

Berthold-Georg Englert

Scientific Curriculum (March 2023) and List of Publications (February 2024)

Scientific Curriculum (updated in March 2023)

My research activities span more than four decades and diverse topics in theoretical quantum physics. The following remarks on selected papers of mine focus on work in the areas specified by these key words:

- 1 – Semiclassical theory of many-fermion systems;
- 2 – Quantum optics;
- 3 – Classical-quantum boundary;
- 4 – Complementarity, wave-particle duality, and all that;
- 5 – Quantum information;
- 6 – Other work.

1 – Semiclassical theory of many-fermion systems

1a – Electrons in atoms (1981–1993)

Papers [4–12], summarized and extended in the book [13], deal with refinements of the semiclassical Thomas–Fermi model of atoms to the point where it becomes possible to treat atomic shell structure quantitatively (see [10], in particular). These investigations identify the link between the systematics of the Periodic Table and the properties of the Thomas–Fermi potential, whereby a simple rule is established for the order in which the orbital states become available [8]. A further extension focuses on the ‘last’ electron [11, 12] and derives the semiclassical prediction for the ionization energy. — The developments up to 1985 are recalled in [201]; see also [207].

1b – Ultracold trapped atoms (2001 and later)

Later, these methods (supplemented by the momentum-space considerations in [19, 28, 29, 39, 42]) found an application to cold trapped Fermi gases [96], which deserve further study. When the gas is trapped in a two-dimensional geometry, matters are markedly different from the three-dimensional situation [155]. A systematic study of Airy-averaged gradient corrections for two-dimensional fermion gases — a revival, to some extent, of the three-dimensional investigations in [6] — is conducted in [194], with results that strongly encourage the application to the self-consistent equations for interacting systems.

There is also the little paper [70] on two atoms in a harmonic trap with a contact interactions between them. Judging by the large number of citations, this work is of some importance for experiments with neutral atoms in optical potentials.

Paper [144] concerns cold fermionic atoms trapped in a two-dimensional honeycomb potential and demonstrates the feasibility of implementations with imperfect optical potentials; some of the predictions have been verified in experiments (Esslinger).

1c – General developments

In [190] we solve a twenty-five year old mystery about inhomogeneity corrections to the Thomas–Fermi approximation for the kinetic energy of two-dimensional gases of fermions. Contrary to folklore, we show that these corrections are definitely nonzero and evaluate the leading correction in perturbation theory.

Paper [198] introduces a novel method for approximating the single-particle density as a functional of the effective single-particle potential energy, and thus also other functionals,

without a gradient expansion. Instead, the density is expressed in terms of unitary evolution operator which is approximated by a factorization of the Suzuki–Trotter kind; see also [217]. A spin-off is the use of this factorization in the fourth-order leapfrog algorithm that is reported in [214].

Most recently, a novel approach that treats all single-particle contributions to the energy by an exactly known density functional is introduced in [220]; ongoing research will eventually tell if this is a viable alternative.

2 – Quantum Optics

2a – Master equations and the theory of the micromaser (1993–2006)

Paper [36] introduces the *damping-basis method*, a powerful tool for investigating and solving master equations as they appear in studies of open, driven quantum systems, in particular those of interest in quantum optics. The method enabled us to give a complete analytical solution of the Jaynes–Cummings model with dissipation (a problem that had frustrated many). This is crucial for extending the theoretical treatment of the micromaser to including photon dissipation during the passage of an atom [44]. The damping-basis method is equally useful when dealing with the time-averaged behavior of a periodically pumped micromaser [57, 69, 84], or when studying correlations among emerging atoms [77]. The latter requires calculating the statistics of detector clicks, for which the general formalism is described in paper [43]. The lecture notes [107] are a tutorial introduction into these matters, and [106, 120] deal with further developments.

The review [130] summarizes the literature on cavity quantum electrodynamics both from the experimental and the theoretical viewpoint.

2b – Raman transitions (2012–2013)

In the context of our work on a scheme for the robust storage of quantum information (see [156]), we needed to refine the existing methods for treating multi-photon Raman-type transitions that make use of nonresonant intermediate levels. This led us to a systematic improvement over the usual adiabatic-elimination procedure [174] as well as to an alternative approach [175] that does not rely on adiabatic elimination of the intermediate levels.

2c – Other matter

Paper [176] deals with quantum correlations as they manifest themselves in the data recorded by lossy detectors that can distinguish between one, two, or more photons. See also [192].

3 – Classical-quantum boundary (1989–1998)

The 1989 paper [16] deals with my unified approach to phase-space functions of various kinds (Wigner, Kirkwood, Glauber). Insights gained then were later useful when giving a rather precise meaning to the classical limit of a quantum-mechanical observable; see papers [25] and [71] in particular.

In [25], general criteria for what can be considered a reasonable phase operator are first established and then applied to a number of plausible candidates. A spin-off is [56] where these ideas helped to analyze a real-world physical experiment.

A puzzling observation is reported in [71]: Unitarily equivalent Hamilton operators can have utterly different classical limits, so that their classical analogs describe quite different physical systems, such as harmonic oscillators with different frequencies. This has an obvious bearing on the question of how to quantize a given classical dynamics.

4 – Complementarity, wave-particle duality, and all that (1988–2015)

4a – Stern-Gerlach interferometers and Humpty Dumpty

The fully quantum-mechanical treatment of Stern-Gerlach interferometers in papers [14, 15, 18] is a very early study of an atom interferometer, in which we find that it is virtually impossible to recover the original spin coherence when a beam of spin- $\frac{1}{2}$ is split in two and then reunited. This ‘Humpty-Dumpty effect’ was later demonstrated experimentally (Baudon).

Paper [216] reports a highly accurate treatment of the Stern–Gerlach interferometer, with a proper magnetic field and a three-dimensional wave function (an application of the fourth-order leapfrog [214]). The study confirms the Humpty-Dumpty effect conclusively.

4b – Bohr’s complementarity and Einstein’s wave-particle duality

Lessons learned then were crucial for paper [24] on Bohr’s complementarity principle and its link to Heisenberg’s uncertainty relation. The more qualitative arguments of [24] received a fully quantitative basis by the work on the quantitative aspects of Einstein’s wave-particle duality in paper [67], extended in [68, 73, 76, 81] and summarized in [87]. The crucial step is the derivation of the duality relation in [67] which states the limits on the compromises between the wave character (visibility of interference fringes) of a quantum object and its particle character (path knowledge). Particularly important is the observation that the duality relation is logically independent of Heisenberg’s uncertainty relation and its generalizations. Experimental tests of the duality relation have been performed with atoms (Rempe) and photons [76, 80] and proposed for neutrons [78]. An application of these concepts to the situation of coherent double scattering is given in [137].

All these studies deal with two-path interferometers. The generalization to multipath configurations is partly accomplished in [138], where the basic conceptual questions are answered, but further studies are necessary before the picture is complete.

A conjecture in [138] was eventually shown to be wrong, and this triggered renewed interest in entropic measures for path distinguishability and interference strength. Some results are reported in [188] without, however, closing the subject as important problems remain unsolved.

4c – Mutually unbiased bases

The concept of mutually unbiased bases is central to these matters — two observables are complementary if their eigenstate bases are unbiased. The review article [151] summarizes what is currently known about such bases and introduces a new problem: How many such bases are there for a periodic continuous degree of freedom? The answer to this question is given in [170]: In full analogy with the other continuous degrees of freedom, there is a continuous set of pairwise unbiased bases for a periodic degree of freedom, too.

There remains the open problem of how many such bases one can have in a six-dimensional Hilbert space, the smallest space in which the standard constructions for maximal sets of unbiased bases does not work. The numerical search that is reported in [159] adds analytical insight in support of the conjecture that there are no more than three pairwise unbiased bases, by establishing the four most distant bases and demonstrating that they are not mutually unbiased.

For mutually unbiased bases in the context of quantum state tomography, see [189].

5 – Quantum information (1997 and later)

5a – Structure of two-qubit states

Papers [91, 94] and the extensive book chapter [100] report work that began in 1997 and is still not completed in full. It concerns the classification of general two-qubit states — the ‘hydrogen molecule’ of quantum information theory. These states are specified by fifteen parameters, and the corresponding state space has a very rich structure that is not fully understood even today. Our approach puts much emphasis on geometrical features. In particular, we use two three-component vectors and a 3×3 -component dyadic to specify the two-qubit states. The vectors and the dyadic behave in a transparent manner under unitary transformations, and this facilitates detailed studies enormously.

We are particularly interested in the so-called Lewenstein–Sanpera decompositions which are crucial for determining to which extent the correlations between the two qubits can be mimicked by classical statistics and to which extent they are of a purely quantum nature. We succeeded in finding the optimal decompositions for some important classes of states, but a procedure for general two-qubit states was missing for many years. Finally, owing to the observation that the search for the optimal decomposition can be formulated as a semidefinite program [147], a relatively simple numerical procedure is now at hand that

can determine the optimal decomposition for any two-qubit state. It also gives analytical solutions for cases not accessible earlier.

5b – The Mean King’s problem and quantum cryptography

A different line of research involves an optical realization of Aharonov’s ‘Mean King’s Problem’. It is proposed in paper [93], and [110] reports the experimental realization. These studies suggested a new method for quantum cryptography and, in particular, for direct secure communication [98, 104]. The latter is fascinating because it enables one to send a confidential message without first establishing a shared key for encryption. This opens up a whole new line of research in quantum information theory. The book chapter [103] summarizes the state of affairs in 2002.

After joining the National University of Singapore, first as a Visiting Professor, then as a permanent faculty member, I got interested in schemes for Tomographic Quantum Cryptography — a very promising field, both for theoretical studies and for proposing experimental implementations of new schemes for quantum key distribution. Paper [117] introduces the general ideas, defines terminology and notation, and explains the strategy for analyzing eavesdropping attacks. In [116], [118], and [121] we describe various results, which also have a bearing on other protocols that are used routinely.

A central problem in these investigations is to find the optimal measurement that fully extracts the accessible information, for which an iterative procedure is described in [124], and an open-source code is made available in [141]; an extension thereof, for the purpose of computing channel capacities, is the open-source code of [162]. The 2007 status of this field is summarized in the book chapter [135], and the optimal measurements for quantum pyramids are given in [142].

A tomographic protocol of particular interest became known as the ‘Singapore Protocol’, introduced in [126]. It makes use of the minimal qubit tomography of [122] and [125], is more efficient than competing tomographic protocols, and more robust than all other protocols described in the literature. The Singapore protocol has been analyzed in full, but the analysis is not published as yet. The experimental study in [199] covers the Singapore protocol along with others.

Studies of quantum key distribution protocols with partial tomography resulted in paper [136]. A novel protocol with trine states, characterized by a key extraction scheme that is substantially more efficient than the usual scheme, is reported in [148].

5c – Quantum state tomography; quantum state estimation

State tomography, in particular of two-qubit states distributed by some source, are the subject matter of papers [143] and [145]. Partly, they extend the single-qubit results of paper [122], but there are also truly novel concepts, such as the tomography with entanglement witnesses and the tomography that exploits witness basis measurements, both introduced in paper [143]. An experiment that demonstrates tomography with witness bases has been performed; see [179] and [181]. Paper [154] is an exhaustive study of highly symmetric generalized measurements for qubit pairs, and paper [161] compares tomography schemes that use product measurements with schemes that are most symmetric.

These “most symmetric” schemes are examples of symmetric informationally complete probability-operator measurements (SIC POMs), much studied in a plethora of theoretical and mathematical publications. Papers [165] and [168] deal with proposals for the actual laboratory implementation of SIC POMs for higher-dimensional quantum degrees of freedom (the qubit case is the subject matter of [122]).

The interpretation of the data acquired by schemes for state tomography or process tomography requires systematic statistical inference. For that purpose, maximum-likelihood estimation is a popular procedure. Paper [157] shows how to supplement it with Jaynes’s maximum-entropy principle if the data are incomplete; a comprehensive study of these matters is [166]. The application of these ideas to adaptive process tomography is presented in [164], and [173] deals with related matters, such as the problem of confirming entanglement on the basis of incomplete data. Paper [215] deals with aspects of gate set tomography.

Maximum-likelihood estimation has a tendency to produce implausible estimators, so that alternatives are worth exploring, among them minimax estimation, which yields conservative estimators. In [167] the research is motivated, a program introduced, and a simple, yet accurate, minimax estimator presented; a somewhat different approach is explored in [172].

All these estimation strategies aim at specifying a best guess for the statistical operator (see also [189] for a particular scenario of incomplete tomographic information). In addition, one needs to attach meaningful error bars. Our answer to this question is in terms of estimator regions, in particular the smallest credible regions; we introduce this research program in [178] and report very encouraging first results. In [191], we show how this strategy is applied to the problem of estimating one or a few properties of the quantum state directly, that is: without estimating the state first. It turns out that the direct estimation is, in fact, preferable as it is more reliable and results in shorter error intervals. The important extension to self-calibrating quantum tomography, where the quantum state and parameters of the apparatus or the transmission line are jointly estimated from the same data, is the topic of [205].

In our approach, the estimators for the quantum state are necessarily quantum states themselves. In [182] we comment on an arXiv posting (later published in Physical Review Letters) that advertises the use of estimators that are not assuredly inside the quantum state space.

5d – Sampling from the quantum state space

The methods of [178] and [191] are Bayesian and require the computation of high-dimensional integrals which can only be done with Monte Carlo integration. For this purpose, one needs to sample the quantum state space in accordance with various distributions. Papers [184], [185], and [218] deal with algorithms for generating good samples of this kind. Arguably the most powerful, and flexible, algorithm is described in [219]. Paper [195] makes an open-source online repository of tested codes for sampling, and also a selection of large ready-to-use samples, available to the community.

The one-to-one mapping between quantum channels and bi-partite quantum states — the Choi–Jamiołkowski isomorphism — can be exploited for a random sampling of quantum channels by a suitable adaptation of the state-sampling algorithm. This is the subject matter of [206]. In [212] we address the problem of estimating the minimum fidelity of a quantum gate (a basic quantum channel, so to say) directly without full channel tomography.

5e – Consistency checks

In the Bayesian reasoning, one encodes pre-measurement knowledge about the situation in the prior density on the state space, and one relies on proper modeling of the situation. The question whether the observed data are typical for the prior can be answered by checks for prior-data conflict, and the model needs to be checked against the data as well. We propose strategies for that in [193], [200], and [204].

Model checking plays a crucial role in [202] which deals with the data from four experiments that probe variants of Bell’s inequality. We find that two experiments did not report the correct value for the conversion probability of a short-wavelength photon into two long-wavelength photons, and the correct values could be extracted from the data by careful model checking.

5f – Other topics

A possible experimental realization of the trine scheme could make use of the reference-free (RFF) qubits, composed of three spin- $\frac{1}{2}$ particles, that we recently introduced in [139]. RFF qubits can also be used for quantum storage purposes, with each qubit encoded in rotationally invariant states of three ultracold spin- $\frac{1}{2}$ atoms in a two-dimensional lattice. The practical feasibility of this idea is the subject of exciting ongoing theoretical studies; a very long life time is predicted for such qubits [156].

In [186] we describe how a controlled-phase gate can be realized between two neutral atoms of the same kind in a rather simple manner. The scheme owes its simplicity to the use

of a single laser pulse that drives the relevant transitions off resonance with the detunings adjusted such that the gate is realized with high fidelity.

The systematic and robust encoding of many qubits in a single continuous quantum degree of freedom is the subject matter of paper [149]. The scheme exploits the observation that the state space of a quantum rotor is equal to the product of the spaces of a genuine qubit and another rotor. This is an invitation to an iteration, which we gladly accept. Coaxial photons that carry orbital angular momentum could be used for laboratory implementation, but no such experiments have been realized as yet.

Another line of research aims at combining the advantages of quantum computation by unitary evolution with those of quantum computation by measurement into a hybrid scheme. This can be done and is potentially useful, indeed; see [153]. During these studies, a lesson was learned about quantum search algorithms, which is the subject matter of [158].

Paper [208] contributes to the discussion about overcoming the resolution limits of classical optics with the aid of quantum aspects of light. We conclude that some claims do not survive scrutiny.

6 – Other work

6a – Research

The 1998 paper [74] is a parody on the hype about quantum computation in those days. It is probably my most-read paper.

Paper [146] deals with an old subject that is still not completely settled: the transmission of waves through a linear random stack of partially transmitting mirrors. We established a recurrence relation that enabled us to improve on earlier treatments and derive strict upper and lower bounds (both exponential in the number of slabs) on the average transmission probability. The finishing touch is put on in [177], where that recurrence relation is solved explicitly in terms of Legendre functions and a number of analytical results are derived.

Owing to fortunate circumstances, I was involved in experimental studies of the spin Hall effect in platinum, carried out at IMRE [140, 150]. While being off my usual track, this activity was eventually rather rewarding after solid data demonstrated a giant spin Hall conductivity [150], about a factor of 100 larger than any conductivities measured earlier by others.

There is also the colloquium on quantum theory [180], in which I assure the reader that quantum theory is a well-defined local theory with no unsolved foundational problems. The alleged great mysteries result from one misunderstanding or another.

Paper [35] explains why the trajectories of Bohmian mechanics cannot be regarded as stating the historical past of a quantum particle. Another, and very different, attempts at ascribing a past to a quantum particle is criticized in [196]; see also [203]. Both cases have in common that, when one monitors the particle's path through an interferometer, the observed past is at variance with what these proposals say. The experiment reported in [197] was triggered by the theoretical study in [196].

An appendix in [151] showed a connection between the Hilbert-space formalism of quantum theory and number theory and put on record a curious multiplicative function, found by serendipity. As shown in [211] it is a particular representative of two large families of unusual multiplicative functions.

6b – Books

The book [13] records the sequence of lectures I gave in 1985 on papers [4–10] and contains other material as well.

I put Julian Schwinger's notes on quantum mechanics [95] into print. This book is much more a posthumous publication by him than a text by me.

The three companion books [131–133] are the lecture notes for my quantum-mechanics courses at NUS; my notes on classical electrodynamics are book [183], the notes on classical mechanics are book [187], and the notes on statistical mechanics are book [213]. Three more volumes in the "Lectures on ..." series will appear in due course; they will

treat advanced topics (variational principles, complementarity and wave-particle duality; variational principles).

Together with others, I co-edited the four books [134, 152, 160, 221]. Three of them grew out of workshops held in Singapore. The editing of book [210] did not involve others; the book includes [209] which is of historical interest.

Revised, corrected and enlarged, second editions of [95] and [131–133] are being prepared.

List of Publications*

(updated in February 2024)

1. BGE, J. Karkowski, and J. M. Rayski, Jr.
Conditions on Classical Sources for a Quantum Scalar Field with Higher Order Derivatives
Physics Letters **83B**, 399–402 (1979).
2. *Quantization of the Radiation-Damped Harmonic Oscillator*
Annals of Physics **129**, 1–21 (1980).
3. W. Dittrich and BGE
One-Loop Thermal Corrections in the Gross-Neveu Model
Nuclear Physics **B179**, 85–105 (1981).
4. BGE and J. Schwinger
Thomas-Fermi revisited: The outer regions of the atom
Physical Review A **26**, 2322–2329 (1982).
5. BGE and J. Schwinger
Statistical atom: Handling the strongly bound electrons
Physical Review A **29**, 2331–2338 (1984).
6. BGE and J. Schwinger
Statistical atom: Some quantum improvements
Physical Review A **29**, 2339–2352 (1984).
7. BGE and J. Schwinger
New statistical atom: A numerical study
Physical Review A **29**, 2353–2363 (1984).
8. BGE and J. Schwinger
Semiclassical atom
Physical Review A **32**, 26–35 (1985).
9. BGE and J. Schwinger
Linear degeneracy in the semiclassical atom
Physical Review A **32**, 36–46 (1985).
10. BGE and J. Schwinger
Atomic-binding-energy oscillations
Physical Review A **32**, 47–63 (1985).
- J. Schwinger and BGE
The statistical atom
unpublished (1985).[†]
11. *Weakly ionized Thomas-Fermi atoms*
Physical Review A **33**, 2146–2147 (1986).
12. *Statistical Atom: Ionization Energies*
Zeitschrift für Naturforschung **42a**, 825–834 (1987).

*Papers 35(a), 36, 59, 70, 74, 78, 97, 99, 102, 105, 113, 115, 118(b), 122, 135, 143, 144, 151, 157, 168, 175, 178, 180, and 181 are fully or partly reprinted in *Quantum Paths*, edited by Rui Han and Hui Khoo Ng (World Scientific Publishing Company Co., Singapore 2015).

[†]This paper was an invited contribution to *Physikalische Blätter*, but the editor did not like the article and did not put it into print. It got eventually published in the proceedings of the Schwinger Centennial Conference; see 201 and 210.

13. *Semiclassical Theory of Atoms*
Lecture Notes in Physics, Vol. 300
(Springer-Verlag, Berlin and Heidelberg, 1988)
ISBN 3-540-19204-2.
14. BGE, J. Schwinger, and M. O. Scully
Is Spin Coherence like Humpty-Dumpty? I. Simplified Treatment
Foundations of Physics **18**, 1045-1056 (1988)
(invited contribution to a Festschrift for David Bohm).
15. J. Schwinger, M. O. Scully, and BGE
Is spin coherence like Humpty-Dumpty? II. General theory
Zeitschrift für Physik **D10**, 135-144 (1988);
reprinted in the Proceedings of the Eleventh International Conference on Atomic Physics
(11th ICAP), Paris 1988 (World Scientific, Singapore 1989, edited by S. Haroche *et al.*),
pp. 37-62.
16. *On the operator bases underlying Wigner's, Kirkwood's and Glauber's phase space functions*
Journal of Physics A: Mathematical and General **22**, 625-640 (1989).
17. BGE and J. Schwinger
Thomas-Fermi Quantization, Classical Orbits, and the Systematics of the Periodic Table
Proceedings of the International Conference on Classical Dynamics in Atomic and Molecular
Physics (CDAMP '88), Brioni 1988 (World Scientific, Singapore 1989, edited by
T. Grozdanov *et al.*), pp. 371-387.
18. M. O. Scully, BGE, and J. Schwinger
Spin coherence and Humpty-Dumpty. III. The effects of observation
Physical Review A **40**, 1775-1784 (1989).
19. K. Buchwald and BGE
Thomas-Fermi-Scott model: Momentum-space density
Physical Review A **40**, 2738-2741 (1989).
20. BGE and M. O. Scully
Good and Bad Welcher Weg Detectors
Proceedings of the NATO Conference on New Frontiers in Quantum Electrodynamics and
Quantum Optics, Istanbul 1989 (Plenum Press, New York 1990, edited by A. O. Barut,
NATO ASI Series, Vol. B232), pp. 507-512.
21. BGE, J. Schwinger, and M. O. Scully
Center-of-Mass Motion of Masing Atoms
Proceedings of the NATO Conference on New Frontiers in Quantum Electrodynamics and
Quantum Optics, Istanbul 1989 (Plenum Press, New York 1990, edited by A. O. Barut,
NATO ASI Series, Vol. B232), pp. 513-519.
22. *Spin Coherence in Stern-Gerlach Interferometers*
Proceedings of the NATO Conference on New Frontiers in Quantum Electrodynamics and
Quantum Optics, Istanbul 1989 (Plenum Press, New York 1990, edited by A. O. Barut,
NATO ASI Series, Vol. B232), pp. 521-530.
23. BGE, J. Schwinger, A. O. Barut, and M. O. Scully
Reflecting Slow Atoms from a Micromaser Field
Europhysics Letters **14**, 25-31 (1991).
24. M. O. Scully, BGE, and H. Walther
Quantum optical tests of complementarity
Nature **351**, 111-116 (1991).
25. J. Bergou and BGE
Operators of the Phase. Fundamentals
Annals of Physics **209**, 479-505 (1991).
26. H.-J. Briegel, BGE, M. Michaelis, and G. Süssmann
*Über die Wurzel aus der Klein-Gordon-Gleichung als Schrödingergleichung eines
relativistischen Spin-0-Teilchens*
Zeitschrift für Naturforschung **46a**, 925-932 (1991).
27. H.-J. Briegel, BGE, and G. Süssmann
Canonical Quantization of the Classical Hamiltonian for a Relativistic Spin-0 Particle
Zeitschrift für Naturforschung **46a**, 933-938 (1991).

28. *Energy functionals and the Thomas-Fermi model in momentum space*
Physical Review A **45**, 127–134 (1992).
29. M. Cinal and BGE
Thomas-Fermi-Scott model in momentum space
Physical Review A **45**, 135–139 (1992).
30. BGE, H. Fearn, M. O. Scully, and H. Walther
An atomic-beam quantum-eraser gedanken experiment
Proceedings of the NATO Advanced Research Workshop on Quantum Measurements in Optics, Cortina d’Ampezzo 1991 (Plenum Press, New York 1992, edited by P. Tombesi and D. F. Walls), pp. 55–62.
31. BGE, H. Walther, and M. O. Scully
Quantum Optical Ramsey Fringes and Complementarity
Applied Physics **B54**, 366–368 (1992).
32. *Complementarity*
Proceedings of the Santa Fe 1991 Workshop on the Foundations of Quantum Mechanics (World Scientific, Singapore 1992, edited by T. D. Black *et al.*), pp. 181–192.
33. BGE und H. Walther
Komplementarität in der Quantenmechanik
Physik in unserer Zeit **23**, 213–220 (1992).
34. *Time Reversal Symmetry and Humpty-Dumpty*
Zeitschrift für Naturforschung **52a**, 13-14 (1997);
Proceedings of the workshop in honor of E. C. G. Sudarshan, Austin 1991, edited by BGE and G. Süssmann.
35. BGE, G. Süssmann, M. O. Scully, and H. Walther
 - (a) *Surrealistic Bohm Trajectories*
Zeitschrift für Naturforschung **47a**, 1175–1186 (1992).
 - (b) *Reply to Comment on ‘Surrealistic Bohm Trajectories’*
Zeitschrift für Naturforschung **48a**, 1263–1264 (1993).
36. H.-J. Briegel and BGE
Quantum optical master equations: The use of damping bases
Physical Review A **47**, 3311–3329 (1993).
— *Sonolumineszenz – Casimir-Licht aus einer Wasserblase?*
Physik in unserer Zeit **24**, 100–101 (1993).
37. C. Ginzel, H.-J. Briegel, U. Martini, BGE, and A. Schenzle
Quantum optical master equations: The one-atom laser
Physical Review A **48**, 732–738 (1993).
38. BGE, N. Sterpi, and H. Walther
Parity states in the one-atom maser
Optics Communications **100**, 526–535 (1993).
39. M. Cinal and BGE
Energy functionals in momentum space: Exchange energy, quantum corrections, and the Kohn-Sham scheme
Physical Review A **48**, 1893–1902 (1993).
40. BGE, N. Sterpi, and H. Walther
One-atom maser: Parity states
Proceedings of the Adriatico Workshop on Quantum Interferometry, Trieste 1993 (World Scientific, Singapore 1994, edited by F. De Martini, G. Denardo, and A. Zeilinger), pp. 91–102.
41. BGE, H. Fearn, M. O. Scully, and H. Walther
The micromaser welcher-weg detector revisited
Proceedings of the Adriatico Workshop on Quantum Interferometry, Trieste 1993 (World Scientific, Singapore 1994, edited by F. De Martini, G. Denardo, and A. Zeilinger), pp. 103–119.
- BGE, M. O. Scully, and H. Walther
One-atom maser: Recoilfree photon emission
unpublished (1993).

- M. Cinal and BGE
Komplementarność
Delta, November 1993, pp. 1–4.
- 42. B. Rohwedder and BGE
Semiclassical quantization in momentum space
Physical Review A **49**, 2340–2346 (1994).
- 43. H.-J. Briegel, BGE, N. Sterpi, and H. Walther
One-atom maser: Statistics of detector clicks
Physical Review A **49**, 2962–2985 (1994).
- 44. H.-J. Briegel, BGE, C. Ginzel, and A. Schenzle
One-atom maser with a periodic and noisy pump. An application of damping bases
Physical Review A **49**, 5019–5041 (1994).
- 45. BGE, M. Naraschewski, and A. Schenzle
Quantum-optical master equations: An interaction picture
Physical Review A **50**, 2667–2679 (1994).
- 46. E. Wehner, R. Seno, N. Sterpi, BGE, and H. Walther
Atom pairs in the micromaser
Optics Communications **110**, 655–669 (1994).
- 47. M. Battocletti and BGE
Reflecting slow atoms from a damped resonator
Journal de Physique II **4**, 1939–1953 (1994).
- 48. BGE, C. Miniatura, and J. Baudon
Least-bias description of atomic beams
Journal de Physique II **4**, 2043–2059 (1994).
- 49. BGE, M. O. Scully and H. Walther
The Duality in Matter and Light
Scientific American **271**(6) (December 1994), pp. 56–61 (international edition); pp. 86–92 (US edition).
- 50. *Elements of micromaser physics*
eprint arXiv:quant-ph/0203052
Written for the Proceedings of the 19th International Nathiagali Summer College on Physics and Contemporary Needs, Nathiagali 1994 (edited by S. A. Ahmad and S. M. Farooqi for Pak Book Cooperation), which never appeared in print.
- 51. K. Wódkiewicz and BGE
Quantum trigonometry and phase-space propensity
in: Quantization, Coherent States, and Complex Structures (Proceedings of the XIIIth Workshop on Geometric Methods in Physics, Białowieża 1994) (Plenum Press, New York 1995, edited by J.-P. Antoine *et al.*), pp. 243–248.
- 52. BGE and K. Wódkiewicz
Intrinsic and operational observables in quantum mechanics
eprint arXiv:quant-ph/9502013
Physical Review A **51**, R2661–R2664 (1995).
- 53. *Driven Systems with One Bound State*
Letters in Mathematical Physics **34**, 239–248 (1995)
(invited contribution to the memorial issue for Julian Schwinger).
- 54. BGE, M. O. Scully, and H. Walther
Complementarity and uncertainty
Nature **375**, 367–368 (1995).
- BGE, M. O. Scully, and H. Walther
Is the principle of complementarity deeper than the uncertainty relation? Certainly!
unpublished (1995).
- 55. BGE, Ts. Gantsog, A. Schenzle, and C. Wagner
Successive clicks of the same kind in one-atom-maser experiments
Acta Physica Slovaca **45**, 353–356 (1995).
- 56. BGE, K. Wódkiewicz, and P. Riegler
Intrinsic phase operator of the Noh-Fougères-Mandel experiments
Physical Review A **52**, 1704–1711 (1995).

57. H.-J. Briegel and BGE
Macroscopic dynamics of a maser with non-Poissonian injection statistics
Physical Review A **52**, 2361–2375 (1995).
58. BGE, Ts. Gantsog, A. Schenzle, and C. Wagner
Analytical calculation of the atom counting statistics for the one-atom maser
in: Coherence and Quantum Optics VIII (Proceedings of the CQO-7 Conference, Rochester 1995) (Plenum Press, New York 1996, edited by J. Eberly, L. Mandel, and E. Wolf), pp. 361–362.
59. M. Thoss and BGE
A Quantum Action Principle for Open Systems
Letters in Mathematical Physics **37**, 293–308 (1996).
60. H.-J. Briegel, G. M. Meyer, and BGE
Correlated atomic excitation in multi-level lasers
in: Laser Optics '95: Nonlinear Dynamics in Lasers (Proceedings of the 8th Laser Optics Conference, St. Petersburg 1995) (SPIE 1996, edited by N. B. Abraham and Ya. I. Khanin), pp. 43–53.
- J. P. Dowling, BGE, A. Schenzle, J. E. Alcock, and R. Hyman
Comment on 'Theoretical Model of a Purported Empirical Violation of the Predictions of Quantum Theory'
unpublished (1995).
61. H.-J. Briegel, G. M. Meyer, and BGE
Dynamic noise reduction in multi-level lasers: Nonlinear theory and the pump-operator approach
Physical Review A **53**, 1143–1159 (1996).
62. H.-J. Briegel, BGE, M. O. Scully, and H. Walther
Atom Interferometry and the Quantum Theory of Measurement
in: Atom Interferometry (Academic Press, San Diego and London 1997, edited by P. Berman), pp. 217–255.
63. BGE, Ts. Gantsog, A. Schenzle, C. Wagner, and H. Walther
One-atom maser: Phase-sensitive measurements
Physical Review A **53**, 4386–4399 (1996).
- *Quantenoptik — zwei Darstellungen*
Comparative book review of W. Vogel & D.-G. Welsch, *Lectures on Quantum Optics* (Akademie Verlag, Berlin 1994) and D. F. Walls & G. J. Milburn, *Quantum Optics* (Springer-Verlag, Berlin and Heidelberg 1994)
Physik in unserer Zeit **27**, XV (1996).
64. H.-J. Briegel, G. M. Meyer, and BGE
Pump operator for lasers with multi-level excitation
Europhysics Letters **33**, 515–520 (1996).
65. BGE, H. Walther, A. Zucchetti, P. Masiak, and K. Rzążewski
Time-averaged inversion in the one-atom maser
Laser Physics **6**, 544–547 (1996).
66. M. Löffler, BGE, and H. Walther
Testing a Bell-type inequality with a micromaser
Applied Physics **B63**, 511–516 (1996).
67. *Fringe Visibility and Which-Way Information: An Inequality*
Physical Review Letters **77**, 2154–2157 (1996).
68. *Duality in the Ramsey interferometer*
Acta Physica Slovaca **46**, 249–258 (1996).
69. H.-J. Briegel, BGE, and M. O. Scully
Spectral properties of a micromaser: Atomic-beam statistics and the field correlation function
Physical Review A **54**, 3603–3613 (1996).
70. T. Busch, BGE, K. Rzążewski, and M. Wilkens
Two Cold Atoms in a Harmonic Trap
Foundations of Physics **28**, 549–559 (1998)
(memorial issue for Asim O. Barut).

- *Comment on ‘Quantum action-angle variables for the harmonic oscillator’*
unpublished (1997).
- 71. *Classical Analogs of Unitarily Equivalent Hamilton Operators*
Foundations of Physics **28**, 375–384 (1998)
(memorial issue for Asim O. Barut).
- 72. BGE, M. O. Scully, and H. Walther
Quantum erasure in double-slit interferometers with which-way detectors
American Journal of Physics **67**, 325–329 (1999).
- 73. *Wave-particle duality quantified*
Proceedings of the Fifth International Conference on Squeezed States and Uncertainty
Relations, Balatonfüred 1997 (NASA/CP-1998-206855, edited by D. Han, J. Janszky, Y. S.
Kim, and V. I. Man’ko), pp. 603–608.
- 74. J. A. Bergou and BGE
Heisenberg’s dog and quantum computing
Journal of Modern Optics **45**, 701–711 (1998).
- 75. *Remarks on Some Basic Issues in Quantum Mechanics*
Zeitschrift für Naturforschung **54a**, 11–32 (1999).
- 76. P. D. D. Schwindt, P. G. Kwiat, and BGE
Quantitative wave-particle duality and non-erasing quantum erasure
eprint arXiv:quant-ph/9908072
Physical Review A **60**, 4285–4290 (1999).
- 77. BGE, M. Löffler, O. Benson, B. Varcoe, M. Weidinger, and H. Walther
Entangled atoms in micromaser physics
Fortschritte der Physik **46**, 897–926 (1998).
- *Von wißbaren und unwißbaren Wegen*
Physikalische Blätter **54**, 999–1000 (1998).
- 78. G. Badurek, R. J. Buchelt, BGE, and H. Rauch
Wave-particle duality and quantum erasure in polarized-neutron interferometry
Nuclear Instruments and Methods in Physics Research A **440**, 562–567 (2000).
- 79. M. O. Scully, Y. Aharonov, and BGE
On the Locality and Reality of Einstein-Podolsky-Rosen Correlations
in: *Mysteries, Puzzles, and Paradoxes in Quantum Mechanics* (Proceedings of the conference
held at Gargnano 1998) (CP 461, American Institute of Physics 1999, edited by R.
Bonifacio), pp. 47–68.
- 80. P. G. Kwiat, P. D. D. Schwindt, and BGE
What Does a Quantum Eraser Really Erase?
in: *Mysteries, Puzzles, and Paradoxes in Quantum Mechanics* (Proceedings of the conference
held at Gargnano 1998) (CP 461, American Institute of Physics 1999, edited by R.
Bonifacio), pp. 69–80.
- *Book review of M. O. Scully and M. S. Zubairy, Quantum optics (Cambridge University
Press, Cambridge 1997)*
Foundations of Physics **29**, 829 (1999).
- 81. *Quantitative wave-particle duality*
Proceedings of the International Symposium
‘From Duality to Unity: 75 Years of Wave-Particle Duality,’ Delhi 1998
(Plenum, in print, edited by R. Nair).
- 82. Yu. M. Golubev, BGE, H. Lee, M. O. Scully, and H. Walther
Generation of sub-Poissonian light by a four-level microlaser with a high-Q cavity
Journal of Experimental and Theoretical Physics **89**, 258–266 (1999)
[JETP **116**, 485 (1999)].
- 83. Y. Aharonov, BGE, and M. O. Scully
Protective measurements and Bohm trajectories
Physics Letters **A263**, 137–146 (1999); *errata*: **A266**, 216–217 (2000).

84. B. T. H. Varcoe, S. Brattke, BGE, and H. Walther
 (a) *From trapping states to Fock states in the micromaser*
 Laser Spectroscopy. Proceedings of the XIV International Conference (ICOLS '99,
 Innsbruck 1999) (World Scientific, 1999, edited by R. Blatt, J. Eschner, D. Leibfried, and
 F. Schmidt-Kaler), pp. 130–139.
 (b) *The Generation of Fock-States in the One-Atom Maser*
 Laser Physics **10**, 1–7 (2000).
 (c) *Fock State Rabi Oscillations; A Building Block for the Observation of New Phenomena*
 in *Quantum Optics*
 Fortschritte der Physik **48**, 679–687 (2000).
85. BGE, M. O. Scully, and H. Walther
Comment on 'Complementarity Enforced by Random Classical Phase Kicks'
 Physical Review Letters **84**, 2040 (2000).
86. M. O. Scully, BGE, and C. J. Bednar
Two-photon scheme for detecting the Bell basis using atomic coherence
 Physical Review Letters **83**, 4433–4436 (1999).
87. BGE and J. A. Bergou
Quantitative quantum erasure
 Optics Communications **179**, 337–355 (2000).
88. BGE and H. Walther
Preparing a GHZ state, or an EPR state, with the one-atom maser
 Optics Communications **179**, 283–288 (2000).
89. J. A. Bergou, BGE, M. Lax, M. O. Scully, H. Walther, and M. S. Zubairy
Quantum Theory of the Laser
 in: Handbook of Optics, Vol. IV, edited by M. Bass, J. M. Enoch, E. W. van Stryland, and W.
 L. Wolfe (Mc-Graw Hill, 2001), pp. 26.1–26.50
90. BGE, M. O. Scully, and H. Walther
On mechanism that enforce complementarity
 eprint arXiv:quant-ph/9910037
 Journal of Modern Optics **47**, 2213–2220 (2000).
91. BGE and N. Metwally
Separability of entangled q-bit pairs
 eprint arXiv:quant-ph/9912089
 Journal of Modern Optics **47**, 2221–2231 (2000).
92. S. Brattke, BGE, B. T. H. Varcoe, and H. Walther
Fock states in a cyclically pumped one-atom maser
 Journal of Modern Optics **47**, 2857–2867 (2000).
93. BGE, C. Kurtsiefer, and H. Weinfurter
Universal unitary gate for single-photon 2-qubit states
 eprint arXiv:quant-ph/0101064
 Physical Review A **63**, art. 032303 (2001) [10 pages].
94. BGE and N. Metwally
Remarks on 2-q-bit states
 eprint arXiv:quant-ph/0007053
 Applied Physics B **72**, 35–42 (2001).
95. J. Schwinger
Quantum Mechanics – Symbolism of Atomic Measurements
 edited by BGE (Springer-Verlag, Berlin and Heidelberg 2001, 2003)
 ISBN 3–540–41408–8.
96. K. Góral, BGE, and K. Rzążewski
Semiclassical theory of trapped fermionic dipoles
 eprint arXiv:cond-mat/0010193
 Physical Review A **63**, art. 033606 (2001) [8 pages].
97. Y. Aharonov and BGE
The mean king's problem: Spin 1
 eprint arXiv:quant-ph/0101065
 Zeitschrift für Naturforschung **56a**, 16–19 (2001).

98. A. Beige, BGE, C. Kurtsiefer, and H. Weinfurter
Secure communication with single-photon two-qubit states
eprint arXiv:quant-ph/0101066
Journal of Physics A: Mathematical and General **35**, L407–L413 (2002).
99. BGE and Y. Aharonov
The mean king's problem: Prime degrees of freedom
eprint arXiv:quant-ph/0101134
Physics Letters A **284**, 1–5 (2001).
100. BGE and N. Metwally
Kinematics of qubit pairs
Chapter 2 in: Mathematics of Quantum Computation,
edited by G. Chen and R. K. Brylinski
(CRC Press LLC, Boca Raton, 2002), pp. 25–75.
— *Book review of H. Dürr, Bohmsche Mechanik als Grundlage der Quantenmechanik (Springer Verlag, Berlin 2001)*
Physikalische Blätter **57**(11), 82–83 (2001).
101. BGE and K. Wódkiewicz
Separability of Two-Party Gaussian States
eprint arXiv:quant-ph/0107131
Physical Review A **65**, art. 054303 (2002) [4 pages].
102. G. Morigi, E. Solano, BGE, and H. Walther
Measuring irreversible dynamics of a quantum harmonic oscillator
eprint arXiv:quant-ph/0108082
Physical Review A **65**, art. 040102 (2002) [4 pages].
103. A. Beige, BGE, C. Kurtsiefer, and H. Weinfurter
Communicating with qubit pairs
Chapter 14 in: Mathematics of Quantum Computation,
edited by G. Chen and R. K. Brylinski
(CRC Press LLC, Boca Raton, 2002), pp. 359–401.
104. A. Beige, BGE, C. Kurtsiefer, and H. Weinfurter
Secure communication with a publicly known key
eprint arXiv:quant-ph/0111106
Acta Physica Polonica A **101**, 357–368 (2002); erratum **101**, 901 (2002).
105. BGE, S. A. Fulling, and M. D. Pilloff
Statistics of dressed modes in a thermal state
eprint arXiv:quant-ph/0205023
Optics Communications **208**, 139–144 (2002).
106. G. Morigi, E. Solano, BGE, and H. Walther
Reversing the Jaynes-Cummings dynamics to measure decoherence
Journal of Optics B: Quantum and Semiclassical Optics **4**, S310–S312 (2002).
107. BGE and G. Morigi
Five lectures on dissipative master equations
eprint arXiv:quant-ph/0206116
Chapter 2 in: Coherent Evolution in Noisy Environments,
edited by A. Buchleitner and K. Hornberger,
Lecture Notes in Physics, Vol. 611
(Springer Verlag, Berlin and Heidelberg, 2002), pp. 55–106.
108. S. A. Fulling, BGE, and M. D. Pilloff
Interacting bosons at finite temperature: How Bogolubov visited a black hole and came home again
eprint arXiv:gr-qc/0207032
Foundations of Physics **33**, 87–110 (2003)
(special issue in honor of Jacob Bekenstein).
109. BGE and P. G. Kwiat
Comment on 'Comprehensive experimental test of quantum erasure'
submitted to European Physics Journal D.

110. O. Schulz, R. Steinhübl, M. Weber, BGE, C. Kurtsiefer, and H. Weinfurter
Ascertaining the Values of σ_x , σ_y , and σ_z of a Polarization Qubit
 eprint arXiv:quant-ph/0209127
 Physical Review Letters **90**, art. 177901 (2003) [4 pages].
111. BGE, P. Lougovski, E. Solano, and H. Walther
One-atom maser: Non-separable atom pairs
 eprint arXiv:quant-ph/0209128
 Laser Physics **13**, 355–358 (2003)
 (memorial issue for Aleksandr M. Prokhorov).
112. G. Chen, BGE, and J. Zhou
Convergence Analysis of an Optimal Scaling Algorithm for Semilinear Elliptic Boundary Value Problems
 in: *Variational Methods: Open Problems, Recent Progress, and Numerical Algorithms*,
 edited by J. M. Neuberger, Contemporary Mathematics **357**, 69–85 (2004).
113. P. G. Kwiat and BGE
Quantum erasing the nature of reality or, perhaps, the reality of Nature?
 Chapter 15 in: *Science and Ultimate Reality — Quantum Theory, Cosmology and Complexity*, edited by J. D. Barrow, P. C. W. Davies, and C. L. Harper, Jr. (Cambridge University Press, Cambridge 2004) pp. 306–329.
114. G. Chen, D. A. Church, BGE, and M. S. Zubairy
Mathematical modeling of contemporary quantum computing devices
 eprint arXiv:quant-ph/0303163
 in *Quantum Control: Mathematical and Numerical Challenges*, edited by A. Bandrauk, M. C. Delfour, and C. Le Bris, Centre de Recherche Mathématique, CRM Proceedings and Lecture Notes **33**, 79–118 (2003).
115. D. Kaszlikowski, L. C. Kwek, M. Żukowski, and BGE
Information-theoretic approach to single-particle and two-particle interference in multi-path interferometers
 eprint arXiv:quant-ph/0302140
 Physical Review Letters **91**, art. 037901 (2003) [4 pages].
116. D. Bruß, M. Christandl, A. Ekert, BGE, D. Kaszlikowski, and C. Macchiavello
Tomographic Quantum Cryptography: Equivalence of Quantum and Classical Key Distillation
 eprint arXiv:quant-ph/0303184
 Physical Review Letters **91**, art. 097901 (2003) [4 pages].
117. Y. C. Liang, D. Kaszlikowski, BGE, L. C. Kwek, and C. H. Oh
Tomographic Quantum Cryptography
 eprint arXiv:quant-ph/0305018
 Physical Review A **68**, art. 022324 (2003) [9 pages].
118. D. Kaszlikowski, A. Gopinathan, Y. C. Liang, L. C. Kwek, and BGE
 (a) *How well can you know the edge of a quantum pyramid?*
 eprint arXiv:quant-ph/0307086.
 (b) *Quantum Cryptography: Security Criteria Reexamined*
 eprint arXiv:quant-ph/0310144
 Physical Review A **70**, art. 032306 (2004) [5 pages].
119. BGE and K. Wódkiewicz
Tutorial Notes on One-Party and Two-Party Gaussian States
 eprint arXiv:quant-ph/0307196
 International Journal of Quantum Information **1**, 153–188 (2003).
120. (a) P. Lougovski, F. Casagrande, A. Lulli, BGE, E. Solano, and H. Walther
Solvable model of a strongly-driven micromaser
 eprint arXiv:quant-ph/0309040
 Physical Review A **69**, art. 023812 (2004) [9 pages].
 (b) F. Casagrande, BGE, P. Lougovski, A. Lulli, E. Solano, and H. Walther
A solvable open quantum system: The strongly driven micromaser
 Optics and Spectroscopy **99**, 301–306 (2005).

121. D. Kaszlikowski, J. Y. Lim, L. C. Kwek, and BGE
 - (a) *Quantum and classical advantage distillation are not equivalent*
eprint arXiv:quant-ph/0310156.
 - (b) *Coherent Eavesdropping Attacks in Tomographic Quantum Cryptography: Nonequivalence of Quantum and Classical Key Distillation*
eprint arXiv:quant-ph/0312172
Physical Review A **72**, art. 042315 (2005) [5 pages].
122. J. Řeháček, BGE, and D. Kaszlikowski
Minimal qubit tomography
eprint arXiv:quant-ph/0405084
Physical Review A **70**, art. 052321 (2004) [13 pages].
123. L. Praxmeyer, BGE, and K. Wódkiewicz
Violation of Bell's inequality for continuous variables
eprint arXiv:quant-ph/0406172
European Physics Journal D **32**, 227–231 (2005).
124. J. Řeháček, BGE, and D. Kaszlikowski
Iterative procedure for computing accessible information in quantum communication
eprint arXiv:quant-ph/0408134
Physical Review A **71**, art. 054303 (2005) [4 pages].
125. BGE, K. M. Tin, C. G. Goh, and H. K. Ng
Single-loop interferometer for minimal ellipsometry
eprint arXiv:physics/0409015
Laser Physics **15**, 7–9 (2005).
126. BGE, D. Kaszlikowski, H. K. Ng, W. K. Chua, J. Řeháček, and J. Anders
Efficient and robust quantum key distribution with minimal state tomography
eprint arXiv:quant-ph/0412075.
127. BGE, F.-W. Fu, H. Niederreiter, and C. Xing
Codes for Key Generation in Quantum Cryptography
eprint arXiv:quant-ph/0504093
International Journal for Quantum Information **3** (Supplement), 97–110 (2005).
128. J. Anders, H. K. Ng, BGE, and S. Y. Looi
Singapore Protocol: Incoherent Eavesdropping Attacks
eprint arXiv:quant-ph/0505069.
129. BGE, K. L. Lee, A. Mann, and M. Revzen
Periodic and discrete Zak bases
eprint arXiv:quant-ph/0511234
Journal of Physics A: Mathematical and General **39**, 1669–1682 (2006).
130. H. Walther, B. T. H. Varcoe, BGE, and T. Becker
Cavity Quantum Electrodynamics
Reports on Progress in Physics **69**, 1325–1382 (2006).
131. *Lectures on Quantum Mechanics — Basic Matters*
(World Scientific Publishing Co., Singapore 2006)
ISBN 978–981–256–970–7 (hardcover), ISBN 978–981–256–971–4 (softcover),
ISBN 978–981–4365–52–9 (ebook); for the second edition, see 225.
132. *Lectures on Quantum Mechanics — Simple Systems*
(World Scientific Publishing Co., Singapore 2006)
ISBN 978–981–256–972–1 (hardcover), ISBN 978–981–256–973–8 (softcover),
ISBN 978–981–4365–51–2 (ebook); for the second edition, see 226.
133. *Lectures on Quantum Mechanics — Perturbed Evolution*
(World Scientific Publishing Co., Singapore 2006)
ISBN 978–981–256–974–5 (hardcover), ISBN 978–981–256–975–2 (softcover),
ISBN 978–981–4365–50–5 (ebook); for the second edition, see 227.
134. G. Chen, D. A. Church, BGE, C. Henkel, B. Rohwedder, M. O. Scully, and M. S. Zubairy
Quantum Computing Devices: Principles, Designs and Analysis
(Chapman & Hall/CRC, Boca Raton 2006)
ISBN 158–488–681–1.

135. J. Suzuki, S. M. Assad, and BGE
Accessible information about quantum states: An open optimization problem
 Chapter 11 in *Mathematics of Quantum Computation and Quantum Technology*, edited by
 G. Chen, S. J. Lomonaco, and L. Kauffman
 (Chapman & Hall/CRC, Boca Raton 2007), pp. 309–348.
136. S. M. Assad, J. Suzuki, and BGE
Raw-data attacks in quantum cryptography with partial tomography
 eprint arXiv:quant-ph/0609175
International Journal of Quantum Information **4**, 1003–1012 (2006).
137. C. Miniatura, C. A. Müller, Y. Lu, G. Wang, and BGE
Path distinguishability in double scattering of light by atoms
 eprint arXiv:0704.1896 [quant-ph]
Physical Review A **76**, art. 022101 (2007) [4 pages].
138. BGE, D. Kaszlikowski, L. C. Kwek, and W. H. Chee
*Wave-particle duality in multi-path interferometers: General concepts and three-path
 interferometers*
 eprint arXiv:0710.0179 [quant-ph]
International Journal of Quantum Information **6**, 129–157 (2008).
139. J. Suzuki, G. N. M. Tabia, and BGE
Symmetric construction of reference-frame-free qudits
 eprint arXiv:0802.1609 [quant-ph]
Physical Review A **78**, art. 052328 (2008) [5 pages].
140. Koong C. W., N. Chandrasekhar, C. Miniatura, and BGE
Spin orbit interaction induced spin-separation in platinum nanostructures
 eprint arXiv:0804.0096 [cond-mat.mes-hall]
 Chapter 5 in *Electron Transport in Nanosystems*, edited by Janez Bonča and Sergei Kruchinin
 (Springer Verlag, 2008), pp. 49–58.
141. K. L. Lee, J. Shang, W. K. Chua, S. Y. Looi, and BGE
*SOMIM: An open-source program code for the numerical Search for Optimal Measurements
 by an Iterative Method*
 eprint arXiv:0805.2847 [quant-ph]
 URL: <http://www.quantumlah.org/publications/software/SOMIM/>
142. BGE and J. Reháček
How well can you know the edge of a quantum pyramid?
 eprint arXiv:0905.0510 [quant-ph]
Journal of Modern Optics **57**, 218–226 (2010).
143. H. Zhu, Y. S. Teo, and BGE
Minimal tomography with entanglement witnesses
 eprint arXiv:0906.3985 [quant-ph]
Physical Review A **81**, art. 052339 (2010) [8 pages].
144. K. L. Lee, B. Grémaud, R. Han, BGE, and C. Miniatura
Ultracold fermions in a graphene-type optical lattice
 eprint arXiv:0906.4158 [quant-ph, cond-mat.quant-gas]
Physical Review A **80**, art. 043411 (2009) [18 pages].
145. Y. S. Teo, H. Zhu, and BGE
*Product measurements and fully symmetric measurements in qubit-pair tomography:
 A numerical study*
 eprint arXiv:0907.4258 [quant-ph]
Optics Communications **283**, 724–729 (2010).
146. Y. Lu, C. Miniatura, and BGE
Average transmission probability of a random stack
 eprint arXiv:0907.5557 [quant-ph]
European Journal of Physics **31**, 47–55 (2010).
147. G. C. Thiang, P. Raynal, and BGE
*Optimal Lewenstein–Sanpera decomposition of two-qubit states using semidefinite
 programming*
 eprint arXiv:0909.4599 [quant-ph]
Physical Review A **80**, art. 052313 (2009) [6 pages].

148. G. Tabia and BGE
Efficient quantum key distribution with trines of reference-frame-free qubits
 eprint arXiv:0910.5375 [quant-ph]
 Physics Letters A **375**, 817–822 (2011).
149. P. Raynal, A. Kalev, J. Suzuki, and BGE
Encoding many qubits in a rotor
 eprint arXiv:1003.1201 [quant-ph]
 Physical Review A **81**, art. 052327 (2010) [11 pages];
 reprinted in *Quantum Africa 2010: Theoretical and experimental foundations of recent quantum technology*, AIP Conference Proceedings **1469**, 63–81 (2012).
150. Koong C. W., BGE, C. Miniatura, and N. Chandrasekhar
Giant spin Hall effect in platinum at room temperature
 eprint arXiv:1004.1273 [cond-mat.mes-hall].
151. T. Durt, BGE, I. Bengtsson, and K. Życzkowski
On mutually unbiased bases
 eprint arXiv:1004.3348 [quant-ph]
 International Journal of Quantum Information **8**, 535–640 (2010).
152. H. Araki, BGE, L.-C. Kwek, and J. Suzuki, eds.,
Mathematical Horizons for Quantum Physics
 Lecture Notes Series, Institute of Mathematical Sciences, National University of Singapore,
 vol. 20
 (World Scientific Publishing Co., Singapore 2010)
 ISBN-13 978–981–4313–31–5, ISBN-10 981–4313–31–9.
153. A. Sehwat, D. Zemann, and BGE
Hybrid quantum computation
 eprint arXiv:1008.1118 [quant-ph]
 Physical Review A **83**, art. 022317 (2011) [14 pages].
154. H. Zhu, Y. S. Teo, and BGE
Two-qubit symmetric informationally complete positive-operator-valued measures
 eprint arXiv:1008.1138 [quant-ph]
 Physical Review A **82**, art. 042308 (2010) [9 pages].
155. B. Fang and BGE
Density functional of a two-dimensional gas of dipolar atoms: Thomas-Fermi-Dirac treatment
 eprint arXiv:1008.1163 [cond-mat.quant-gas]
 Physical Review A **83**, art. 052517 (2011) [11 pages].
156. R. Han, N. Lörch, J. Suzuki, and BGE
Long-lived qubit from three spin-1/2 atoms
 eprint arXiv:1008.1523 [quant-ph]
 Physical Review A **84**, art. 012322 (2011) [14 pages].
157. Y. S. Teo, H. Zhu, BGE, J. Řeháček, and Z. Hradil
Quantum-State Reconstruction by Maximizing Likelihood and Entropy
 eprint arXiv:1102.2662 [quant-ph]
 Physical Review Letters **107**, art. 020404 (2011) [4 pages].
158. A. Sehwat, L. H. Nguyen, and BGE
Test-state approach to the quantum search problem
 eprint arXiv:1102.3628 [quant-ph]
 Physical Review A **83**, art. 052311 (2011) [10 pages].
159. P. Raynal, X. Lü, and BGE
Mutually unbiased bases in dimension six: The four most distant bases
 eprint arXiv:1103.1025 [quant-ph]
 Physical Review A **83**, art. 062303 (2011) [9 pages].
160. C. Miniatura, L.-C. Kwek, M. Ducloy, B. Grémaud, BGE, L.F. Cugliandolo, A. Ekert, and K.K. Phua, eds.,
Les Houches 2009—Session XCI: Ultracold Gases and Quantum Information
 (Oxford University Press, Oxford 2011)
 ISBN 978–0–19–960365–7.

161. H. Zhu and BGE
Quantum state tomography with fully symmetric measurements and product measurements
 eprint arXiv:1105.4561 [quant-ph]
 Physical Review A **84**, art. 022327 (2011) [13 pages].
162. J. Shang, K. L. Lee, and BGE
SeCQC: An open-source program code for the numerical Search for the classical Capacity of Quantum Channels
 eprint arXiv:1108.0226 [quant-ph]
 URL: <http://www.quantumlah.org/publications/software/SeCQC/>
163. *Comment on 'Minimum Uncertainty and Entanglement'*
 eprint arXiv:1108.1106 [quant-ph].
164. Y. S. Teo, BGE, J. Řeháček, and Z. Hradil
Adaptive schemes for incomplete quantum process tomography
 eprint arXiv:1110.1202 [quant-ph]
 Physical Review A **84**, art. 062125 (2011) [9 pages].
165. A. Kalev, J. Shang, and BGE
Experiment proposal for symmetric minimal two-qubit state tomography
 eprint arXiv:1203.1675 [quant-ph]
 Physical Review A **85**, art. 052115 (2012) [4 pages].
166. Y. S. Teo, B. Stoklasa, BGE, J. Řeháček, and Z. Hradil
Incomplete quantum state estimation: A comprehensive study
 eprint arXiv:1202.1713 [quant-ph]
 Physical Review A **85**, art. 042317 (2012) [9 pages].
167. H. K. Ng and BGE
A simple minimax estimator for quantum states
 eprint arXiv:1202.5136 [quant-ph]
 International Journal of Quantum Information **11**, art. 1250038 (2012) [25 pages].
168. A. Kalev, J. Shang, and BGE
Symmetric minimal quantum tomography by successive measurements
 eprint arXiv:1203.1677 [quant-ph]
 Physical Review A **85**, art. 052116 (2012) [7 pages].
169. L. H. Nguyen, A. Kalev, M. Barrett, and BGE
Micromotion in the trapped atom-ion system
 eprint arXiv:1203.0792 [quant-ph]
 Physical Review A **85**, art. 052718 (2012) [22 pages].
170. X. Lü, P. Raynal, and BGE
Mutually unbiased bases for the rotor degree of freedom
 eprint arXiv:1203.5201 [quant-ph]
 Physical Review A **85**, art. 052316 (2012) [8 pages].
171. J. Suzuki and BGE
Symmetric coupling of four spin-1/2 systems
 eprint arXiv:1204.2615 [quant-ph]
 Journal of Physics A: Mathematical and Theoretical **45**, art. 255301 (2012) [17 pages].
172. H. K. Ng, K. T. B. Phuah, and BGE
Minimax mean estimator for the trine
 eprint arXiv:1207.0183 [quant-ph]
 New Journal of Physics **14**, art. 085007 (2012) [17 pages].
173. Y. S. Teo, BGE, J. Řeháček, Z. Hradil, and D. Mogilevtsev
Verification of state and entanglement with incomplete tomography
 eprint arXiv:1207.5386 [quant-ph]
 New Journal of Physics **14**, art. 105020 (2012) [14 pages].
174. V. Paulisch, R. Han, H. K. Ng, and BGE
Beyond adiabatic elimination: A hierarchy of approximations for multi-photon processes
 eprint arXiv:1209.6568 [quant-ph]
 European Physics Journal Plus **129**, art. 12 (2014) [14 pages].

175. R. Han, H. K. Ng, and BGE
Raman transitions without adiabatic elimination: A simple and accurate treatment
 eprint arXiv:1209.6569 [quant-ph]
 Journal of Modern Optics **60**, 255–265 (2013).
176. S.-H. Tan, L. A. Krivitsky, and BGE
Measuring quantum correlations using lossy photon-number-resolving detectors with saturation
 eprint arXiv:1210.8022 [quant-ph]
 Journal of Modern Optics **63**, 276–283 (2016).
177. H. K. Ng and BGE
One-dimensional transport revisited: A simple and exact solution for phase disorder
 eprint arXiv:1212.1951 [cond-math.dis-nn]
 Physical Review B **88**, art. 054201 (2013) [9 pages].
178. J. Shang, H. K. Ng, A. Sehwat, X. Li, and BGE
Optimal error regions for quantum state estimation
 eprint arXiv:1302.4081 [quant-ph]
 New Journal of Physics **15**, art. 123026 (2013) [26 pages].
179. J. Dai, Y. L. Len, Y. S. Teo, L. A. Krivitsky, and BGE
Controllable generation of mixed two-photon states
 eprint arXiv:1304.2101 [quant-ph]
 New Journal of Physics **15**, art. 063011 (2013) [10 pages].
180. *On Quantum Theory*
 eprint arXiv:1308.5290 [quant-ph]
 The European Physical Journal D **67**, art. 238 (2013) [16 pages].
181. J. Dai, Y. L. Len, Y. S. Teo, BGE, and L. A. Krivitsky
Experimental detection of entanglement with optimal-witness families
 eprint arXiv:1402.5710 [quant-ph]
 Physical Review Letters **113**, art. 170402 (2014) [5+4 pages]
182. J. Shang, H. K. Ng, and BGE
Quantum state tomography: Mean squared error matters, bias does not
 eprint arXiv:1405.5350 [quant-ph]
183. *Lectures on Classical Electrodynamics*
 (World Scientific Publishing Co., Singapore 2014)
 ISBN 978–981–4596–92–3 (hardcover), ISBN 978–981–4596–93–0 (softcover),
 ISBN 978–981–4596–95–4 (ebook).
184. J. Shang, Y.-L. Seah, H. K. Ng, D. J. Nott, and BGE
Monte Carlo sampling from the quantum state space. I
 eprint arXiv:1407.7805 [quant-ph]
 New Journal of Physics **17**, art. 043017 (2015) [13 pages].
185. Y.-L. Seah, J. Shang, H. K. Ng, D. J. Nott, and BGE
Monte Carlo sampling from the quantum state space. II
 eprint arXiv:1407.7806 [quant-ph]
 New Journal of Physics **17**, art. 043018 (2015) [11 pages].
186. R. Han, H. K. Ng, and BGE
Implementing a neutral-atom controlled-phase gate with a single Rydberg pulse
 eprint arXiv:1407.8051 [quant-ph]
 Europhysics Letters **113**, art. 40001 (2016) [6 pages].
187. *Lectures on Classical Mechanics*
 (World Scientific Publishing Co., Singapore 2015)
 ISBN 978–981–4678–44–5 (hardcover), ISBN 978–981–4678–45–2 (softcover),
 ISBN 978–981–4678–47–6 (ebook).
188. K. Abdelkhalak, R. Schwonnek, H. Maassen, F. Furrer, J. Duhme, P. Raynal, BGE, and R. F. Werner
Optimality of entropic uncertainty relations
 eprint arXiv:1509.00398 [quant-ph]
 International Journal of Quantum Information **13**, art. 1550045 (2015) [28 pages].

189. J. Řeháček, Z. Hradil, Y. S. Teo, L. L. Sánchez Soto, H. K. Ng, J. H. Chai, and BGE
Least-bias state estimation with incomplete unbiased measurements
eprint arXiv:1509.07614 [quant-ph]
Physical Review A **92**, art. 052303 (2015) [13 pages].
190. M.-I. Trappe, Y. L. Len, H. K. Ng, C. A. Müller, and BGE
Leading gradient correction to the kinetic energy for two-dimensional fermion gases
eprint arXiv:1512.07367 [cond-mat.quant-gas]
Physical Review A **93**, art. 042510 (2016) [6 pages].
191. X. Li, J. Shang, H. K. Ng, and BGE
Optimal error intervals for properties of the quantum state
eprint arXiv:1602.05780 [quant-ph]
Physical Review A **94**, art. 062112 (2016) [21 pages].
192. S.-H. Tan, L. A. Krivitsky, and BGE
Photon-number-resolving detectors and their role in quantifying quantum correlations
Proceedings of SPIE, vol. 9980, *Quantum Communications and Quantum Imaging XIV*
(edited by R. E. Meyers, Y. Shih, and K.S. Deacon), art. 99800E [7 pages].
193. D. J. Nott, X. Wang, M. Evans, and BGE
Checking for prior-data conflict using prior-to-posterior divergences
eprint arXiv:1611.00113 [stat.ME]
Statistical Science **35**, 234–253 (2020).
194. M.-I. Trappe, Y. L. Len, H. K. Ng, and BGE
Airy-averaged gradient corrections for two-dimensional Fermi gases
eprint arXiv:1612.04048 [cond-mat.quant-gas]
Annals of Physics **385**, 136–161 (2017).
195. J. Shang, Y.-L. Seah, B. Wang, H. K. Ng, D. J. Nott, and BGE
Random samples of quantum states: Online resources
eprint arXiv:1612.05180 [quant-ph]
URL: <http://www.quantumlah.org/publications/software/QSampling/>
196. BGE, K. Horia, J. Dai, Y. L. Len, and H. K. Ng
Past of a quantum particle revisited
eprint arXiv:1704.03722 [quant-ph]
Physical Review A **96**, art. 022126 (2017) [18 pages].
197. Y. L. Len, J. Dai, BGE, and L. A. Krivitsky
Unambiguous path discrimination in a two-path interferometer
eprint arXiv:1708.01408 [quant-ph]
Physical Review A **98**, art. 022110 (2018) [7 pages].
198. T. T. Chau, J. H. Hue, M.-I. Trappe, and BGE
Systematic corrections to the Thomas–Fermi approximation without a gradient expansion
eprint arXiv:1709.01719 [cond-mat.quant-gas, physics.atom-ph, quant-ph]
New Journal of Physics **20**, art. 073003 (2018) [16 pages].
199. F. Bouchard, K. Heshami, D. England, R. Fickler, R. W. Boyd, BGE, L. L. Sánchez-Soto, and E. Karimi
Experimental investigation of quantum key distribution protocols with twisted photons
eprint arXiv:1802.05773 [quant-ph]
Quantum **2**, art. 111 (2018) [13 pages].
200. BGE, M. Evans, G. H. Jang, H. K. Ng, D. Nott, and Y.-L. Seah
Checking for Model Failure and for Prior-Data Conflict with the Constrained Multinomial Model
eprint arXiv:1804.06906 [math.ST, quant-ph]
Metrika **84**, 1141–1168 (2021).
201. J. Schwinger and BGE
The statistical atom
eprint arXiv:1807.10109 [quant-ph]
pp. 237–260 in the proceedings of the Julian Schwinger Centennial Conference, 7–12 February 2018, Singapore; see 210.

202. Y. Gu, W. Li, M. Evans, and BGE
Very strong evidence in favor of quantum mechanics and against local hidden variables from a Bayesian analysis
 eprint arXiv:1808.06863 [quant-ph, stat.AP]
 Physical Review A **99**, art. 022112 (2019) [17 pages].
203. BGE, K. Horia, J. Dai, Y. L. Len, and H. K. Ng
Reply to “Comment on ‘Past of a quantum particle revisited’ ”
 eprint arXiv:1901.05673 [quant-ph]
 Physical Review A **99**, art. 026104 (2019) [3 pages].
204. D. J. Nott, M. Seah, L. Al-Labadi, M. Evans, H. K. Ng, and BGE
Using prior expansions for prior-data conflict checking
 eprint arXiv:1902.10393 [stat.ME, quant-ph]
 Bayesian Analysis **16**, 203–231 (2021).
205. J. Y. Sim, J. Shang, H. K. Ng, and BGE
Proper error bars for self-calibrating quantum tomography
 eprint arXiv:1904.11202 [quant-ph, stat.ME]
 Physical Review A **100**, art. 022333 (2019) [10 pages].
206. J. Y. Sim, J. Suzuki, BGE, and H. K. Ng
User-specified random sampling of quantum channels and its applications
 eprint arXiv:1905.00696 [quant-ph, stat.ME]
 Physical Review A **101**, art. 022307 (2020) [17 pages].
207. *Julian Schwinger and the semiclassical atom*
 eprint arXiv:1907.04751 [physics.hist-ph, quant-ph]
 pp. 261–269 in the proceedings of the Julian Schwinger Centennial Conference, 7–12 February 2018, Singapore; see 210.
208. Z. Hradil, J. Řeháček, L. Sánchez-Soto, and BGE
Quantum Fisher information with coherence
 eprint arXiv:1910.10265 [quant-ph, physics.optics]
 Optica **6**, 1437–1440 (2019).
209. BGE and K. A. Milton
Speeches by V. F. Weisskopf, J. H. Van Vleck, I. I. Rabi, M. Hamermesh, B. T. Feld, R. P. Feynman, and D. Saxon, given in honor of Julian Schwinger at his 60th birthday
 eprint arXiv:1907.08879 [physics.hist-ph]
 pp. 285–311 in the proceedings of the Julian Schwinger Centennial Conference, 7–12 February 2018, Singapore; see 210.
210. *Proceedings of the Julian Schwinger Centennial Conference*
 (edited by BGE, World Scientific Publishing Co., Singapore 2019)
 ISBN 978–981–121–213–0 (hardcover), ISBN 978–981–121–315–1 (ebook).
211. H. H. Chan and BGE
Multiplicative functions arising from the study of mutually unbiased bases
 eprint arXiv:2003.03733 [math.NT, quant-ph]
 New Zealand Journal of Mathematics **51**, 65–78 (2021).
212. Y. Lu, J. Y. Sim, J. Suzuki, BGE, and H. K. Ng
Direct estimation of minimum gate fidelity
 eprint arXiv:2004.02422 [quant-ph]
 Physical Review A **102**, art. 022410 (2020) [11 pages].
213. *Lectures on Statistical Mechanics*
 (World Scientific Publishing Co., Singapore 2020)
 ISBN 978–981–122–457–7 (hardcover), ISBN 978–981–122–554–3 (softcover),
 ISBN 978–981–122–459–1 (ebook).
214. J. H. Hue, E. Eren, S. H. Chiew, J. W. Z. Lau, L. Chang, T. T. Chau, M.-I. Trappe, and BGE
Fourth-order leapfrog algorithms for numerical time evolution of classical and quantum systems
 eprint arXiv:2007.05308 [physics.comp-ph]
215. Y. Gu, R. Mishra, BGE, H. K. Ng
Randomized linear gate set tomography
 eprint arXiv:2010.12235 [quant-ph]
 PRX Quantum **2**, art. 030328 (2021) [16 pages].

216. M. M. Paraniak and BGE
Quantum dynamical simulation of a transversal Stern–Gerlach interferometer
 eprint arXiv:2106.00205 [quant-ph]
 Symmetry **13**, art. 1660 (2021) [13 pages].
217. M.-I. Trappe, J. H. Hue, and BGE
Density-potential functional theory for fermions in one dimension
 eprint arXiv:2106.07839 [cond-mat.quant-gas, quant-ph]
 Chapter 8, pp. 251–268, in 221.
218. R. Han, W. Li, S. Bagchi, H. K. Ng, and BGE
Uncorrelated problem-specific samples of quantum states from zero-mean Wishart distributions
 eprint arXiv:2106.08533 [quant-ph]
219. W. Li, R. Han, J. Shang, H. K. Ng, and BGE
Sequentially constrained Monte Carlo sampler for quantum states
 eprint arXiv:2109.14215 [quant-ph]
220. BGE, J. H. Hue, Z. C. Huang, M. M. Paraniak, and M.-I. Trappe
Energy functional of single-particle densities: A unified view
 eprint arXiv:2206.10097 [cond-mat.quant-gas, quant-ph]
 Chapter 10, pp. 287–308, in 221.
221. BGE, H. Siedentop, and M.-I. Trappe, eds.
Density Functionals for Many-Particle Systems: Mathematical Theory and Physical Applications of Effective Equations
 Lecture Notes Series, IMS, NUS **41**
 (World Scientific Publishing Company, Singapore 2023)
 ISBN 987–981–127–214–1 (hardcover), ISBN 987–981–127–216–5 (ebook).
222. J. Cioslowski, BGE, M.-I. Trappe, and J. H. Hue
Contactium: A strongly correlated model system
 eprint arXiv:2303.14982 [physics.chem-ph, cond-mat.quant-gas, quant-ph]
 Journal of Physical Chemistry **158**, art. 184110 (2023) [8 pages].
223. M.-I. Trappe, J. H. Hue, Z. C. Huang, M. Paraniak, D. Hiller, J. Cioslowski, and BGE
Single-particle-exact density functional theory
 eprint arXiv:2305.03233 [cond-mat.quant-gas]
 Annals of Physics **459**, art. 169497 (2023) [25 pages].
224. *Uncertainty relations revisited*
 eprint arXiv:2310.05039 [quant-ph]
 Physics Letters A **494**, art. 129278 (2023) [9 pages].
225. *Lectures on Quantum Mechanics — Basic Matters*
 (2nd edition, World Scientific Publishing Co., Singapore 2024)
 ISBN 978–981–12–8472–4 (hardcover), ISBN 978–981–12–8498–4 (softcover).
226. *Lectures on Quantum Mechanics — Simple Systems*
 (2nd edition, World Scientific Publishing Co., Singapore 2024)
 ISBN 978–981–12–8475–5 (hardcover), ISBN 978–981–12–8499–1 (softcover).
227. *Lectures on Quantum Mechanics — Perturbed Evolution*
 (2nd edition, World Scientific Publishing Co., Singapore 2024)
 ISBN 978–981–12–8478–6 (hardcover), ISBN 978–981–12–8500–4 (softcover).

Publication categories

Category	Count
Articles in international refereed journals	169
Authored books	10
Edited books	6
Chapters in books	30
Others publications	14

List of co-authors

- Kais ABDELKHALEK 188
Yakir AHARONOV 79, 83, 97, 99
Luai AL-LABADI 204
Janet ANDERS 126, 128
Huzihiro ARAKI 152
Syed M. ASSAD 135, 136
Gerald BADUREK 78
Shrobona BAGCHI 218
Murray BARRETT 169
Asim O. BARUT 23
Marco BATTOCLETTI 47
Jacques BAUDON 48
Thomas BECKER 130
Chris. J. BEDNAR 86
Almut BEIGE 98, 103, 104
Ingemar BENGTTSSON 151
Oliver BENSON 77
János BERGOU 25, 74, 87, 89
Frédéric BOUCHARD 199
Robert W. BOYD 199
Hans J. BRIEGEL 26, 27, 36, 37, 43, 44, 57, 60, 61, 62, 64, 69
Simon BRATTKE 84a-c, 92
Dagmar BRUSS 116
Roland J. BUCHELT 78
Klaus BUCHWALD 19
Thomas BUSCH 70
Federico CASAGRANDE 120a-b
Jing Hao CHAI 189
Heng Huat CHAN 211
N. CHANDRASEKHAR 140, 150
Leo CHANG 214
Thanh Tri CHAU 198, 214
Wei Hui CHEE 138
Goong CHEN 112, 114, 134
Shao Hen CHIEW 214
Matthias CHRISTANDL 116
Wee Kang CHUA 126, 141
David A. CHURCH 114, 134
Marek CINAL 29, 39
Jerzy CIOSLOWSKI 222, 223
L. F. CUGLIANDOLO 160
Jibo DAI 179, 181, 196, 197, 203
Walter DITTRICH 3
Martial DUCLOY 160
Jörg DUHME 188
Tom DURT 151
Artur K. EKERT 116, 160
Duncan ENGLAND 199
Ege EREN 214
Michael EVANS 193, 200, 202, 204
Bess FANG 155
Heidi FEARN 30, 41
Robert FICKLER 199
Fang-Wei FU 127
Stephen A. FULLING 105, 108
Fabian FURRER 188
Tserensodnom GANTSOG 55, 58, 63
Christian GINZEL 37, 44
Choon Guan GOH 125
Yuri M. GOLUBEV 82
Ajay GOPINATHAN 118a-b
Krzysztof GÓRAL 96
Benoît GRÉMAUD 144, 160
Yanwu GU 202, 215
Rui HAN 144, 156, 174, 175, 186, 218, 219
Carsten HENKEL 134
Khabat HESHAMI 199
Djamila HILLER 223
Kelvin HORIA 196, 203
Zděnek HRADIL 157, 164, 166, 173, 189, 208
Zi Chao (Jonah) HUANG 220, 223
Jun Hao (Alex) HUE 198, 214, 217, 220, 222, 223
Gun Ho JANG 200
Amir KALEV 149, 165, 168, 169
Ebrahim KARIMI 199
Janusz KARWOWSKI 1
Dagomir KASZLIKOWSKI 115, 116, 117, 118a-b, 121a-b, 122, 124, 126, 138
Chee Weng KOONG 140, 150
Leonid A. KRIVITSKY 176, 179, 181, 192, 197
Christian KURTSIEFER 93, 98, 103, 104, 110
Leong Chuan KWEK 115, 117, 118a-b, 121a-b, 138, 152, 160
Paul G. KWIAT 76, 80, 109, 113
Jonathan Wei Zhong LAU 214
Melvin LAX 89
Hwang LEE 82
Kean Loon LEE 129, 141, 144, 162
Yink Loon LEN 179, 181, 190, 194, 196, 197, 203
Weijun LI 202, 218, 219
Xikun LI 178, 191
Yeong Cherng LIANG 117, 118a-b
Jenn Yang LIM 121a-b
Markus LÖFFLER 66, 77
Shiang Yong LOOI 128, 141
Niels LÖRCH 156
Pavel LOUGOVSKI 111, 120a-b
Yin LU 137, 146
Yiping (Todd) LU 212
Xin LÜ 159, 170
A. LULLI 120a-b
Hans MAASSEN 188
Chiara MACCHIAVELLO 116
Ady MANN 129
Ulrich MARTINI 37
Piotr MASIĄK 65
Nasser M. METWALLY 91, 94, 100
Georg M. MEYER 60, 61, 64
Markus MICHAELIS 26
Kimball A. MILTON 209
Christian MINIATURA 48, 137, 140, 144, 146, 150, 160
Rajesh MISHRA 215
Dmitry MOGILEVTSEV 173
Giovanna MORIGI 102, 106, 107
Cord A. MÜLLER 137, 190
Martin NARASCHEWSKI 45
Hui Khoon NG 125, 126, 128, 167, 172, 174, 175, 177, 178, 182, 184, 185, 186, 189, 190, 191, 194, 195, 196, 200, 203, 204, 205, 206, 212, 215, 218, 219
Le Huy NGUYEN 158, 169
Harald NIEDERREITER 127
David John NOTT 184, 185, 193, 195, 200, 204
Choo Hiap OH 117
Mikołaj M. PARANIAK 216, 220, 223
Vanessa PAULISCH 174
K. K. PHUA 160
K. T. Benjamin PHUAH 172
Mark D. PILLOFF 105, 108
Ludmilla PRAXMEYER 123
Helmut RAUCH 78
Philippe RAYNAL 147, 149, 159, 170, 188

Jacek M. RAYSKI, JR. 1	Jiangwei SHANG 141, 162, 165, 168, 178, 182, 184, 185, 191, 195, 205, 219	Herbert WALTHER 24, 30, 31, 33, 35a-b, 38, 40, 41, 43, 46, 49, 54, 62, 63, 65, 66, 72, 77, 82, 84a-c, 85, 88, 89, 90, 92, 102, 106, 111, 120a-b, 130
Jaroslav ŘEHÁČEK 122, 124, 126, 142, 157, 164, 166, 173, 189, 208	Heinz SIEDENTOP 221	Boyu WANG 195
Michael REVZEN 129	Jun Yan SIM 205, 206, 212	Guangquan WANG 137
Peter RIEGLER 56	Ruprecht STEINHÜBL 110	Xueou WANG 193
Bernd ROHWEDDER 42, 134	Bohumil STOKLASA 166	Markus WEBER 110
Kazimierz RZAŻEWSKI 65, 70, 96	Enrique SOLANO 102, 106, 111, 120a-b	Edda WEHNER 46
Luis Lorenzo SÁNCHEZ SOTO 189, 199, 208	Nicoletta STERPI 38, 40, 43, 46	Matthias WEIDINGER 77
Axel SCHENZLE 37, 44, 45, 55, 58, 63	Georg SÜSSMANN 26, 27, 35a-b	Harald WEINFURTER 93, 98, 103, 104, 110
Oliver SCHULZ 110	Jun SUZUKI 135, 136, 139, 149, 152, 156, 171, 206, 212	Reinhard F. WERNER 188
Peter D. D. SCHWINDT 76, 80	Gelo N. M. TABIA 139, 148	Martin WILKENS 70
Julian SCHWINGER 4, 5, 6, 7, 8, 9, 10, 14, 15, 17, 18, 21, 23, (95), 201	Si-Hui TAN 176, 192	Krzysztof WÓDKIEWICZ 51, 52, 56, 101, 119, 123
René SCHWONNEK 188	Yong Siah TEO 143, 145, 154, 157, 164, 166, 173, 179, 181, 189	Chaoping XING 127
Marlan O. SCULLY 14, 15, 18, 20, 21, 23, 24, 30, 31, 35a-b, 41, 49, 54, 62, 69, 72, 79, 82, 83, 85, 86, 89, 90, 134	Guo Chuan THIANG 147	Daniel ZEMANN 153
Yi-Lin (Max) SEAH 184, 185, 195, 200, 204	Michael THOSS 59	Jianxin ZHOU 112
Arun SEHRAWAT 153, 158, 178	Kah Ming TIN 125	Huangjun ZHU 143, 145, 154, 157, 161
Rafaela SENO 46	Martin-Isbjörn TRAPPE 190, 194, 198, 214, 217, 220, 221, 222, 223	M. Suhail ZUBAIRY 89, 114, 134
	Benjamin T. H. VARCOE 77, 84a-c, 92, 130	Andrea ZUCCHETTI 65
	Christian WAGNER 55, 58, 63	Marek ŻUKOWSKI 115
		Karol ŻYCZKOWSKI 151
		(180 co-authors)