. W. Dür and J. I Cirac,
Phys. Rev. A 64, 012317 (2001).
`` Non--local Operations: Purification, storage, compression, tomography, and probabilistic implementation ''

54. W. Dür , G. Vidal and J. I. Cirac,
Phys. Rev. A 64, 022308 (2001).
``Visible compression of commuting mixed states''

55. W. Dür and J. I Cirac,
Journal of Physics A: Mathematical and General, Vol. 34, 6837-6850 (2001).
``Multiparticle entanglement and its experimental detection''

56. W. Dür and J. I Cirac,
Quant. Inf. Comp., Vol. 2, No. 3, 240-254 (2002).
``Equivalence classes of non-local unitary operations''

57. W. Dür, R. Raussendorf, V. M. Kendon and H.-J. Briegel,
Phys. Rev. A 66, 052319 (2002).
``Quantum walks in optical lattices''

58. E. Jane, G. Vidal, W. Dür, P. Zoller and J. I. Cirac,
Quant. Inf. Comp., Vol. 3, No. 1, 15-37 (2003).
``Simulation of quantum dynamics with quantum optical systems''

59. H. Aschauer, W. Dür and H.-J. Briegel,
Phys. Rev. A 71, 012319 (2005),
``Multiparticle entanglement purification for two-colorable graph states''

60. M. Hein, W. Dür, H. J. Briegel,
Phys. Rev. A 71, 032350 (2005),
``Entanglement properties of multipartite entangled states under the influence of decoherence''

61. W. Dür, J. Calsamiglia and H.-J. Briegel,
Phys. Rev. A 71, 042336 (2005),
``Multipartite secure state distribution''

62. W. Dür, M. Hein, J.I. Cirac and H.-J. Briegel,
Phys. Rev. A 72, 052326 (2005).
``Standard forms of noisy quantum operations via depolarization”

63. J. Calsamiglia, L. Hartmann, W. Dür and H.-J. Briegel,
International Journal of Quantum Information, Vol. 5, No. 4, 509-523 (2007).
``Entanglement and decoherence in spin gases''

64. L. Hartmann, J. Calsamiglia,W. Dür and H.-J. Briegel,
Phys. Rev. A 72, 052107 (2005).
`` Spin gases as microscopic models for non-Markovian decoherence”

65. J. M. Taylor, H.-A. Engel, W. Dür , A. Yacoby, C. M. Marcus, P. Zoller, and M. D. Lukin,
Nature Physics 1, 177 (2005).
`` Fault-tolerant architecture for quantum computation using electrically controlled semiconductor spins”

66. Caroline Kruszynska, Simon Anders, Wolfgang Dür, and Hans J. Briegel,
Phys. Rev. A 73, 062328 (2006).
``Quantum communication cost of preparing multipartite entanglement’’

67. A.Kay, J. Pachos, W. Dür and H.-J. Briegel,
New J. Phys. 8, 147 (2006);
``Optimal purification of thermal graph states’’

68. Caroline Kruszynska, Akimasa Miyake, Hans J. Briegel, and Wolfgang Dür,
Phys. Rev. A 74, 052316 (2006).
``Entanglement purification protocols for all graph states’’

69. L. Hartmann, W. Dür, and H.-J. Briegel,
Phys. Rev. A 74, 052304 (2006).
``Steady state entanglement in open and noisy quantum systems at high temperature''

70. M. Van den Nest, W. Dür, G. Vidal, and H.-J. Briegel,
Phys. Rev. A 75, 012337 (2007).
`Classical simulation versus universality in measurement based quantum computation´

71. L. Hartmann, B. Kraus, H.-J. Briegel and W. Dür,
Phys. Rev. A 75, 032310 (2007).
``On the role of memory errors in quantum repeaters''

72. L. Hartmann, J. Calsamiglia, W. Dür and H.-J. Briegel
J. Phys. B: At. Mol. Opt. Phys. 40, S1-S44 (2007),
`` Weighted graph states in spin chains, spin lattices and spin gases''

73. M. Van den Nest, W. Dür, A. Miyake and H.-J. Briegel,
New J. Phys. 9, 204 (2007).
`` Fundamentals of universality in one-way quantum computation''

74. L. Hartmann, W. Dür and H.-J. Briegel,
New J. Phys. 9, 230 (2007).
`` Entanglement and its dynamics in open, dissipative systems''

75. W. Dür and H.-J. Briegel,
Rep. Prog. Phys. 70, 1381 (2007).
`` Entanglement purification and quantum error correction''

76. S. Anders, H.-J. Briegel and W. Dür,
New J. Phys. 9, 361 (2007).
`` A variatonal method based on weighted graph states''

77. M. Van den Nest, K. Luttmer, W. Dür and H.-J. Briegel,
Phys. Rev. A 77, 012301 (2008).
`` Graph states as ground states of many-body spin-1/2 Hamiltonians''

78. W. Dür, M. Bremner and H.-J. Briegel,
Phys. Rev. A 78, 052325 (2008).
`Quantum simulation of interacting high-dimensional systems: the influence of noise'

79. H. J. Briegel, D.E. Browne, W. Dür, R. Raussendorf and M. Van den Nest
Nature Physics 5, Vol. 1, 19-26 (2009).
`` Measurement-based quantum computation''

80. R. Hübener, C. Kruszynska, L. Hartmann, and W. Dür; F. Verstraete; J. Eisert and M.B. Plenio,
Phys. Rev. A 79, 022317 (2009).
`` Renormalization algorithm with graph enhancement''

81. G. De las Cuevas, W. Dür, M. Van den Nest and H. J. Briegel,
J. Stat. Mech., P07001 (2009).
Completeness of classical spin models and universal quantum computation

82. R. Hübener, M. Van den Nest, W. Dür and H. J. Briegel,
J. Math. Phys. 50, 083303 (2009).
``Classical spin systems and the quantum stabilizer formalism: general mappings and applications´´

83. M. Van den Nest, W. Dür, R. Raussendorf and H.-J. Briegel,
Phys. Rev. A 80, 052334 (2009)
``Quantum algorithms for spin models and simulable gate sets for quantum computation''

84. R. Hübener, V. Nebendahl and W. Dür,
New J. Phys. 12, 025004 (2010).
``Concatenated tensor network states''

85. C. E. Mora, M. Piani, A. Miyake, M. Van den Nest, W. Dür and H. J. Briegel
Phys. Rev. A 81, 042315 (2010).
``Universal resources for approximate and stochastic measurement-based quantum computation''

86. G. De las Cuevas, W. Dür, H. J. Briegel and M. A. Martin-Delgado,
New J. Phys. 12, 043014 (2010).
`` Mapping all classical spin models to a lattice gauge theory''

87. F. Fröwis, V. Nebendahl and W. Dür,
Phys. Rev. A 81, 062337 (2010).
`` Tensor operators - constructions and applications for long-range interaction systems''

88. Jianming Cai, Akimasa Miyake, Wolfgang Dür and Hans J. Briegel,
Phys. Rev. A 82, 052309 (2010).
`` Universal quantum computer from a quantum magnet''

89. Ying Xu, Gemma De las Cuevas, Wolfgang Dür, Hans J. Briegel and Miguel A. Martin-Delgado,
J. Stat. Mech., P02013 (2011).
`` The U(1) Lattice Gauge Theory Universally Connects All Classical Models with Continuous Variables, Including Background Gravity''

90. R.Hübener, C. Kruszynska, L. Hartmann, W. Dür, J. Eisert and M.B. Plenio,
Phys. Rev. B 84, 125103 (2011),
``Tensor network methods with graph enhancement''.

91. G. De las Cuevas, W. Dür, M. Van den Nest and M. A. Martin-Delgado,
New J. Phys. 13, 093021 (2011).
``Quantum algorithms for classical lattice models''

92. F. Fröwis and W. Dür,
Phys. Rev. A 85, 052329 (2012).
`` Stability of encoded macroscopic quantum superpositions''

93. M. Zwerger, W. Dür and H. J. Briegel,
Phys. Rev. A 85, 062326 (2012)
`` Measurement-based quantum repeaters''

94. F. Fröwis and W. Dür
New J. Phys. 14, 093039 (2012)
``Measures of macroscopicity for quantum spin systems''

95. M. Skotiniotis, W. Dür and B. Kraus
Quant. Inf. Comp. Vol. 13, number 3&4, 0290-0323 (2013) (E-print: arXiv: 1204.0891)
`` Efficient quantum communication under collective noise''

96. V. Nebendahl and W. Dür
Phys. Rev. B 87, 075413 (2013)
``Improved numerical methods for infinite spin chains with long-range interactions''

97. Tatjana Carle, Barbara Kraus, Wolfgang Dür and Julio I. de Vicente
Phys. Rev. A 87, 012328 (2013)
`` Purification to Locally Maximally Entangleable States''

98. F. Kesting, F. Fröwis and W. Dür
Phys. Rev. A 88, 042305 (2013)
`` Effective noise channels for encoded quantum states''

99. F. Fröwis, M. Van den Nest and W. Dür
New J. Phys. 15, 113011 (2013)
`` Certifyability criterion for large-scale quantum systems''

100. M. Van den Nest and W. Dür,
Phys. Rev. A 89, 012334 (2014)
`` Exponentially improved classical and quantum algorithms for three-body Ising models´´

101. N. Friis, V. Dunjko, W. Dür and H.J. Briegel
Phys. Rev. A 89, 030303(R) (2014)
`` Implementing quantum control for unknown subroutines''

102. F. Fröwis, M. Skotiniotis, B. Kraus and W. Dür
New J. Phys. 16, 083010 (2014)
`` Optimal quantum states for frequency estimation''

103. M. Zwerger, H. J. Briegel and W. Dür,
Scientific Reports 4, 5364 (2014).
`` Hybrid architecture for encoded measurement-based quantum computation''

104. M. Zwerger, H. J. Briegel and W. Dür
Phys. Rev. A. 90, 012314 (2014)
`` Robustness of hashing protocols for entanglement purification''

105. Stefanie Barz, Rui Vasconcelos, Chiara Greganti, Michael Zwerger, Wolfgang Dür,Hans J. Briegel and Philip Walther
Phys. Rev. A 90, 042302 (2014)
`` Demonstrating elements of measurement-based quantum error correction''

106. M. Skotiniotis, P. Sekatski and W. Dür,
New J. Phys. 17, 073032 (2015)
``Quantum metrology for the Ising Hamiltonian with transverse magnetic field ''

107. N. Friis, M. Skotiniotis, I. Fuentes and W. Dür,
Phys. Rev. A 92, 022106 (2015)
`` Heisenberg scaling in Gaussian quantum metrology ''

108. M. Skotiniotis, F. Fröwis, W. Dür and B. Kraus
Phys. Rev. A 92, 022323 (2015)
`` Algebraic metrology: Nonoptimal but pretty good states and bounds''

109. P. Sekatski, M. Skotiniotis and W. Dür,
Phys. Rev. A 92, 022355 (2015) (Editors' suggestion)
``No-signalling bounds for quantum cloning and metrology''

110. M. Zwerger, H. J. Briegel and W. Dür
Applied Physics B, 122:50, (2016), Special issue: Quantum Repeaters: From Components to Strategies,
`` Measurement-based Quantum Communication''

111. P. Sekatski, M. Skotiniotis and W. Dür,
New J. Phys. 18, 073034 (2016)
`` Dynamical decoupling leads to improved scaling in noisy quantum metrology ''

112. J. Wallnöfer, M. Zwerger, C. Muschik, N. Sangouard, and W. Dür,
Phys. Rev. A 94, 052307 (2016)
``Two dimensional quantum repeaters''

113. P. W. L. Boyajian, M. Skotiniotis, W. Dür and B. Kraus
Phys. Rev. A 94, 062326 (2016)
`` Compressed quantum metrology for the Ising Hamiltonian ''

114. J. Wallnöfer and W. Dür,
Phys. Rev. A 95, 012303 (2017)
``Measurement based quantum communication with resource states generated by entanglement purification''

115. N. Friis, D. Orsucci, M. Skotiniotis, P. Sekatski, V. Dunjko, H.J. Briegel and W. Dür
New J. Phys. 19, 063044 (2017); https://doi.org/10.1088/1367-2630/aa7144
(Selected for "New Journal of Physics (NJP) Highlights of 2017")
`` Flexible resources for quantum metrology ''

116. A. Pirker, J. Wallnöfer, H.J. Briegel and W. Dür,
Phys. Rev. A 95, 062332 (2017); https://doi.org/10.1103/PhysRevA.95.062332
`` Construction of optimal resources for concatenated quantum protocols ''

117. M. Zwerger, B. P. Lanyon, T. E. Northup, C. A. Muschik, W. Dür and N. Sangouard
Quantum Science and Technology 2, Number 4, 044001 (2017).
https://doi.org/10.1088/2058-9565/aa7983
``Quantum repeaters based on trapped ions with decoherence free subspace encoding''

118. A. Pirker, V. Dunjko, W. Dür and H.J. Briegel
New J. Phys 19, 113012 (2017); https://doi.org/10.1088/1367-2630/aa8086
`` Entanglement generation secure against general attacks ''

119. P. Sekatski, M. Skotiniotis, J. Kolodynski and W. Dür,
Quantum 1, 27 (2017); https://doi.org/10.22331/q-2017-09-06-27
``Quantum metrology with full and fast quantum control''

120. M. Skotiniotis, W. Dür and P. Sekatski,
Quantum 1, 34 (2017); https://doi.org/10.22331/q-2017-11-21-34
``Macroscopic superpositions require tremendous measurement devices''

121. P. Sekatski, B. Yadin, M.-O. Renou, W. Dür, N. Gisin and F. Fröwis,
New J. Phys 20, 013025 (2018); https://doi.org/10.1088/1367-2630/aa84de,
``General measure for macroscopic quantum states beyond "dead and alive''

122. F. Fröwis, P. Sekatski, W. Dür, N.Gisin and N. Sangouard,
Rev. Mod. Phys. 90, 025004 (2018), https://doi.org/10.1103/RevModPhys.90.025004
``Macroscopic quantum states: measures, fragility and implementations''

123. A. Pirker, J. Wallnöfer and W. Dür,
New J. Phys. 20, 053054 (2018), https://doi.org/10.1088/1367-2630/aac2aa
`` Modular architectures for quantum networks ''

124. Jorge Miguel-Ramiro and W. Dür,
Phys. Rev. A 98, 042309 (2018) ; https://link.aps.org/doi/10.1103/PhysRevA.98.042309
`` Efficient entanglement purification protocols for d-level systems ''

125. Hayata Yamasaki, Alexander Pirker, Mio Murao, Wolfgang Dür and Barbara Kraus
Phys. Rev. A 98, 052313 (2018) (Editors' suggestion);
https://doi.org/10.1103/PhysRevA.98.052313
``Multipartite entanglement outperforms bipartite entanglement under limited quantum system sizes''

126. J. Wallnöfer, A. Pirker, M. Zwerger and W. Dür,
Scientific Reports 9, 314 (2019); https://doi.org/10.1038/s41598-018-36543-5
`` Multipartite state generation in quantum networks with optimal scaling ''

127. A. López-Incera, P. Sekatski and W. Dür,
Quantum 3, 118 (2019); https://doi.org/10.22331/q-2019-01-25-118
`` All macroscopic quantum states are fragile and hard to prepare ''

128. A. Pirker and W. Dür,
New J. Phys. 21, 033003 (2019), https://doi.org/10.1088/1367-2630/ab05f7
``A quantum network stack and protocols for reliable entanglement-based networks ''

129. A. Pirker, M. Zwerger, V. Dunjko, H.J. Briegel and W. Dür,
Quantum Sci. Technol. 4, 025009 (2019), https://doi.org/10.1088/2058-9565/ab03ac
`` Simple proof of confidentiality for private quantum channels in noisy environments ''

130. V. Kuzmin, D. V. Vasilyev, N. Sangouard, W. Dür and C. A. Muschik,
npj Quantum Information 5, 115 (2019); https://doi.org/10.1038/s41534-019-0230-3
`` Scalable repeater architectures for multi-party states ''

131. Jorge Miguel-Ramiro and W. Dür,
New J. Phys. 22, 043011 (2020), https://doi.org/10.1088/1367-2630/ab784d
``Delocalized information in quantum networks''

132. P. Sekatski, S. Wölk and W. Dür,
Physical Review Research 2, 023052 (2020), https://doi.org/10.1103/PhysRevResearch.2.023052
``Optimal distributed sensing in noisy environments''

133. S. Wölk, P. Sekatski and W. Dür,
Quantum Science and Technology 5, 045003 (2020), https://doi.org/10.1088/2058-9565/ab9ba5
`` Noisy distributed sensing in the Bayesian regime ''

134. Julius Wallnöfer, Alexey A. Melnikov, Wolfgang Dür, and Hans J. Briegel,
PRX Quantum 1, 010301 (2020), https://doi.org/10.1103/PRXQuantum.1.010301
``Machine learning for long-distance quantum communication''

135. Jorge Miguel-Ramiro, Alexander Pirker and Wolfgang Dür,
Phys. Rev. Research 3, 033038 (2021), https://doi.org/10.1103/PhysRevResearch.3.033038
`` Coherent randomized benchmarking ''

136. Ferran Riera-Sabat, Pavel Sekatski, Alexander Pirker and Wolfgang Dür,
Phys. Rev. A 104, 012419 (2021) ; https://doi.org/10.1103/PhysRevA.104.012419
`` Entanglement purification by counting and locating errors with entangling measurements ''

137. Jorge Miguel-Ramiro, Alexander Pirker and Wolfgang Dür,
npj Quantum Information 7, 135 (2021) ; https://doi.org/10.1038/s41534-021-00472-5
`` Genuine quantum networks with superposed tasks and addressing ''

138. Arne Hamann, Pavel Sekatski and Wolfgang Dür,
Quantum Science and Technology 7, 025003 (2022) ; https://doi.org/10.1088/2058-9565/ac44de
`` Approximate decoherence free subspaces for distributed sensing ''

139. Stefan Heusler, Wolfgang Dür, Malte S Ubben and Andreas Hartmann,
Journal of Physics A: Mathematical and Theoretical, Volume 55, Number 40 (2022);
https://doi.org/10.1088/1751-8121/ac8f74
`` Aspects of entropy in classical and in quantum physics ''

140. Ferran Riera-Sabat, Pavel Sekatski and Wolfgang Dür,
Quantum 7, 904 (2023) ; https://doi.org/10.22331/q-2023-01-24-904
`` Remotely Controlled Entanglement Generation ''

141. Ferran Riera-Sabat, Pavel Sekatski, and Wolfgang Dür,
New J. Phys. 25, 023001 (2023) ; https://doi.org/10.1088/1367-2630/acb5ba
`` A Quantum Simulator Based on Locally Controlled Logical Systems ''

142. Ferran Riera-Sabat, Jorge Miguel-Ramiro and Wolfgang Dür,
Phys. Rev. A 107, 022414 (2023) ; https://link.aps.org/doi/10.1103/PhysRevA.107.022414
`` Non-Destructive Verification of Entangled States via Fidelity Witnessing ''

143. Jorge Miguel-Ramiro, Alexander Pirker and Wolfgang Dür,
Quantum 7, 919 (2023); https://doi.org/10.22331/q-2023-02-09-919
`` Optimized quantum networks''

144. Maria-Flors Mor-Ruiz and Wolfgang Dür,
Phys. Rev. A 107, 032424 (2023) ; https://doi.org/10.1103/PhysRevA.107.032424
`` Noisy stabilizer formalism''

145. Ferran Riera-Sabat, Jorge Miguel-Ramiro and Wolfgang Dür, PRX Quantum 4, 040323 (2023) ; https://doi.org/10.1103/PRXQuantum.4.040323
`` Quantum repeater for W states ''

146. Jorge Miguel-Ramiro, Zheng Shi, Luca Dellantonio, Albie Chan, Christine A. Muschik, and Wolfgang Dür, Phys. Rev. A 108, 062604 (2023); https://link.aps.org/doi/10.1103/PhysRevA.108.062604
`` Enhancing Quantum Computation via Superposition of Quantum Gates''

147. Maria-Flors Mor-Ruiz and Wolfgang Dür, IEEE Journal on Selected Areas in Communications 42, 1793-1807 (2024), Special Issue on "The Quantum Internet: principles, protocols, and architectures" ; https://doi.org/10.1109/JSAC.2024.3380089
`` Influence of noise in entanglement-based quantum networks''

148. Arne Hamann, Pavel Sekatski and Wolfgang Dür, Quantum Sci. Technol. 9, 035005 (2024) ; https://iopscience.iop.org/article/10.1088/2058-9565/ad37d5
`` Optimal distributed multiparameter estimation in noisy environments''

149. Ferran Riera-Sabat, Pavel Sekatski, and Wolfgang Dür, Phys. Rev. Research 6, 033101 (2024), https://doi.org/10.1103/PhysRevResearch.6.033101 ,
`` Quantum computation with logical gates between hot systems''

150. Julia Freund, Alexander Pirker and Wolfgang Dür, Phys. Rev. Research 6, 033267 (2024), https://link.aps.org/doi/10.1103/PhysRevResearch.6.033267
`` Flexible quantum data bus ''

151. Ferran Riera-Sabat and Wolfgang Dür, , New J. Phys. 26, 123015 (2024), https://iopscience.iop.org/article/10.1088/1367-2630/ad9945
``A modular entanglement-based quantum computer architecture '',

152. Maria-Flors Mor-Ruiz, Julius Wallnöfer and Wolfgang Dür, Quantum 9, 1605 (2025); https://doi.org/10.22331/q-2025-01-21-1605 ,
``Imperfect quantum networks with tailored resource states''

153. Jorge Miguel-Ramiro, Alexander Pirker and Wolfgang Dür, Quantum 9, 1702 (2025); https://doi.org/10.22331/q-2025-04-09-1702
``Improving entanglement purification through coherent superposition of roles''

154. Andrea López-Incera, Wolfgang Dür and Stefan Heusler, Eur. J. Phys. 46 045703 (2025), https://doi.org/10.1088/1361-6404/add58e , ``How many lives does Schrödinger's cat have?''

155. Arne Hamann, Paul Aigner, Pavel Sekatski and Wolfgang Dür, Quantum Sci. Techn. 10, 035028 (2025), https://doi.org/10.1088/2058-9565/add61b
``Selective and noise-resilient wave estimation with quantum sensor networks''

156. Jorge Miguel-Ramiro and Wolfgang Dür, Phys. Rev. A 111, 052624 (2025); https://link.aps.org/doi/10.1103/PhysRevA.111.052624 , ``Graph state fission''

157. Paul Aigner, Maria Flors Mor-Ruiz and Wolfgang Dür, Phys. Rev. A 112, 022402 (2025), https://doi.org/10.1103/gqfw-x72s ``Qudit noisy stabilizer formalism''

158. Julia Freund, Alexander Pirker, Lina Vandre and Wolfgang Dür, New J. Phys. 27, 094505 (2025); https://doi.org/10.1088/1367-2630/ae02bd
``Graph state extraction from two-dimensional cluster states ''

159. Paul Aigner and Wolfgang Dür, New J. Phys. (2025), https://iopscience.iop.org/article/10.1088/1367-2630/ae0fbd
`` Improved Quantum Sensing by Spectral Design ´´

Preprints and manuscripts in preparation

160. Ferran Riera-Sabat, Jorge Miguel-Ramiro and Wolfgang Dür, E-print arXiv:2506.09144 , ``Quantum simulation of noisy quantum networks´´

161. Maria Flors Mor-Ruiz, Jorge Miguel-Ramiro, Julius Wallnöfer, Tim Coopmans and Wolfgang Dür, E-print arXiv: 2502.04450 , ``Merging-based quantum repeater´´

162. Wolfgang Dür, E-print arXiv: 2507.08936, ``Long-ranged gates in quantum computation architectures with limited connectivity´´

163. Alexander Pirker, Belen Munoz, and Wolfgang Dür, E-print arXiv: 2507.12030 , ``A resource-centric, task-based approach to quantum network control´´

164. Jorge Miguel-Ramiro, Jessica Illiano, Francesco Mazza, Alexander Pirker, Julia Freund, Angela Sara Cacciapuoti, Marcello Caleffi, Wolfgang Dür, E-print arXiv: 2508.03806 , `` QPing: a Quantum Ping Primitive for Quantum Networks´´

165. Francesco Mazza, Jorge Miguel-Ramiro, Jessica Illiano, Alexander Pirker, Marcello Caleffi and Angela Sara Cacciapuoti and Wolfgang Dür, E-print arXiv: 2510.15776 , `` Flexible Qubit Allocation of Network Resource States´´

166. Albie Chan, Zheng Shi, Jorge Miguel-Ramiro, Luca Dellantonio, Christine A. Muschik and Wolfgang Dür, E-print arXiv: 2510.xxxx , ``Self-Configuring Quantum Networks with Superposition of Trajectories´´

Proceedings and book contributions

1. H. Briegel, W. Dür, S. Van Enk, J. I. Cirac, P. Zoller, Proceedings of the International Conference on Atomic Physics (ICAP 98), in Windsor, Canada 2. - 3. Aug 1998.
``Quantum Communication and Computation''

2. G. Giedke, H. J. Briegel, W. Dür, J. I. Cirac, and P. Zoller, Proceedings of the Fourth International Conference on Quantum Communication, Measurement, and Computing (QCM98), in Evanston, USA 22.-27 Aug. 1998, Plenum Press 1999.
``Quantum Communication with imperfect means: Entanglement Purification And The Quantum Repeater''

3. H.J. Briegel, J.I. Cirac, W. Dür, G. Giedke, and P. Zoller, Epistemological and Experimental Perspectives on Quantum Physics (Yearbook 7/1999 Vienna Circle), Kluwer, 1999. ``Quantum Repeaters for Quantum Communication''

4. H.-J. Briegel, W. Dür, J. I. Cirac, and P. Zoller, ``Quantum networks II: Communication over noisy channels'', in ``Quantum computing and information'', Springer 2000.

5. L.M. Duan, W. Dür, J.I. Cirac, D. Jaksch, G. Vidal and P. Zoller,
Quantum computing and quantum communication with atoms,
XVIII ICAP 2002 Proceedings - MIT, Cambridge, MA July 27- August 2 (2002).

6. W. Dür, H.-J. Briegel and P. Zoller
"Quantum Repeater", Lectures on Quantum Information, Eds. D. Bruss and G. Leuchs, Wiley-VCH, Berlin 2006.

7. W. Dür and H.-J. Briegel
"Purification and Distillation", Lectures on Quantum Information, Eds. D. Bruss and G. Leuchs, Wiley-VCH, Berlin 2006.

8. C. Becher, J. Benhelm, D. Chek-al-kar, M. Chwalla, W. Dür, O. Gühne, H. Häffner, W. Hänsel, T. Körber, A. Kreuter, G.P.T. Lancaster, T. Monz, E.S. Phillips, U.D. Rapol, M. Riebe, C.F. Roos, C. Russo, F. Schmidt-Kaler, R. Blatt,
Entanglement of trapped ions
Laser Spectroscopy, 381-392 (2005).

9. M. Hein, W. Dür, J. Eisert, R. Raussendorf, M. Van den Nest, and H.-J. Briegel
Entanglement in graph states and its applications
Quantum Computer, Algorithms and Chaos, Volume 162, International School of Physics Enrico Fermi, Edited by: G. Casati, D.L. Shepelyansky, P. Zoller and G. Benenti, IOS Press (2006); E-print: quant-ph/0602096.

10. Wolfgang Dür und Hans-J. Briegel, Physik Journal 12, p22 (2006).
``Protokolle für die Quanteninformation''

11. Wolfgang Dür, Quanteninformation – Ein Thema für den Schulunterricht, Praxis der Naturwissenschaften: Physik in der Schule 6/58, 12-21 (2009). (Themenheft: An den Grenzen der Forschung)

12. Wolfgang Dür, Quanteninformationstheorie im Schulunterricht, PhyDid B - Didaktik der Physik, DD 13.01 (2010).

13. Wolfgang Dür und Stefan Heusler, Was man vom einzelnen Qubit über Quantenphysik lernen kann, PhyDid A - Physik und Didaktik in Schule und Hochschule, Nr. 11, Band 1 (2012).

14. Wolfgang Dür und Stefan Heusler, Was man von zwei Qubits über Quantenphysik lernen kann: Verschränkung und Quantenkorrelationen
PhyDid A - Physik und Didaktik in Schule und Hochschule, Nr. 13, Band 1 (2014).

15. Wolfgang Dür and Stefan Heusler, What we can learn about quantum physics from a single qubit, E-print: arXiv: 1312.1463

16. Wolfgang Dür and Stefan Heusler, Visualization of the invisible: The Qubit as key to quantum physics, Phys. Teach. 52, 489 (2014); http://dx.doi.org/10.1119/1.4897588

17. Artur Habicher und Wolfgang Dür, Forschen und Experimentieren im Sachunterricht - ein Lehrgang zur Förderung des Lernbereichs Technik, Erziehung & Unterricht 9-10, 835 (2015).

18. Wolfgang Dür and Stefan Heusler, The Qubit as key to quantum physics Part II: Physical realizations and applications, Phys. Teach. 54, 156 (2016); http://dx.doi.org/10.1119/1.4942137

19. Wolfgang Dür and Stefan Heusler, Das Quanteninternet,
Praxis der Naturwissenschaften: Physik in der Schule 1/65, 23-32 (2016). (Themenheft: Quanteninformation)

20. Wolfgang Dür and Stefan Heusler, Visualising the invisible - the qubit as a key to quantum physics, In L.-J. Thoms & R. Girwidz (Eds.), Proceedings of the 20th International Conference on Multimedia in Physics Teaching and Learning (pp. 197-204). European Physical Society (2016). https://epub.ub.uni-muenchen.de/29030/7/MPTL20_Proceedings.pdf

21. Wolfgang Dür, Von Qubits lernen, Physik Journal 06, 43 (2017).
http://www.pro-physik.de/details/physikjournalArticle/10536194/Von_Qubits_lernen.html

22. Wolfgang Dür, Raphael Lamprecht and Stefan Heusler, Towards a quantum internet, European Journal of Physics 38, 043001 (2017), https://doi.org/10.1088/1361-6404/aa6df7

23. Stefan Heusler and Wolfgang Dür, Modeling decoherence with qubits,
European Journal of Physics 39, 025406 (2018), https://doi.org/10.1088/1361-6404/aa9cb8

24. Andrea López-Incera and Wolfgang Dür. Entangle me!, A game to demonstrate the principles of quantum mechanics, Am. J. Phys. 87, 95 (2019) (Editor's pick),https://doi.org/10.1119/1.5086275
(E-print: https://arxiv.org/abs/1901.07587)

25. Andrea López-Incera, Andreas Hartmann, Wolfgang Dür, Encrypt me! A game-based approach to Bell inequalities and quantum cryptography, European Journal of Physics 41, 065702 (2020), https://doi.org/10.1088/1361-6404/ab9a67

26. Johanna Taglieber, Corinna Pieber, Suzanne Kapelari, Wolfgang Dür, Barbara Hinger; Eine interdisziplinäre Studie zum Einfluss von TBLT auf die Scientific Interlanguage von SchülerInnen im Biologie- und Physikunterricht; in Vierte „Tagung der Fachdidaktik“ 2019, Interdisziplinäre fachdidaktische Diskurse zur Bildung für nachhaltige Entwicklung, Suzanne Kapelari (Hg.); DOI: 10.15203/99106-019-2-07

27. Artur Habicher, Herbert Oberhauser und Wolfgang Dür, Kompetenzorientierung einmal anders – Lernaufgaben für den Unterricht, Plus Lucis 2, S.25 (2021)

28. Johanna Taglieber; Corinna Pieber; Suzanne Kapelari; Wolfgang Dür; Barbara Hinger Dür, Identifying Language Requirements of Pre-Scientific Writing for Learners in Science Education using a Task-Based Needs Analysis", accepted for publication in Pedagogical Linguistics (2023).

Alumni

PhD Students

- Caroline Kruszynska (co supervised with H.J. Briegel), *Study on multipartite quantum states: preparation,simulation and characterisation*, 2009
- Robert Hübener (co supervised with H.J. Briegel), *On the Structure and Description of Complex Systems*, 2009
- Gemma De las Cuevas (co supervised with H.J. Briegel), *A Quantum Information approach to Statistical Mechanics*, 2011
- Florian Fröwis, *Macroscopicity and stability of quantum spin systems*, 2012
- Michael Zwerger (co supervised with H.J. Briegel), *Small-scale quantum processors and machines*, 2015
- Walter Boyajian (co-supervisor, main supervisor B. Kraus), *Matchgate circuits and compressed quantum computation*, 2015
- Davide Orsucci (co-supervisor, main supervisor H.J.Briegel), *Machine learning approaches to quantum estimation and deliberation*, 2016 (ongoing)
- Volckmar Nebendahl, *On the simulation of spin systems with tensor networks and the numerical optimization of quantum algorithms*, 2016 (defensio April 2016)
- Katharina Schwaiger (co-supervisor, main supervisor B. Kraus), *Few-Body entanglement*, 2018
- Alexander Pirker (main supervisor, co-supervised by H.J. Briegel), *Secure, entanglement-based quantum networks*, 2016-10/2019
- Julius Wallnöfer, *Multipartite and measurement-based approaches for entanglement distribution*, 2016 -12/2019
- Andreas Hartmann (co-supervisor, main supervisor W.Lechner, Enhancing adiabatic quantum computation with non-adiabatic methods. 2021
- Viacheslav Kuzmin, Protocols for noisy intermediate scale quantum devices: quantum repeaters and quantum simulators, 01/2022
- Jorge Miguel-Ramiro, Features, characterization and novel approaches for entanglement-based quantum networks, 2018-04/2023
- Arne Hamann, Distributed sensing, 2019 (ongoing)
- Ferran Riera Sabat, Entanglement distribution & logical encoding for interactions control, 2020-10/2024
- Maria Flors Mor Ruiz, Distributing and tailoring noisy resource states in quantum networks, 2021-11/2025
- Julia Freund, Multiplexing in quantum networks, 2023 (ongoing)
- Alena Romanova, Measurement-based quantum computation with qudits, 2024 (ongoing)
- Paul Aigner, Quantum sensor networks with high-dimensional sensors, 2024(ongoing)
- Karim Osman, 2024 (ongoing)
- Katerina Stloukalova, Simuation of quantum network protocols, 2024 (ongoing)

Diploma- and master students (research)

- Daniel Zemann (co supervised with H.J. Briegel), *Diagonal Unitary Operations in Hybrid Quantum Computation*, 2009
- Christoph Reiter, *Entanglement purification for multipartite graph states*, 2011
- Matthäus Pühringer, *Classical simulation of decoherence processes with tensor network methods*, 2012
- Frederik Kesting, *Decay of entanglement in encoded quantum systems*, 2013
- Stefan Hattinger, *Messungsbasierte Quantenfehlerkorrektur*, 2015
- Julius Wallnöfer, *Hybrid fault-tolerant quantum computation*, 2015
- Andrea Lopez-Incera,*Fragility of macroscopic quantum states*, 2018

- Jorge Miguel-Ramiro, *Entanglement purification of multi-level systems*, 2018
- Ferran Riera Sabat, *Improved hashing protocols*, 2019
- Akshay Sharma, *Entanglement purification for multipartite states*, 2023 (laufend)
- Paul Aigner, *Noisy Stabilizer Formalism: Extension to higher dimensions* (2024)
- Jasmin Matti, *Extensions and Limitations of the noisy stabilizer formalism* (2025)
- Florian Bönke, (2025, ongoing)

Diploma- and master students (teacher education)

- Peter Niederwieser, *Der Quantencomputer im Schulunterricht*, 2012
- Marion Zöggeler, *Quantenmechanische Verschränkung im Schulunterricht*, 2012
- Josef Gredler, *Zugänge zur Quantenphysik für den Unterricht*, 2013
- Katharina Putzer, *Quantenteleportation im Schulunterricht*, 2014
- Markus Frischauf, *Von Qubits zu Wellenfunktionen*, 2015
- Raphael Lamprecht, *Quantennetzwerke – ein Kontextbezogener Zugang zur Quantenmechanik für den Unterricht*, 2015
- Anja Walder*, Der Feldbegriff im Physikunterricht*, 2016
- Caroline Roos, *Messung der Zeit*, 2016
- Bernhard Nairz, *Entwicklung kompetenzorientierter Lernaufgaben für das Unterrichtsfach Physik*, 2016
- Stefano Flaminio, Entwicklung und möglicher Einsatz von Skripten für den Physikunterricht, 2017
- Magdalena Reitmeir, *Einsatz von GeoGebra im Physikunterricht*, 2017
- Johannes Weiss, *Die Bell'sche Ungleichung im Schulunterricht*, 2018
- Martin Bstieler, *Verschränkungsbasierte Quantenkryptographie*, 2018
- Marco Egger, *Der Mikrowellenherd: Grundlagen und Anwendungen*, 2019
- Filomena Orgler, *Zur Interpretation der Quantenphysik*, 2020
- Ivan Gasser, Angebot bestehender Zugänge zur Quantenphysik im Schulunterricht, 2022
- Manuel Zehetner, Macroscopic quantum states, 2022
- Christiane Stecher, Quantensprung ins Klassenzimmer: Grundlagen des Quantencomputings mit Cloud-Technologie für den Physikunterricht, 2025

Bachelor students

- Peter Niederwieser, *Quantenalgorithmen*, 2010
- Valentin Torggler, *Quantenkommunikation & Quantenrepeater*, 2011
- Julius Wallnöfer, *Multipartite Verschränkungsreinigung*, 2013
- Raphael Brieger, *Tensornetzwerkzustände*, 2014
- Susanne Kühsling, *Messungsbasierte Quanteninformationsverarbeitung*, 2014
- Georg Gruber, *Quanten Clonen,* 2015
- Tobias Olsacher, Mermin-Klyshko Ungleichung, 2016
- Arne Hamann, Quantensimulatoren, 2016
- Elisa Brunori, Verschränkungsreinigung, 2017
- Olivia Callegari, Physik im Schisport, 2019
- Magdalena Salzburger, Schrödingers Katze im Unterricht, 2019
- Marco Pritzi, Bellsche Ungleichung, 2019
- Rebekka Hilfert, Mechanik in Action- und Superheldenfilmen, 2019
- Rupert Dankl, Physik der Achterbahn, 2019
- Manuel Zehetner, Physik des Mountainbikens, 2020
- Stefan Waldegger, Quantenkryptographie, 2020
- Shirin Stührenberg, Physik im Tanzsport, 2020
- Heidi Feurstein, Siedlungswasserwirtschaft Wasserversorgung, 2020
- Tamara Graschi, Selbständiges Schreiben im Physikunterricht, 2020

- Simon Stricker, Verschränkung, 2020
- Judith Flatscher, Kompetenzorientierte Lernaufgaben im Physikunterricht der Sek. 1, 2021
- Lisa Eisele, Förderung fachlicher und sprachlicher Kompetenzen im Physikunterricht durch Lernaufgaben, 2021
- Natalie Schwarz, Physik des Eisstocksports, 2021
- Anna Schmidhofer, Physik des Langlaufsports, 2021
- Stefan Kapeller, Erarbeitung physikalischer Inhalte durch Modellierung von Trick-Shot-Videos, 2022
- Michael Siding, Der Einsatz von Geogebra im Physikunterricht, 2022
- Lukas Bodner, Physik im Klettersport, 2022
- Thomas Bichlmair, Physik in der Formel 1: Didaktische Umsetzungen für den Unterricht, 2023
- Laura Grabher-Meyer, Nobelpreis 2023: Anton Zeilingers Forschung aus fachlicher und fachdidaktischer Perspektive 2023
- Raphael Mayr, Ein Einblick in die Funktionsweise eines Radars, mit Ausführungen zur Radarpistole und zum Wetterradar, 2023
- Mathias Zerlauth, Die Heisenbergsche Unbestimmtheitsrelation, 2023
- Matthias Scheffauer, Physik bei der Feuerwehr, 2023
- Laurin Unterkofler, Raumakustik, 2024
- Klaus Frick, Unsichtbares sichtbar machen: Technische Anwendungen des Faraday'schen Induktionsgesetzes, 2024
- Isaak Hartmann, Dekohärenz, 2025 (ongoing)