

CURRICULUM VITAE

Carlton M. Caves

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CV, updated monthly, is available at <http://info.phys.unm.edu/~caves/vita.pdf>.

PERSONAL

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Birth date: 1950 October 24

HIGHER EDUCATION

Rice University, 1968-9 to 1972-5
BA in Physics and Mathematics, summa cum laude, 1972

California Institute of Technology, 1972-9 to 1979-5
PhD in Physics, 1979 (thesis supervisor: Kip S. Thorne)

PRESENT POSITIONS

Distinguished Professor Emeritus, University of New Mexico, 2018-7 to present

PREVIOUS POSITIONS

Graduate Research Assistant, California Institute of Technology, 1975-10 to 1976-9 and 1977-10 to 1979-5

Research Fellow in Physics, California Institute of Technology, 1979-5 to 1981-12

Senior Research Fellow in Theoretical Physics, California Institute of Technology, 1982-1 to 1987-11

Associate Professor of Electrical Engineering/Electrophysics (and Physics, beginning 1989-9), University of Southern California, 1987-12 to 1992-7

Professor of Physics and Astronomy, University of New Mexico, 1992-8 to 2006-7

Director, Center for Advanced Studies, University of New Mexico, 1993-7 to 1996-6

Distinguished Professor, University of New Mexico, 2006-8 to 2018-6

Director, Center for Quantum Information and Control, University of New Mexico, 2009-8 to 2018-6

Research Professor of Physics and Astronomy, University of New Mexico, 2018-7 to 2021-6

TEMPORARY AND VISITING POSITIONS

Member, (Kavli) Institute for Theoretical Physics, University of California, Santa Barbara, 1984-1 to 1984-6, 1996-8 to 1996-12, 2001-8 to 2001-12, 2013-1 to 2013-2

Lecturer, California Institute of Technology, 1984-10 to 1985-9

Visiting Associate in Physics, California Institute of Technology, 1987-12 to 1993-1

Visiting Professor, Santa Fe Institute, 1992-9 to 1992-12

Visiting Scholar, School of Mathematics and Physics, University of Queensland, 2007-8 to 2008-7

Visiting Professor, School of Mathematics and Physics, University of Queensland, 2011-2 to 2017-6

FIELDS OF RESEARCH SPECIALIZATION

Physics of information; information, entropy, and complexity; quantum information theory; quantum metrology; quantum chaos; quantum control
Quantum optics; theory of nonclassical light
Theory of quantum noise; quantum theory of measurement

PROFESSIONAL SOCIETIES

Member, US National Academy of Sciences (elected 2020)
Fellow and Member, American Physical Society (elected Fellow 2004)
Fellow and Member, American Association for the Advancement of Science (elected Fellow 2008)

BOARD MEMBERSHIPS

Member, Board of Directors, Audubon New Mexico, 2012–2017

AWARDS, SCHOLARSHIPS, AND FELLOWSHIPS

Phi Beta Kappa, 1971
National Science Foundation Predoctoral Fellow, 1972–10 to 1975–9
Richard P. Feynman Fellow, Caltech, 1976–10 to 1977–9
First Öcsi Bácsi Fellow, Caltech, 1976–1977
Einstein Prize for Laser Science, Society for Optical and Quantum Electronics, 1990
Excellence in Teaching Award, UNM Department of Physics and Astronomy, 1998–1999, 1999–2000, and 2004–2005
Max Born Award, Optical Society of America, 2011
Lifetime Achievement Award, New Mexico International Year of Light Celebration, 2015
Quantum Communication Award, International Conference on Quantum Communication, Measurement and Computing (QCMC), 2018
2020 Outstanding Referee, American Physical Society journals
Micius Quantum Prize 2020

TEACHING (since 2016)

Quantum Information Theory, one-semester graduate-level course, spring semester 2017
Mathematical Methods of Physics, one-semester upper-division course, fall semester 2015 and fall semester 2016

UNIVERSITY SERVICE (since 2016)

Faculty Search Committee, Department of Physics and Astronomy, 2017–2018

EXTERNAL SERVICE (since 2016)

Friend of the American Physical Society, University of New Mexico, 2006–2018
Member, Steering Committee for Biennial Conferences on Quantum Communication, Measurement and Computing (QCMC), 2012–2016
Divisional Associate Editor, Physical Review Letters, 2012–9 to 2018–8
Member, Search Committee, American Physical Society Editor-in-Chief, spring 2016
Member, Editorial Advisory Board, American Journal of Physics, 2018–1 to 2020–12
Member, Search Committee, Lead Editor of Physical Review A, 2018–5 to 2018–10
Co-organizer, Quantum Gates, Jumps and Machines: A Conference in Honour of Gerard Milburn's 60th Birthday, Brisbane, 2018–10
Co-chair, Physics Next Workshop on Scientific Publication and Research Dissemination, Riverhead, Long Island, delayed till who knows

INVITED TALKS AND LECTURES (since 2016)

- Invited speaker, Quantum Computing: Beginnings to Current Frontiers (Symposium in honor of Paul Benioff's contribution to quantum computing), Argonne National Laboratory, 2016–5
- Invited speaker, Quantumness: A Celebration of Luiz Davidovich's Research Career on his 70th Birthday, Rio de Janeiro, 2016–6
- Invited speaker, Thirteenth International Conference on Quantum Communication, Measurement, and Computing (QCMC 2016), Singapore, 2016–7
- Invited speaker, QIM IV: Quantum Technologies, Université Pierre et Marie Curie, Paris, 2017–4
- Arfken Physics Scholar-in-Residence, Miami University, Oxford, Ohio, 2017–4
- Plenary speaker, Conference on Quantum Information and Quantum Control VII, Toronto, 2017–8
- Invited speaker, Quantum Information Processing 2018, Technical University of Delft, 2018–1
- Invited speaker, Gordon Conference on Mechanical Systems in the Quantum Regime, Ventura, California, 2018–3
- 2018 Quantum Communication Award lecturer, International Conference on Quantum Communication, Measurement and Computing (QCMC), Louisiana State University, 2018–3
- Hearne Eminent Lecturer, Hearne Institute for Theoretical Physics, Louisiana State University, 2018–3
- Invited speaker, Quantum Gates, Jumps and Machines: A Conference in Honour of Gerard Milburn's 60th Birthday, Brisbane, 2018–10
- Plenary speaker, New Technologies for Discovery IV: The CPAD Instrumentation Frontier Workshop 2018, Brown University, Providence, 2018–12
- Invited lecturer, Quantum-Enhanced Sensing via Quantum Control (QuSCo) First Winter School, Saarbrücken, Germany, 2019–3 (four lectures on quantum metrology)
- Plenary speaker, 26th Central European Workshop on Quantum Optics (CEWQO), Paderborn University, Germany, 2019–6
- Invited speaker, Workshop on Quantum Foundations and Quantum Information, Quantum Science and Technology–Argentina 2019, Puerto Madryn, Argentina, 2019–10
- Keynote speaker, International Iran Conference on Quantum Information (IICQI), online, 2020–12
- Invited speaker, Workshop on Recent Advances in Quantum Computation and Quantum Information Science, Bhabha Atomic Research Centre, Mumbai, online, 2021–5
- Keynote speaker, Central European Workshop on Quantum Optics (CEWQO), online, 2021–6
- Invited speaker, Lecture Series of Quantum Portugal Initiative, online, 2021–9

PUBLICATIONS

I. Book-length publications

A. PhD thesis

Theoretical Investigations of Experimental Gravitation, submitted to the California Institute of Technology on 1979 May 8.

B. Disciplinary reports

1. K. Bartschat, D. Blume, C. M. Caves, and I. H. Deutsch, *Theoretical Atomic, Molecular, and Optical Physics: Recent Developments and a Vision for the Future* (American Institute of Physics, New York, 2012).

C. Edited conference proceedings

1. *Quantum Communication, Computing, and Measurement*, edited by O. Hirota, A. S. Holevo, and C. M. Caves (Plenum, New York, 1997).

II. Technical articles

Web of Science (Publons) has 144 research articles, with 17,541 citations (in the Web of Science Core Collection), 122 citations/article, h-index 56, 10h-index 19, and 100h-index 6. Google Scholar finds over 200 publications, but there are no citations after the first 160 or so; GS has 28,069 total citations, h-index 67, 10h-index 23, and 100h-index 8. This citation record comes almost entirely from publishing in journals whose objective is to disseminate good science, not in journals whose objective is to sell magazines.

A. Technical articles in refereed journals

1. D. L. Lee, C. M. Caves, W.-T. Ni, and C. M. Will, "Theoretical frameworks for testing relativistic gravity. V. Post-Newtonian limit of Rosen's theory," *Astrophysical Journal* **206**, 555–558 (1976).
2. V. B. Braginsky, C. M. Caves, and K. S. Thorne, "Laboratory experiments to test relativistic gravity," *Physical Review D* **15**, 2047–2068 (1977).
3. K. S. Thorne, R. W. P. Drever, C. M. Caves, M. Zimmermann, and V. D. Sandberg, "Quantum nondemolition measurements of harmonic oscillators," *Physical Review Letters* **40**, 667–671 (1978).
4. C. M. Caves, "Microwave cavity gravitational radiation detectors," *Physics Letters* **80B**, 323–326 (1979).
5. C. M. Caves, "Gravitational radiation and the ultimate speed in Rosen's bimetric theory of gravity," *Annals of Physics* **125**, 35–52 (1980).
6. C. M. Caves, K. S. Thorne, R. W. P. Drever, V. D. Sandberg, and M. Zimmermann, "On the measurement of a weak classical force coupled to a quantum-mechanical oscillator. I. Issues of principle," *Reviews of Modern Physics* **52**, 341–392 (1980).
7. C. M. Caves, "Quantum-mechanical radiation-pressure fluctuations in an interferometer," *Physical Review Letters* **45**, 75–79 (1980). Reprinted in *Nonclassical Effects in Quantum Optics*, edited by D. F. Walls and P. Meystre (American Institute of Physics, New York, 1991), pages 268–272.
8. C. M. Caves, "Quantum-mechanical noise in an interferometer," *Physical Review D* **23**, 1693–1708 (1981). Reprinted in *Interferometry*, edited by P. Harihan (SPIE, Bellingham, Washington, 1991), pages 507–522; in *Photon Statistics and Coherence in Nonlinear Optics*, edited by J. Peřina (SPIE, Bellingham, Washington, 1991), pages 246–261; and in *Fundamentals of Quantum Optics*, edited by G. S. Agarwal (SPIE, Bellingham, Washington, 1994).
9. C. M. Caves, "Quantum limits on noise in linear amplifiers," *Physical Review D* **26**, 1817–1839 (1982).
10. C. M. Caves and B. L. Schumaker, "New formalism for two-photon quantum optics. I. Quadrature phases and squeezed states," *Physical Review A* **31**, 3068–3092 (1985).
11. B. L. Schumaker and C. M. Caves, "New formalism for two-photon quantum optics. II. Mathematical foundation and compact notation," *Physical Review A* **31**, 3093–3111 (1985).

12. C. M. Caves, "Defense of the standard quantum limit for free-mass position," *Physical Review Letters* **54**, 2465–2468 (1985).
13. C. M. Caves, "Quantum mechanics of measurements distributed in time. A path-integral formulation," *Physical Review D* **33**, 1643–1665 (1986).
14. C. M. Caves, "Quantum mechanics of measurements distributed in time. II. Connections among formulations," *Physical Review D* **35**, 1815–1830 (1987).
15. C. M. Caves and D. D. Crouch, "Quantum wideband traveling-wave analysis of a degenerate parametric amplifier," *Journal of the Optical Society of America B* **4**, 1535–1545 (1987) [Erratum: **5**, 1343 (1988)].
16. C. M. Caves, "Squeezing more out of a laser," *Optics Letters* **12**, 971–973 (1987).
17. C. M. Caves and G. J. Milburn, "Quantum-mechanical model for continuous position measurements," *Physical Review A* **36**, 5543–5555 (1987).
18. S. L. Braunstein and C. M. Caves, "Quantum rules: An Effect can have more than one Operation," *Foundations of Physics Letters* **1**, 3–12 (1988).
19. S. L. Braunstein and C. M. Caves, "Information-theoretic Bell inequalities," *Physical Review Letters* **61**, 662–665 (1988) [Erratum: **63**, 1896 (1989)].
20. C. M. Caves, "Quantitative limits on the ability of a Maxwell demon to extract work from heat," *Physical Review Letters* **64**, 2111–2114 (1990).
21. S. Song, C. M. Caves, and B. Yurke, "Generation of superpositions of classically distinguishable quantum states from optical back-action evasion," *Physical Review A* **41**, 5261–5264 (1990).
22. S. L. Braunstein and C. M. Caves, "Wringing out better Bell inequalities," *Annals of Physics* **202**, 22–56 (1990).
23. C. M. Caves, W. G. Unruh, and W. H. Zurek, "Comment on 'Quantitative limits on the ability of a Maxwell demon to extract work from heat'," *Physical Review Letters* **65**, 1387 (1990).
24. S. L. Braunstein and C. M. Caves, "Phase and homodyne statistics of generalized squeezed states," *Physical Review A* **42**, 4115–4119 (1990).
25. C. Zhu and C. M. Caves, "Photocount distributions for continuous-wave squeezed light," *Physical Review A* **42**, 6794–6804 (1990).
26. S. L. Braunstein, C. M. Caves, and G. J. Milburn, "Interpretation for a positive P representation," *Physical Review A* **43**, 1153–1159 (1991).
27. C. M. Caves, C. Zhu, G. J. Milburn, and W. Schleich, "Photon statistics of two-mode squeezed states and interference in four-dimensional phase space," *Physical Review A* **43**, 3854–3861 (1991).
28. S. L. Braunstein, A. S. Lane, and C. M. Caves, "Maximum-likelihood analysis of multiple quantum phase measurements," *Physical Review Letters* **69**, 2153–2156 (1992).
29. R. Schack and C. M. Caves, "Information and entropy in the baker's map," *Physical Review Letters* **69**, 3413–3416 (1992).
30. A. S. Lane, S. L. Braunstein, and C. M. Caves, "Maximum-likelihood statistics of multiple quantum phase measurements," *Physical Review A* **47**, 1667–1696 (1993).
31. C. M. Caves, "Information and entropy," *Physical Review E* **47**, 4010–4017 (1993).
32. R. Schack and C. M. Caves, "Hypersensitivity to perturbations in the quantum baker's map," *Physical Review Letters* **71**, 525–528 (1993).
33. C. M. Caves and P. D. Drummond, "Quantum limits on bosonic communication rates," *Reviews of Modern Physics* **66**, 481–537 (1994).
34. S. L. Braunstein and C. M. Caves, "Statistical distance and the geometry of quantum states," *Physical Review Letters* **72**, 3439–3443 (1994).
35. R. Schack, G. M. D'Ariano, and C. M. Caves, "Hypersensitivity to perturbation in the quantum kicked top," *Physical Review E* **50**, 972–987 (1994).
36. C. A. Fuchs and C. M. Caves, "Ensemble-dependent bounds for accessible information in quantum mechanics," *Physical Review Letters* **73**, 3047–3050 (1994).

37. C. A. Fuchs and C. M. Caves, "Mathematical techniques for quantum communication theory," *Open Systems and Information Dynamics* **3**, 345–356 (1995).
38. H. Barnum, C. M. Caves, C. A. Fuchs, R. Jozsa, and B. Schumacher, "Noncommuting mixed states cannot be broadcast," *Physical Review Letters* **76**, 2818–2821 (1996).
39. S. L. Braunstein, C. M. Caves, and G. J. Milburn, "Generalized uncertainty relations: Theory, examples, and Lorentz invariance," *Annals of Physics* **247**, 135–173 (1996).
40. R. Schack and C. M. Caves, "Information-theoretic characterization of quantum chaos," *Physical Review E* **53**, 3257–3270 (1996).
41. R. Schack and C. M. Caves, "Chaos for Liouville probability densities," *Physical Review E* **53**, 3387–3401 (1996).
42. M. A. Nielsen and C. M. Caves, "Reversible quantum operations and their application to teleportation," *Physical Review A* **55**, 2547–2556 (1997).
43. C. M. Caves and R. Schack, "Unpredictability, information, and chaos," *Complexity* **3**(1), 46–57 (1997).
44. M. A. Nielsen, C. M. Caves, B. Schumacher, and H. Barnum, "Information-theoretic approach to quantum error correction and reversible measurements," *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* **454**, 277–304 (1998).
45. G. K. Brennen, C. M. Caves, P. S. Jessen, and I. H. Deutsch, "Quantum logic gates in optical lattices," *Physical Review Letters* **82**, 1060–1063 (1999).
46. S. L. Braunstein, C. M. Caves, R. Jozsa, N. Linden, S. Popescu, and R. Schack, "Separability of very noisy mixed states and implications for NMR quantum computing," *Physical Review Letters* **83**, 1054–1057 (1999).
47. C. M. Caves, "Quantum error correction and reversible operations," *Journal of Superconductivity* **12**, 707–718 (1999).
48. R. Schack and C. M. Caves, "Classical model for bulk-ensemble NMR quantum computation," *Physical Review A* **60**, 4354–4362 (1999).
49. R. Schack and C. M. Caves, "Explicit product ensembles for separable quantum states," *Journal of Modern Optics* **47**, 387–399 (2000).
50. R. Schack and C. M. Caves, "Shifts on a finite qubit string: A class of quantum baker's maps," *Applicable Algebra in Engineering, Communication and Computing* **10**, 305–310 (2000).
51. H. Barnum, C. M. Caves, J. Finkelstein, C. A. Fuchs, and R. Schack, "Quantum probability from decision theory?" *Proceedings of the Royal Society A* **456**, 1175–1182 (2000).
52. C. M. Caves, "Predicting future duration from present age: A critical assessment," *Contemporary Physics* **41**, 143–153 (2000).
53. C. M. Caves and G. J. Milburn, "Qutrit entanglement," *Optics Communications* **179**, 439–446 (2000); reprinted in *Ode to a Quantum Physicist: A Festschrift in Honor of Marlan O. Scully*, edited by W. P. Schleich, H. Walther, and W. E. Lamb (Elsevier, Amsterdam, 2000).
54. T. A. Brun, C. M. Caves, and R. Schack, "Entanglement purification of unknown quantum states," *Physical Review A* **63**, 042309 (2001).
55. C. M. Caves, C. A. Fuchs, and P. Rungta, "Entanglement of formation of an arbitrary state of two rebits," *Foundations of Physics Letters* **14**, 199–212 (2001).
56. R. Schack, T. A. Brun, and C. M. Caves, "Quantum Bayes rule," *Physical Review A* **64**, 014305 (2001).
57. P. Rungta, V. Bužek, C. M. Caves, M. Hillery, and G. J. Milburn, "Universal state inversion and concurrence in arbitrary dimensions," *Physical Review A* **64**, 042315 (2001).
58. H. Barnum, C. M. Caves, C. A. Fuchs, R. Jozsa, and B. Schumacher, "On quantum coding for ensembles of mixed states," *Journal of Physics A* **34**, 6767–6785 (2001).
59. C. M. Caves, C. A. Fuchs, and R. Schack, "Quantum probabilities as Bayesian probabilities," *Physical Review A* **65**, 022305 (2002).
60. N. C. Menicucci and C. M. Caves, "Local realistic model for the dynamics of bulk-ensemble NMR information processing," *Physical Review Letters* **88**, 167901 (2002).

61. C. M. Caves, C. A. Fuchs, and R. Schack, “Unknown quantum states: The quantum de Finetti representation,” *Journal of Mathematical Physics* **43**, 4537–4559 (2002) [Erratum: **49**, 19902 (2008)].
62. R. Blume-Kohout, C. M. Caves, and I. H. Deutsch, “Climbing Mount Scalable: Physical-resource requirements for a scalable quantum computer,” *Foundations of Physics* **32**, 1641–1670 (2002).
63. C. M. Caves, C. A. Fuchs, and R. Schack, “Conditions for compatibility of quantum-state assignments,” *Physical Review A* **66**, 062111 (2002).
64. P. Rungta and C. M. Caves, “Concurrence-based entanglement measures for isotropic states,” *Physical Review A* **67**, 012307 (2003).
65. A. J. Scott and C. M. Caves, “Entangling power of the quantum baker’s map,” *Journal of Physics A* **36**, 9553–9576 (2003).
66. C. M. Caves, C. A. Fuchs, K. K. Manne, and J. M. Renes, “Gleason-type derivations of the quantum probability rule for generalized measurements,” *Foundations of Physics* **34**, 193–209 (2004).
67. J. M. Renes, R. Blume-Kohout, A. J. Scott, and C. M. Caves, “Symmetric informationally complete quantum measurements,” *Journal of Mathematical Physics* **45**, 2171–2180 (2004).
68. C. M. Caves and K. Wódkiewicz, “Classical phase-space descriptions of continuous-variable teleportation,” *Physical Review Letters* **93**, 040506 (2004).
69. C. M. Caves, I. H. Deutsch, and R. Blume-Kohout, “Physical-resource requirements and the power of quantum computation,” *Journal of Optics B: Quantum and Semiclassical Optics* **6**, S801–S806 (2004).
70. C. M. Caves and K. Wódkiewicz, “Fidelity of Gaussian channels,” *Open Systems and Information Dynamics* **11**, 309–323 (2004).
71. C. M. Caves and R. Schack, “Properties of the frequency operator do not imply the quantum probability postulate,” *Annals of Physics* **315**, 123–146 (2005) [Corrigendum: **321**, 504–505 (2006)].
72. T. E. Tessier, C. M. Caves, I. H. Deutsch, B. Eastin, and D. Bacon, “Optimal classical-communication-assisted local model of n -qubit Greenberger-Horne-Zeilinger correlations,” *Physical Review A* **72**, 032305 (2005).
73. A. Datta, S. T. Flammia, and C. M. Caves, “Entanglement and the power of one qubit,” *Physical Review A* **72**, 042316 (2005).
74. S. T. Flammia, A. Silberfarb, and C. M. Caves, “Minimal informationally complete measurements for pure states,” *Foundations of Physics* **35**, 1985–2006 (2005).
75. A. J. Scott, T. A. Brun, C. M. Caves, and R. Schack, “Hypersensitivity and chaos signatures in the quantum baker’s maps,” *Journal of Physics A* **39**, 13405–13433 (2006).
76. S. Boixo, C. M. Caves, A. Datta, and A. Shaji, “On decoherence in quantum clock synchronization,” *Laser Physics* **16**, 1525–1532 (2006).
77. J. Barrett, C. M. Caves, B. Eastin, M. B. Elliott, and S. Pironio, “Modeling Pauli measurements on graph states with nearest-neighbor classical communication,” *Physical Review A* **75**, 012103 (2007).
78. S. Boixo, S. T. Flammia, C. M. Caves, and JM Geremia, “Generalized limits for single-parameter quantum estimation,” *Physical Review Letters* **98**, 090401 (2007).
79. C. M. Caves, C. A. Fuchs, and R. Schack, “Subjective probability and quantum certainty,” *Studies in History and Philosophy of Modern Physics* **38**, 255–274 (2007).
80. A. Datta, S. T. Flammia, A. Shaji, and C. M. Caves, “Constrained bounds on measures of entanglement,” *Physical Review A* **75**, 062117 (2007).
81. A. Shaji and C. M. Caves, “Qubit metrology and decoherence,” *Physical Review A* **76**, 032111 (2007).
82. S. Boixo, A. Datta, S. T. Flammia, A. Shaji, E. Bagan, and C. M. Caves, “Quantum-limited metrology with product states,” *Physical Review A* **77**, 012317 (2008).
83. A. Datta, A. Shaji, and C. M. Caves, “Quantum discord and the power of one qubit,” *Physical Review Letters* **100**, 050502 (2008).
84. K. K. Manne and C. M. Caves, “Entanglement of formation of rotationally symmetric states,” *Quantum Information and Computation* **8**, 295–310 (2008).

85. M. B. Elliott, B. Eastin, and C. M. Caves, “Graphical description of the action of Clifford operators on stabilizer states,” *Physical Review A* **77**, 042307 (2008).
86. S. Boixo, A. Datta, M. J. Davis, S. T. Flammia, A. Shaji, and C. M. Caves, “Quantum metrology: Dynamics vs. entanglement,” *Physical Review Letters* **101**, 040403 (2008).
87. A. J. Scott and C. M. Caves, “Teleportation fidelity as a probe of sub-Planck phase-space structure,” *Annals of Physics* **323**, 2685–2708 (2008).
88. M. J. Woolley, G. J. Milburn, and C. M. Caves, “Nonlinear quantum metrology using coupled nanomechanical resonators,” *New Journal of Physics* **10**, 125018 (2008).
89. S. Boixo, A. Datta, M. J. Davis, A. Shaji, A. B. Tacla, and C. M. Caves, “Quantum-limited metrology and Bose-Einstein condensates,” *Physical Review A* **80**, 032103 (2009).
90. C. M. Caves and A. Shaji, “Quantum-circuit guide to optical and atomic interferometry,” *Optics Communications* **283**, 695–712 (2010).
91. M. B. Elliott, B. Eastin, and C. M. Caves, “Graphical description of Pauli measurements on stabilizer states,” *Journal of Physics A* **43**, 025301 (2010).
92. M. Tsang and C. M. Caves, “Coherent quantum-noise cancellation for optomechanical sensors,” *Physical Review Letters* **105**, 123601 (2010).
93. M. D. Lang and C. M. Caves, “Quantum discord and the geometry of Bell-diagonal states,” *Physical Review Letters* **105**, 150501 (2010).
94. A. B. Tacla, S. Boixo, A. Datta, A. Shaji, and C. M. Caves, “Nonlinear interferometry with Bose-Einstein condensates,” *Physical Review A* **82**, 053636 (2010).
95. M. Tsang, H. M. Wiseman, and C. M. Caves, “Fundamental quantum limit to waveform estimation,” *Physical Review Letters* **106**, 090401 (2011).
96. A. B. Tacla and C. M. Caves, “Entanglement-based perturbation theory for highly anisotropic Bose-Einstein condensates,” *Physical Review A* **84**, 153606 (2011).
97. M. D. Lang, C. M. Caves, and A. Shaji, “Entropic measures of non-classical correlations,” *International Journal of Quantum Information* **9**, 1553–1586 (2011).
98. M. Tsang and C. M. Caves, “Evading quantum mechanics: Engineering a classical subsystem within a quantum environment,” *Physical Review X* **2**, 031016 (2012).
99. C. M. Caves, J. Combes, Z. Jiang, and S. Pandey, “Quantum limits on phase-preserving linear amplifiers,” *Physical Review A* **86**, 063802 (2012).
100. Z. Jiang, M. Piani, and C. M. Caves, “Ancilla models for quantum operations: For what unitaries does the ancilla state have to be physical?” *Quantum Information Processing* **12**, 1999–2017 (2013).
101. S. Rahimi-Keshari, C. M. Caves, and T. C. Ralph, “Measurement-based method for verifying quantum discord,” *Physical Review A* **87**, 012119 (2013).
102. A. B. Tacla and C. M. Caves, “Mean-field dynamics of two-mode Bose-Einstein condensates in highly anisotropic potentials: Interference, dimensionality, and entanglement,” *New Journal of Physics* **15**, 023008 (2013).
103. S. Pandey, Z. Jiang, J. Combes, and C. M. Caves, “Quantum limits on probabilistic amplifiers,” *Physical Review A* **88**, 033852 (2013).
104. Z. Jiang, M. D. Lang, and C. M. Caves, “Mixing nonclassical pure states in a linear-optical network almost always generates modal entanglement,” *Physical Review A* **88**, 044301 (2013).
105. M. D. Lang and C. M. Caves, “Optimal quantum-enhanced interferometry using a laser power source,” *Physical Review Letters* **111**, 173601 (2013).
106. J. Combes, C. Ferrie, Z. Jiang, and C. M. Caves, “Quantum limits on postselected, probabilistic quantum metrology,” *Physical Review A* **89**, 052117 (2014).
107. A. B. Tacla and C. M. Caves, “Reduced dimensionality and spatial entanglement in highly anisotropic Bose-Einstein condensates,” *Physical Review A* **90**, 013605 (2014).
108. M. D. Lang and C. M. Caves, “Optimal quantum-enhanced interferometry,” *Physical Review A* **90**, 025802 (2014).

109. S. A. Haine, S. S. Szigeti, M. D. Lang, and C. M. Caves, “Heisenberg-limited metrology with information recycling,” *Physical Review A* **91**, 041802(R) (2015).
110. S. Rahimi-Keshari, T. C. Ralph, and C. M. Caves, “Operational discord measure for Gaussian states with Gaussian measurements,” *New Journal of Physics* **17**, 063037 (2015).
111. J. A. Gross, N. Dangniam, C. Ferrie, and C. M. Caves, “Novelty, efficacy, and significance of weak measurements for quantum tomography,” *Physical Review A* **92**, 062133 (2015).
112. Z. Jiang and C. M. Caves, “Particle-number-conserving Bogoliubov approximation for Bose-Einstein condensates using extended catalytic states,” *Physical Review A* **93**, 033623 (2016).
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