

References

- [Aar01] G. Aarts, Spectral function at high temperature in the classical approximation, *Phys. Lett.* **518B**, 315–322 (2001).
- [AarBer01] G. Aarts and J. Berges, Nonequilibrium time evolution of the spectral function in quantum field theory, *Phys. Rev. D* **64**, 105010 (2001).
- [AarBer02] G. Aarts and J. Berges, Classical aspects of quantum fields far from equilibrium, *Phys. Rev. Lett.* **88**, 041603 (2002).
- [AaBoWe00a] G. Aarts, G.F. Bonini and C. Wetterich, Exact and truncated dynamics in nonequilibrium field theory, *Phys. Rev. D* **63**, 025012 (2000).
- [AaBoWe00b] G. Aarts, G.F. Bonini and C. Wetterich, On thermalization in classical scalar field theory, *Nucl. Phys.* **B587**, 403 (2000).
- [AarMar02] G. Aarts and J. Martinez Resco, Transport coefficients, spectral functions and the lattice, *JHEP* **204**, 54 (2002).
- [AarSmit98] G. Aarts and J. Smit, Classical approximation for time-dependent quantum field theory: Diagrammatic analysis for hot scalar fields, *Nucl. Phys.* **B511**, 451 (1998).
- [AarSmi99] G. Aarts and J. Smit, Particle production and effective thermalization in inhomogeneous mean field theory, *Phys. Rev. D* **61**, 025002 (1999).
- [ABZH96] A. Abada, M. Birse, P. Zhuang and U. Heinz, Remarks on “Relativistic kinetic equations for electromagnetic, scalar and pseudoscalar interactions,” *Phys. Rev. D* **54**, 4175 (1996).
- [Abb81] L. Abbott, The background field method beyond one loop, *Nucl. Phys.* **B185**, 189 (1981).
- [AARS96] Y. Abe, S. Ayik, P.-G. Reinhard and E. Suraud, On stochastic approaches of nuclear dynamics, *Phys. Rep.* **275**, 49 (1996).
- [AbrSte72] M. Abramowitz and I. Stegun (eds.), *Handbook of Mathematical Functions* (Dover, New York, 1972).
- [AbGoDz75] A.A. Abrikosov, L.P. Gorkov and I.E. Dzyaloshinski, *Methods of Quantum Field Theory in Statistical Physics* (Dover, New York, 1975).
- [Adh04] S.K. Adhikari, Mean-field model of jet formation in a collapsing Bose–Einstein condensate, *J. Phys. B At. Mol. Opt. Phys.* **37**, 1185 (2004).
- [Adl04] S.L. Adler, *Quantum theory as an emergent phenomenon* (Cambridge University Press, Cambridge, 2004).
- [AgSoVi06] M.M. Aggarwal, G. Sood and Y.P. Viyogi, Event-by-event study of DCC-like fluctuation in ultra-relativistic nuclear collisions, *Phys. Lett.* **638B**, 39 (2006).
- [AkhPel81] A.I. Akhiezer and S.V. Peletminskii, *Statistical Physics* (Mir, Moscow, 1981).
- [AkLeSi01] S. Akkelin, R. Lednický and Y. Sinyukov, Correlation search for coherent pion emission in heavy ion collisions, *Phys. Rev. C*, **65**, 064904 (2002).
- [ABBCFJ99] S. Alamoudi, D. Barci, D. Boyanovsky, A. de Carvalho, E. Fraga, S. Joras and F. Takakura, Dynamical viscosity of nucleating bubbles, *Phys. Rev. D* **60**, 125003 (1999).
- [AFJP94] A. Albrecht, P. Ferreira, M. Joyce and T. Prokopec, Inflation and squeezed quantum states, *Phys. Rev. D* **50**, 4807 (1994).
- [AlbSte82] A. Albrecht and P.J. Steinhardt, Cosmology for grand unified theories with radiatively induced symmetry breaking, *Phys. Rev. Lett.* **48**, 1220 (1982).
- [Ald73] B.J. Alder, Computer dynamics, *An. Rev. Phys. Chem.* **24**, 325–337 (1973).
- [Alx99] S. Alexandrov, Effective action and quantum gauge transformations, *Phys. Rev. D* **59**, 125016 (1999).

- [AllMis38] J.F. Allen and A.D. Misener, Flow of liquid helium II, *Nature* **141**, 75 (1938).
- [AmBjLa97] G. Amelino-Camelia, J.D. Bjorken and S.E. Larsson, Pion production from Baked-Alaska disoriented chiral condensate, *Phys. Rev. D* **56**, 6942 (1997).
- [Ana97a] C. Anastopoulos, Coarse grainings and irreversibility in quantum field theory, *Phys. Rev. D* **56**, 1009 (1997).
- [Ana97b] C. Anastopoulos, n-particle sector of field theory as a quantum open system, *Phys. Rev. D* **56**, 6702–6705 (1997).
- [AnaHal95] C. Anastopoulos and J.J. Halliwell, Generalized uncertainty relations and long-time limits for quantum Brownian motion models, *Phys. Rev. D* **51**, 6870 (1995).
- [And04] J. Andersen, Theory of the weakly interacting Bose gas, *Rev. Mod. Phys.* **76**, 599 (2004).
- [AndHal93] A. Anderson and J.J. Halliwell, Information-theoretic measure of uncertainty due to quantum and thermal fluctuations, *Phys. Rev. D* **48**, 2753 (1993).
- [Ang93] J.R. Anglin, Influence functionals and the accelerating detector, *Phys. Rev. D* **47**, 4525 (1993).
- [AngZur96] J.R. Anglin and W.H. Zurek, Decoherence of quantum fields: Pointer states and predictability, *Phys. Rev. D* **53**, 7327 (1996).
- [AntBet97] N. Antunes and L. Bettencourt, Out of equilibrium dynamics of quench-induced spontaneous symmetry breaking and topological defect formation, *Phys. Rev. D* **55**, 925 (1997).
- [AnBeZu99] N. Antunes, L. Bettencourt and W. Zurek, Vortex string formation in a 3D U(1) temperature quench, *Phys. Rev. Lett.* **82**, 2824 (1999).
- [AnGaRi06] N. Antunes, P. Gandra and R. Rivers, Domain formation: decided before, or after the transition?, *Phys. Rev. D* **73**, 125003 (2006).
- [AGRS06] N. Antunes, P. Gandra, R. Rivers and A. Swarup, The creation of defects with core condensation, *Phys. Rev. D* **73**, 085012 (2006).
- [ALMV06] N. Antunes, F. Lombardo, D. Montecilla and P. Villar, Decoherence, tunneling and noise-activation in a double-potential well at high and zero temperature, *Phys. Rev. E* **73**, 066105 (2006).
- [ACGI00] D. Arbo, M. Castagnino, F. Gaioli and S. Iguri, Minimal irreversible quantum mechanics. The decay of unstable states, *Physica A* **277**, 469 (2000).
- [ArDoMo06] P. Arnold, C. Dogan and G. Moore, The bulk viscosity of high-temperature QCD, *Phys. Rev. D* **74**, 085021 (2006).
- [ArLeMo03] P. Arnold, J. Lenaghan and G.D. Moore, QCD plasma instabilities and bottom-up thermalization, *JHEP* **0308**, 002 (2003).
- [ALMY05] P. Arnold, J. Lenaghan, G.D. Moore and L.G. Yaffe, Apparent thermalization due to plasma instabilities in a quark-gluon plasma, *Phys. Rev. Lett.* **94**, 072302 (2005).
- [ArnMoo05] P. Arnold and G.D. Moore, QCD plasma instabilities: the non-abelian cascade, *Phys. Rev. D* **73**, 025006 (2006).
- [ArnMoo06] P. Arnold and G.D. Moore, Turbulent spectrum created by non-abelian plasma instabilities, *Phys. Rev. D* **73**, 025013 (2006).
- [ArMoYa00] P. Arnold, G.D. Moore and L.G. Yaffe, Transport coefficients in high temperature gauge theories, *JHEP* **0011**, 001 (2000).
- [ArMoYa01a] P. Arnold, G.D. Moore and L.G. Yaffe, Photon emission from quark-gluon plasma: complete leading order results, *JHEP* **11**, 57 (2001).
- [ArMoYa01b] P. Arnold, G.D. Moore and L.G. Yaffe, Photon emission from ultrarelativistic plasmas, *JHEP* **12**, 9 (2001).
- [ArMoYa02] P. Arnold, G.D. Moore and L.G. Yaffe, Photon and gluon emission in relativistic plasmas, *JHEP* **6**, 30 (2002).
- [ArMoYa03a] P. Arnold, G.D. Moore and L.G. Yaffe, Effective kinetic theory for high temperature gauge theories, *JHEP* **1**, 30 (2003).
- [ArMoYa03b] P. Arnold, G.D. Moore and L.G. Yaffe, Transport coefficients in high temperature gauge theories, 2. Beyond leading log, *JHEP* **5**, 51 (2003).
- [ArMoYa05] P. Arnold, G.D. Moore and L.G. Yaffe, Fate of non-Abelian plasma instabilities in 3 + 1 dimensions, *Phys. Rev. D* **72**, 054003 (2005).

- [ArSoYa99a] P. Arnold, D. Son and L.G. Yaffe, Effective dynamics of hot, soft, non-abelian gauge fields, *Phys. Rev. D* **659**, 105020 (1999).
- [ArSoYa99b] P. Arnold, D. Son and L. Yaffe, Longitudinal subtleties in diffusive Langevin equations, *Phys. Rev. D* **60**, 025007 (1999).
- [ArrSmi02] A. Arrizabalaga and J. Smit, Gauge-fixing dependence of Φ - derivable approximations, *Phys. Rev. D* **66**, 65014 (2002).
- [ArSmTr05] A. Arrizabalaga, J. Smit and A. Transberg, Equilibration in φ^4 theory in 3+1 dimensions, *Phys. Rev. D* **72**, 025014 (2005).
- [AuGeZa02] P. Aurenche, F. Gelis and H. Zaraket, A simple sum rule for the thermal gluon spectral function and applications, *JHEP* **05**, 43 (2002).
- [Baa98] J. Baacke, Choice of initial states in nonequilibrium dynamics, *Phys. Rev. D* **57**, 6398 (1998).
- [Baa00a] J. Baacke, Out-of-equilibrium evolution of scalar fields in FRW cosmology: Renormalization and numerical simulations, *Phys. Rev. D* **61**, 024016 (2000).
- [Baa00b] J. Baacke, Renormalization of the nonequilibrium dynamics of fermions in a flat FRW universe, *Phys. Rev. D* **62**, 084008 (2000).
- [BaBoVe01] J. Baacke, D. Boyanovsky and H.J. de Vega, Initial time singularities in nonequilibrium evolution of condensates and their resolution in the linearized approximation, *Phys. Rev. D* **63**, 45023 (2001).
- [BaaHei03b] J. Baacke and A. Heinen, Nonequilibrium evolution of Φ^4 theory in 1+1 dimensions in the two-particle point-irreducible formalism, *Phys. Rev. D* **67**, 105020 (2003).
- [BaaHei03a] J. Baacke and A. Heinen, Quantum dynamics of Φ^4 field theory beyond leading order in 1+1 dimensions, *Phys. Rev. D* **68**, 127702 (2003).
- [BaiKAt03] V.N. Baier and V.M. Katkov, On theory of Landau–Pomeranchuk–Migdal effect, Plenary talk at the International Conference “I.Ya.Pomeranchuk and the Physics at the Turn of Centuries” Moscow, January 24–28, 2003. To be published in the Proceedings (World Scientific, Singapore) (hep-ph/0305133).
- [Bai92] R. Baier, G. Kunstatter and D. Schiff, Gauge dependence of the resummed thermal gluon self-energy, *Nucl. Phys.* **B388**, 287 (1992).
- [BMSS01] R. Baier, A. Mueller, D. Schiff and D. Son, Bottom-up thermalization in heavy ion collisions, *Phys. Lett.* **502B**, 51 (2001).
- [BaRoWi06a] R. Baier, P. Romatschke and U.A. Wiedemann, Dissipative hydrodynamics and heavy ion collisions, *Phys. Rev. C* **73**, 064903 (2006).
- [BaRoWi06b] R. Baier, P. Romatschke and U.A. Wiedemann, Transverse flow in relativistic viscous hydrodynamics, *Nucl. Phys. A* **782**, 313–318 (2007).
- [BaiSto04] R. Baier and T. Stockamp, Kinetic equations for Bose–Einstein condensates from the 2PI effective action, hep-ph/0412310.
- [BakMah63] P.M. Bakshi and K.T. Mahanthappa, Expectation value formalism in quantum field theory, *J. Math. Phys. (N.Y.)* **4**, 1 (1963); *J. Math. Phys.* **4**, 12 (1963).
- [Bal75] R. Balescu, *Equilibrium and Nonequilibrium Statistical Mechanics* (John Wiley, New York, 1975).
- [BalVen87] R. Balian and M. Veneroni, Incomplete descriptions, relevant information, and entropy production in collision processes, *Ann. Phys. (N.Y.)* **174**, 229–244 (1987).
- [BajaMa04] W. Bao, D. Jakob and P. Markovich, The dimensional simulation of the formation of collapsing condensates, *J. Phys. B At. Mol. Opt. Phys.* **37**, 329 (2004).
- [BaLiVi05] C. Barcelo, S. Liberati and M. Visser, Analogue gravity, *Liv. Rev. Relativity* **8**, 12–113 (2005).
- [BFGR01] D. Barci, E. Fraga, M. Gleiser and R. Ramos, Equilibration time scales in homogeneous Bose–Einstein condensate dynamics, *Physica A* **317**, 535–545 (2003).
- [BaFrRa02] D.G. Barci, E.S. Fraga, Rudnei O. Ramos, Microscopic evolution of a weakly interacting homogeneous Bose gas, *Laser Phys.* **12**, 43–49 (2002).
- [Bar80] J. Bardeen, Gauge-invariant cosmological perturbations, *Phys. Rev. D* **22**, 1882 (1980).

- [BarBub87] J.M. Bardeen and G.J. Bublik, Quantum fluctuations and inflation, *Class. Quan. Grav.* **4**, 573 (1987).
- [BaStTu83] J.M. Bardeen, P.J. Steinhardt and M.S. Turner, Spontaneous creation of almost scale-free density perturbations in an inflationary universe, *Phys. Rev. D* **28**, 679 (1983).
- [Bas98] B.A. Bassett, Inflationary reheating classes via spectral methods, *Phys. Rev. D* **58**, 021303 (1998).
- [BPTV01] B.A. Bassett, G. Pollifrone, S. Tsujikawa and F. Viniegra, Preheating – cosmic magnetic dynamo?, *Phys. Rev. D* **63**, 103515 (2001).
- [BaTsWa06] B.A. Bassett, S. Tsujikawa and D. Wands, Inflation dynamics and reheating, *Rev. Mod. Phys.* **78**, 537 (2006).
- [BasGhi99] A. Bassi and G.-C. Ghirardi, Can the decoherent histories description of reality be considered satisfactory?, *Phys. Lett.* **257A**, 247 (1999).
- [Bat59] G.K. Batchelor, *The Theory of Homogeneous Turbulence* (Cambridge University Press, Cambridge, 1959).
- [Bay62] G. Baym, Self-consistent approximations in many-body systems, *Phys. Rev.* **127**, 1391 (1962).
- [BBGM06] G. Baym, J.-P. Blaizot, F. Gelis and T. Matsui, Landau–Pomeranchuk–Migdal effect in a quark–gluon plasma and the Boltzmann equation, *Phys. Lett. B* **644**, 48–53 (2007).
- [BayKad61] G. Baym and L.P. Kadanoff, Conservation laws and correlation functions, *Phys. Rev.* **124**, 287 (1961).
- [Bed] P.F. Bedaque, Thermalization and pinch singularities in non-equilibrium quantum field theory, *Phys. Lett.* **344B**, 23 (1995).
- [Bek73] J.D. Bekenstein, Black holes and entropy, *Phys. Rev. D* **7**, 2333 (1973).
- [Bek83] J.D. Bekenstein, Black hole fluctuations in *Quantum Theory of Gravity* ed. S. Christensen (Adam Hilger, Boston, 1983).
- [Bek94] J.D. Bekenstein, Review talk at MG7 (1994), Do we understand black hole entropy?, gr-qc/9409015.
- [BekMuk95] J.D. Bekenstein and V. F. Mukhanov, Spectroscopy of the quantum black hole, *Phys. Lett.* **360B**, 7 (1995).
- [BelLan56] S. Belen'kii and L. Landau, Hydrodynamic theory of multiple production of particles, *Supplemento al Nuovo Cimento* **3**, 15 (1956).
- [Bel58a] S.T. Beliaev, Application of the methods of quantum field theory to a system of bosons, *Zh. Eksp. Teor. Fiz.* **34**, 417 (1958) (*Sov. Phys. JETP* **7**, 289 (1958)).
- [Bel58b] S.T. Beliaev, Energy spectrum of a non-ideal Bose gas, *Zh. Eksp. Teor. Fiz.* **34**, 433 (1958) (*Sov. Phys. JETP* **7**, 299 (1958)).
- [Ben96] C.L. Bennett *et al.*, 4-Year COBE DMR cosmic microwave background observations: Maps and basic results, *Astrophys. J.* **464**, L1 (1996).
- [Ben03] C.L. Bennett *et al.*, First-year Wilkinson Microwave Anisotropy Probe (WMAP) observations: Determination of cosmological parameters, *Astrophys. J. Suppl. Ser.* **148**, 1 (2003).
- [BeGlRa98] A. Berera, M. Gleiser and R. Ramos, Strong dissipative behavior in quantum field theory, *Phys. Rev. D* **58**, 123508 (1998).
- [BerRam01] A. Berera and R. Ramos, Affinity for scalar fields to dissipate, *Phys. Rev. D* **63**, 103509 (2001).
- [Ber66] F.A. Berezin, *The Method of Second Quantization* (Academic Press, New York, 1966).
- [Berger74] B. Berger, Quantum graviton creation in a model universe, *Ann. Phys. (N.Y.)* **83**, 458 (1974).
- [Berger75a] B. Berger, Quantum cosmology: Exact solution for the Gowdy T^3 model, *Phys. Rev. D* **11**, 2770 (1975).
- [Berger75b] B. Berger, Scalar particle creation in an anisotropic universe, *Phys. Rev. D* **12**, 368 (1975).

- [Ber02] J. Berges, Controlled nonperturbative dynamics of quantum fields out of equilibrium, *Nucl. Phys.* **A699**, 847 (2002).
- [Ber04a] J. Berges, n-particle irreducible effective action techniques for gauge theories, *Phys. Rev. D* **70**, 105010 (2004).
- [Ber04b] J. Berges, Introduction to nonequilibrium quantum field theory, hep-ph/0409233.
- [BerBol06] J. Berges and S. Borsanyi, Range of validity of transport equations, *Phys. Rev. D* **74**, 045022 (2006).
- [BerBol06] J. Berges and S. Borsanyi, Progress in nonequilibrium quantum field theory III, *Nucl. Phys. A785*, 58–67 (2007).
- [BeBoSe03] J. Berges, S. Borsanyi and J. Serreau, Thermalization of fermionic quantum fields, *Nucl. Phys.* **B600**, 51 (2003).
- [BBSS06] J. Berges, S. Borsanyi, D. Sexty and I-O. Stamatescu, Lattice simulations of real-time quantum fields, hep-lat/0609058.
- [BeBoWe04] J. Berges, S. Borsanyi and C. Wetterich, Prethermalization, *Phys. Rev. Lett.* **93**, 142002 (2004).
- [BeBoWe05] J. Berges, S. Borsanyi and C. Wetterich, Isotropization far from equilibrium, *Nucl. Phys.* **B727**, 244 (2005).
- [BerSer03a] J. Berges and J. Serreau, Parametric resonance in quantum field theory, *Phys. Rev. Lett.* **91**, 111601 (2003).
- [BerSer03b] J. Berges and J. Serreau, Progress in nonequilibrium quantum field theory, “Strong and Electroweak Matter” (SEWM 2002), Heidelberg, Germany, 2–5 Oct 2002 (hep-ph/0302210).
- [BerSer04] J. Berges and J. Serreau, Progress in nonequilibrium quantum field theory II, “Strong and Electroweak Matter” (SEWM 2004), Helsinki, Finland, 16–19 June (hep-ph/0410330).
- [BerSta05] J. Berges and I.O. Stamatescu, Simulating nonequilibrium quantum fields with stochastic quantization techniques, hep-lat/0508030.
- [Ber74] C. Bernard, Feynman rules for gauge theories at finite temperature, *Phys. Rev. D* **9**, 3312 (1974).
- [BerDun77] C. Bernard and A. Duncan, Regularization and renormalization of quantum field theory in curved space-time, *Ann. Phys. (N.Y.)* **107**, 201 (1977).
- [Bes04] D.R. Bes, *Quantum Mechanics* (Springer-Verlag, Berlin, 2004).
- [BesKur90] D.R. Bes and J. Kurchan, *The Treatment of Collective Coordinates in Many-body Systems* (World Scientific, Singapore, 1990).
- [Bet01] L. Bettencourt, Properties of the Langevin and Fokker–Planck equations for scalar fields and their application to the dynamics of second order phase transitions, *Phys. Rev. D* **63**, 45020 (2001).
- [BeAnZu00] L. Bettencourt, N. Antunes and W. Zurek, Ginzburg regime and its effect on topological defect formation, *Phys. Rev. D* **62**, 065005 (2000).
- [BeCoPa02] L. Bettencourt, F. Cooper and K. Pao, Hydrodynamic scaling from the dynamics of relativistic quantum field theory, *Phys. Rev. Lett.* **89**, 112301 (2002).
- [BeHaLy99] L. Bettencourt, S. Habib and G. Lythe, Controlling one-dimensional Langevin dynamics on the lattice, *Phys. Rev. D* **60**, 105039 (1999).
- [BeRaSt01] L. Bettencourt, K. Rajagopal and J. Steele, Langevin evolution of disoriented chiral condensate, *Nucl. Phys.* **A693**, 825 (2001).
- [BetWet98] L. Bettencourt and C. Wetterich, Time evolution of correlation functions for classical and quantum anharmonic oscillators, hep-ph/9805360.
- [BhWaHo02] S.G. Bhongale, R. Walser and M.J. Holland, Memory effects and conservation laws in the quantum kinetic evolution of a dilute Bose gas, *Phys. Rev. A* **66**, 043618 (2002).
- [BiGoBa04] P. Bielewicz, K.M. Górski and A.J. Banday, Low order multipole maps of CMB anisotropy derived from WMAP, *MNRAS* **355**, 1283 (2004).
- [BirDav82] N.D. Birrell and P.C.W. Davies, *Quantum Fields in Curved Spaces* (Cambridge University Press, Cambridge, 1982).

- [BixZwa69] M. Bixon and R. Zwanzig, Boltzmann–Langevin equation and hydrodynamic fluctuations, *Phys. Rev.* **187**, 267 (1969).
- [BixZwa71] M. Bixon and R. Zwanzig, Brownian motion of a nonlinear oscillator, *J. Stat. Phys.* **3**, 245 (1971).
- [BjoVen01] J. BJORAKER AND R. VENUGOPALAN, From a colored glass condensate to the gluon plasma: equilibration in high energy heavy ion collisions, *Phys. Rev. C* **63**, 024609 (2001).
- [Bjo83] J.D. Bjorken, Highly relativistic nucleus-nucleus collisions: the central rapidity region, *Phys. Rev. D* **27**, 140 (1983).
- [Bjo97] J.D. Bjorken, Disoriented chiral condensate: theory and phenomenology, *Acta Phys. Polon. B* **28**, 2773 (1997).
- [BjoDre64] J. Bjorken and S. Drell, *Relativistic Quantum Mechanics* (McGraw-Hill, New York, 1964).
- [BjoDre65] J. Bjorken and S. Drell, *Relativistic Quantum Fields* (McGraw-Hill, New York, 1965).
- [BlaIan99] J.-P. Blaizot and E. Iancu, A Boltzmann equation for the QCD plasma, *Nucl. Phys.* **B557**, 183 (1999).
- [BlaIan02] J.-P. Blaizot and E. Iancu, The quark–gluon plasma: collective dynamics and hard thermal loops, *Phys. Rep.* **359**, 355 (2002).
- [BlaIaRe03] J.-P. Blaizot, E. Iancu and U. Reinosa, Renormalizability of Φ -derivable approximations in scalar ϕ^4 theory, *Phys. Lett.* **568B**, 160 (2003).
- [Bod98] D. Bodeker, Effective dynamics of soft non-abelian gauge fields at finite temperature, *Phys. Lett.* **426B**, 351 (1998).
- [Bod99] D. Bodeker, From hard thermal loops to Langevin dynamics, *Nucl. Phys.* **B559**, 502 (1999).
- [Bol64] L. Boltzmann, *Lectures on Gas Theory* (Dover, New York, 1964).
- [BKLS86] L. Bombelli, R.K. Koul, J. Lee, and R.D. Sorkin, Quantum source of entropy for black holes, *Phys. Rev. D* **34**, 373 (1986).
- [BonSen04] K. Bongs and K. Sengstock, Physics with coherent matter waves, cond-mat/0403128.
- [BooYip91] J.P. Boon and S. Yip, *Molecular Hydrodynamics* (Dover, New York, 1991).
- [Bordag] M. Bordag (ed.) Proceedings of the Fifth Workshop on Quantum Field Theory under the Influence of External Conditions, Leipzig, Germany, Sep. 10-14, 2001. World Scientific, Singapore (2002). Appeared as Special Issue of *Int. J. Mod. Phys. A*, **17** (2002).
- [Bordag96] M. Bordag (ed.) Quantum Field Theory under the Influence of external condition. Proceedings of the Third Workshop, Leipzig, Germany, Sept. 18-22 (1995). Stuttgart, Germany, Teubner (1996). (Teubner-Texte zur Physik), 1996.
- [Bordag99] M. Bordag (ed.) The Casimir Effect 50 Years Later. Proceedings of the Fourth Workshop on Quantum Field Theory under the Influence of External Conditions, Leipzig, Germany, Sep. 14-18 (1998). World Scientific, Singapore (1999).
- [BotMal90] W. Botermans and R. Malfliet, Quantum transport theory of nuclear matter, *Phys. Rep.* **198**, 115 (1990).
- [BowRue75] R. Bowen and D. Ruelle, The ergodic theory of Axiom-A flows, *Inventiones Mathematicae*, **29**, 181 (1975).
- [BowMom98] M.J. Bowick and A. Momen, Domain formation in finite-time quenches, *Phys. Rev. D* **58**, 085014 (1998).
- [Boy02] D. Boyanovsky, S.-Y. Wang, D.-S. Lee, H.-L. Yu, and S. M. Alamoudi, Nonequilibrium relaxation of Bose–Einstein condensates: Real-time equations of motion and Ward identities, *Annals Phys.* **300**, 1–31 (2002).
- [BoCaVe02] D. Boyanovsky, F. Cao and H. de Vega, Inflation from tsunami-waves, *Nucl. Phys.* **B632**, 121–154 (2002).
- [BoyVeg93] D. Boyanovsky and H. de Vega, Quantum rolling down out of equilibrium, *Phys. Rev. D* **47**, 2343 (1993).
- [BoVeHo94] D. Boyanovsky, H. de Vega and R. Holman, Nonequilibrium evolution of scalar fields in FRW cosmologies, *Phys. Rev. D* **49**, 2769 (1994).

- [BoVeHo99] D. Boyanovsky, H. de Vega, and R. Holman, “Non-equilibrium phase transitions in condensed matter and cosmology: spinodal decomposition, condensates and defects.” Lectures delivered at the NATO Advanced Study Institute: Topological Defects and the Non-Equilibrium Dynamics of Symmetry Breaking Phase Transitions, hep-ph/9903534.
- [BVHK97] D. Boyanovsky, H. de Vega, R. Holman and S. Prem Kumar, Nonequilibrium production of photons via $\pi^0 \rightarrow 2\gamma$ in disoriented chiral condensates, *Phys. Rev. D* **56**, 3929 (1997).
- [BBHKP98] D. Boyanovsky, H. de Vega, R. Holman, S. Kumar and R. Pisarski, Nonequilibrium evolution of a “tsunami,” a high multiplicity initial quantum state: Dynamical symmetry breaking, *Phys. Rev. D* **57**, 3653 (1998).
- [BVHLS95] D. Boyanovsky, H. de Vega, R. Holman, D.S. Lee and A. Singh, Dissipation via particle production in scalar field theories, *Phys. Rev. D* **51**, 4419 (1995).
- [BVHS96] D. Boyanovsky, H. de Vega, R. Holman and J.F.J. Salgado, Analytic and numerical study of reheating dynamics, *Phys. Rev. D* **54**, 7570 (1996).
- [BVHS99a] D. Boyanovsky, H. de Vega, R. Holman and J.F.J. Salgado, Nonequilibrium Bose–Einstein condensates, dynamical scaling, and symmetric evolution in the large N Φ^4 theory, *Phys. Rev. D* **59**, 125009 (1999).
- [BVHS99b] D. Boyanovsky, H. de Vega, R. Holman and M. Simionato, Dynamical renormalization group resummation of finite temperature infrared divergences, *Phys. Rev. D* **60**, 065003 (1999).
- [BoVeSa05] D. Boyanovsky, H. de Vega and N.G. Sanchez, The classical and quantum inflaton: the precise inflationary potential and quantum inflaton decay after WMAP, Lecture given at “The Density Perturbation in the Universe,” Demokritos Center, Athens, Greece, June 2004 (astro-ph/0503128).
- [BoVeSi03a] D. Boyanovsky, H. de Vega and M. Simionato, Magnetic field generation from non-equilibrium phase transitions, *Phys. Rev. D* **67**, 023502 (2003).
- [BoVeSi03b] D. Boyanovsky, H. de Vega and M. Simionato, Large scale magnetogenesis from a non-equilibrium phase transition in the radiation dominated era, *Phys. Rev. D* **67**, 123505 (2003).
- [BoVeWa00] D. Boyanovsky, H. de Vega and S.Y. Wang, Dynamical RG approach to quantum kinetics, *Phys. Rev. D* **61**, 65006 (2000).
- [BoDeVe04] D. Boyanovsky, C. Destri and H. de Vega, The approach to thermalization in the classical ϕ^4 theory in 1+1 dimensions: energy cascades and universal scaling, *Phys. Rev. D* **69** 045003 (2004).
- [BoLeeSi93] D. Boyanovsky, D.S. Lee, and A. Singh, Phase transitions out of equilibrium: Domain formation and growth, *Phys. Rev. D* **48**, 800 (1993).
- [BraPis90a] E. Braaten and R. Pisarski, Soft amplitudes in hot gauge theories: a general analysis, *Nucl. Phys.* **B337**, 569 (1990).
- [BraPis90b] E. Braaten and R. Pisarski, Deducing hard thermal loops from Ward identities, *Nucl. Phys.* **B339**, 310 (1990).
- [BraPis92] E. Braaten and R.D. Pisarski, Simple effective Lagrangian for hard thermal loops, *Phys. Rev. D* **45**, 1827–1830 (1992).
- [BrBiGa05] A.S. Bradley, P.B. Blakie and C.W. Gardiner, Properties of the stochastic Gross–Pitaevskii equation: projected Ehrenfest relations and the optimal plane wave basis, *J. Phys. B, At. Mol. Opt. Phys.* **38**, 4259 (2005).
- [BRAHMS05] BRAHMS Collaboration, Quark–gluon plasma and color glass condensate at RHIC? The perspective from the BRAHMS experiment, *Nucl. Phys.* **A757**, 1 (2005).
- [Bra85] R.H. Brandenberger, Quantum field theory methods and inflationary universe models, *Rev. Mod. Phys.* **57**, 1 (1985).
- [Bra83] R. Brandenberger, R. Kahn and W. Press, Cosmological perturbations in the early universe, *Phys. Rev. D* **28**, 1809 (1983).
- [BraMag99] R.H. Brandenberger and J. Maguirejo, Cosmic defects and cosmology, astro-ph/0002030. Lecture notes of the International School on Cosmology, Kish Island, Ireland, Jan. 22 – Feb. 4, 1999.

- [BrMuPr92] R.H. Brandenberger, V. Mukhanov and T. Prokopec, Entropy of a classical stochastic field and cosmological perturbations, *Phys. Rev. Lett.* **69**, 3606 (1992).
- [BrMuPr93] R.H. Brandenberger, V. Mukhanov and T. Prokopec, Entropy of the gravitational field, *Phys. Rev. D* **48**, 2443 (1993).
- [BraSub05] A. Brandenburg and K. Subramanian, Astrophysical magnetic fields and nonlinear dynamo theory, *Phys. Rep.* **417**, 1 (2005).
- [Bre05] G.K. Brennen *et al.*, Scalable register initialization for quantum computing in an optical lattice, *J. Phys. B* **38**, 1687 (2005).
- [BroCar79] L.S. Brown and L.J. Carson, Quantum-mechanical parametric amplification, *Phys. Rev. A* **20**, 2486 (1979).
- [Bru93] T. Brun, Quasiclassical equations of motion for nonlinear Brownian systems, *Phys. Rev. D* **47**, 3383 (1993).
- [Bru96] T. Brun and J.J. Halliwell, Decoherence of hydrodynamic histories: A simple spin model, *Phys. Rev. D* **54**, 2899 (1996).
- [Bug03] K.A. Bugaev, Relativistic kinetic equations for finite domains and the freeze-out problem, *Phys. Rev. Lett.* **90**, 252301 (2003).
- [BunDav78] T.S. Bunch and P.C.W. Davies, Quantum field theory in de Sitter space; renormalization by point splitting, *Proc. Roy. Soc. A* **360**, 117 (1978).
- [BunPar79] T.S. Bunch and L. Parker, Feynman propagator in curved spacetime: A momentum-space representation, *Phys. Rev. D* **20**, 2499 (1979).
- [Bur95] Olga Buryak, Stochastic dynamics of large-scale inflation in De Sitter space, *Phys. Rev. D* **53**, 1763 (1996).
- [BuLiRi05] C. Bustamante, J. Liphardt, and F. Ritort, The nonequilibrium thermodynamics of small systems. *Phys. Today* **58**, 43 (2005).
- [CalLeg83a] A.O. Caldeira and A.J. Leggett, Path integral approach to quantum brownian motion, *Physica* **121A**, 587 (1983).
- [CalLeg83b] A.O. Caldeira and A.J. Leggett, Quantum tunnelling in a dissipative system, *Ann. Phys. (N.Y.)* **149**, 374 (1983).
- [CalLeg85] A.O. Caldeira and A.J. Leggett, Influence of damping on quantum interference: An exactly soluble model, *Phys. Rev. A* **31**, 1059 (1985).
- [CaCoJa70] C.G. Callen, S. Coleman and R. Jackiw, A new improved energy-momentum tensor, *Ann. Phys. (N.Y.)* **59**, 42 (1970).
- [CalWel51] H. Callen and T. Welton, Irreversibility and generalized noise, *Phys. Rev.* **83**, 34 (1951).
- [Cal89] E. Calzetta, Spinodal decomposition in quantum field theory, *Ann. Phys. (N.Y.)* **190**, 32 (1989).
- [Cal98] E. Calzetta, Relativistic fluctuating hydrodynamics, *Class. Q. Grav.* **15**, 653 (1998).
- [CalGon97] E. Calzetta and S. Gonorazky, Primordial fluctuations from nonlinear couplings, *Phys. Rev. D* **55**, 1812 (1997).
- [CalGra02] E. Calzetta and M. Graña, Reheating and turbulence, *Phys. Rev. D* **65**, 063522 (2002).
- [CaHaHu88] E. Calzetta, S. Habib and B.L. Hu, Quantum kinetic field theory in curved spacetime: covariant Wigner function and Liouville–Vlasov equation, *Phys. Rev. D* **37**, 2901 (1988).
- [CalHu87] E. Calzetta and B.L. Hu, Closed time-path functional formalism in curved spacetime: Application to cosmological back-reaction problems, *Phys. Rev. D* **35**, 495 (1987).
- [CalHu88] E. Calzetta and B.L. Hu, Nonequilibrium quantum fields: Closed-time-path effective action, Wigner function, and Boltzmann equation, *Phys. Rev. D* **37**, 2878 (1988).
- [CalHu89] E. Calzetta and B.L. Hu, Dissipation of quantum fields from particle creation, *Phys. Rev. D* **40**, 656 (1989).
- [CalHu93] E. Calzetta and B.L. Hu, Decoherence of correlation histories, in *Directions in General Relativity*, vol. II: *Brill Festschrift*, ed. B. L. Hu and T. A. Jacobson (Cambridge University Press, Cambridge, 1993).

- [CalHu94] E. Calzetta and B.L. Hu, Noise and fluctuations in semiclassical gravity, *Phys. Rev. D* **49**, 6636 (1994).
- [CalHu95] E. Calzetta and B.L. Hu, Quantum fluctuations, decoherence of the mean field, and structure formation in the early universe, *Phys. Rev. D* **52**, 6770 (1995).
- [CalHu95a] E. Calzetta and B.L. Hu, Correlations, decoherence, dissipation and noise in quantum field theory, in *Heat Kernel Techniques and Quantum Gravity*, vol. 4 of *Discourses in Mathematics and Its Applications*, ed. S. A. Fulling (A&M University Press, College Station, TX, 1995), hep-th/9501040.
- [CalHu97] E. Calzetta and B.L. Hu, Stochastic behavior of effective field theories across the threshold, *Phys. Rev. D* **55**, 3536 (1997).
- [CalHu00] E. Calzetta and B.L. Hu, Stochastic dynamics of correlations in quantum field theory: from Schwinger–Dyson to Boltzmann–Langevin equations, *Phys. Rev. D* **61**, 025012 (2000).
- [CalHu03] E. Calzetta and B.L. Hu, Bose–Einstein condensate collapse and dynamical squeezing of vacuum fluctuations, *Phys. Rev. A* **68**, 043625 (2003).
- [CaHuMa01] E. Calzetta, B.L. Hu, Francisco D. Mazzitelli, Coarse-grained effective action and renormalization group theory in semiclassical gravity and cosmology, *Phys. Rep.* **352**, 459–520 (2001).
- [CaHuRa00] E. Calzetta, B.L. Hu, S.A. Ramsey, Hydrodynamic transport functions from quantum kinetic theory, *Phys. Rev. D* **61** 125013 (2000).
- [CaHuRe06] E. Calzetta, B.L. Hu and A.M. Rey, Bose–Einstein condensate superfluid-Mott-insulator transition in an optical lattice, *Phys. Rev. A* **73**, 023610 (2006).
- [CaHuVe07] E. Calzetta, B.L. Hu and E. Verdaguer, Stochastic Gross–Pitaevskii equation for BEC via coarse-grained effective action, *Int. J. Mod. Phys. B* **21**, 4239 (2007).
- [CaJaPA86] E. Calzetta, I. Jack and L. Parker, Quantum gauge fields at high curvature, *Phys. Rev. D* **33**, 953 (1986).
- [CalKan02] E. Calzetta and A. Kandus, Self-consistent estimates of magnetic fields from reheating, *Phys. Rev. D* **65**, 063004 (2002).
- [CaKaMa98] E. Calzetta, A. Kandus and F.D. Mazzitelli, Primordial magnetic fields induced by cosmological particle creation, *Phys. Rev. D* **57**, 7139 (1998).
- [CalMaz90] E. Calzetta and D. Mazzitelli, Decoherence and particle creation, *Phys. Rev. D* **42**, 4066 (1990).
- [CaRoVe01] E. Calzetta, A. Roura and E. Verdaguer, Vacuum decay in quantum field theory, *Phys. Rev. D* **64**, 105008 (2001).
- [CaRoVe03] E. Calzetta, A. Roura and E. Verdaguer, Stochastic description for open quantum systems, *Physica A* **319**, 188 (2003).
- [CalSak92] E. Calzetta and M. Sakellariadou, Inflation in inhomogeneous cosmology, *Phys. Rev. D* **45**, 2802 (1992).
- [CalThi00] E. Calzetta and M. Thibeault, Relativistic theories of interacting fields and fluids, *Phys. Rev. D* **63**, 103507 (2001).
- [CalThi03] E. Calzetta and M. Thibeault, Macroscopic description of preheating, hep-ph/0309135.
- [CamPar04] D. Campo and R. Parentani, Space-time correlations in inflationary spectra: A wave-packet analysis, *Phys. Rev. D* **70**, 105020 (2004).
- [CamPar05] David Campo and Renaud Parentani, Inflationary spectra and partially decohered distributions, *Phys. Rev. D* **72**, 045015 (2005).
- [CamVer96] A. Campos and E. Verdaguer, Stochastic semiclassical equations for weakly inhomogeneous cosmologies, *Phys. Rev. D* **53**, 1927 (1996).
- [CanSci77] P. Candelas and D.W. Sciama, Irreversible thermodynamics of black holes, *Phys. Rev. Lett.* **38**, 1372 (1977).
- [Car93] H. Carmichael, *An Open Systems Approach to Quantum Optics* (Springer-Verlag, Berlin, 1993).
- [Car99] H. Carmichael, *Statistical Methods in Quantum Optics*, vol. I (Springer-Verlag, Berlin, 1999, corrected second printing 2001).

- [CaDeKo00] M. Carrington, H. Defu and R. Kobes, Shear viscosity in phi-fourth theory from an extended ladder resummation, *Phys. Rev. D* **62**, 25010 (2000).
- [CaDeKo01] M. Carrington, H. Defu and R. Kobes, Non-linear response from transport theory and QFT at finite temperature, *Phys. Rev. D* **64**, 25001 (2001).
- [CarKob98] M. Carrington and R. Kobes, General cancellation of ladder graphs at finite temperature, *Phys. Rev. D* **57**, 6372 (1998).
- [CaKoPe98] M. Carrington, R. Kobes and E. Petitgirard, Cancellation of ladder graphs in an effective expansion, *Phys. Rev. D* **57**, 2631 (1998).
- [CaKuZa03] M. Carrington, G. Kunstatter and H. Zarakiet, 2PI effective action and gauge invariance problems, *Eur. Phys. J.* **C42**, 253–259 (2005).
- [CarDuo73] P. Carruthers and M. Duong-van, Rapidity and angular distributions of charged secondaries, *Phys. Rev. D* **8**, 859 (1973).
- [CarZac83] P. Carruthers and F. Zachariasen, Quantum collision theory with phase-space distributions, *Rev. Mod. Phys.* **55**, 245 (1983).
- [Cas04] Y. Castin, Simple theoretical tools for low dimension Bose gases, quantum gases in low dimensions, *J. Phys. IV France*, **116**, 89 (2004).
- [CasDum97] Y. Castin and R. Dum, Instability and depletion of an excited Bose–Einstein condensate in a trap, *Phys. Rev. Lett.* **79**, 3553 (1997).
- [CasDum98] Y. Castin and R. Dum, Low-temperature Bose–Einstein condensates in time-dependent traps: Beyond the U(1) symmetry breaking approach, *Phys. Rev. A* **57**, 3008 (1998).
- [CavSch85] C.M. Caves and B.L. Schumacher, New formalism for two-photon quantum optics. I. Quadrature phases and squeezed states, *Phys. Rev. A* **31**, 3068, 3093 (1985).
- [Cer69] C. Cercignani, *Mathematical Methods in Kinetic Theory* (Macmillan, New York, 1969).
- [Cha43] S. Chandrasekhar, Stochastic problems in physics and astronomy, *Rev. Mod. Phys.* **15**, 1 (1943).
- [ChaCow39] S. Chapman and T. Cowling, *The Mathematical Theory of Non-uniform Gases* (Cambridge University Press, Cambridge, 1939) (reissued 1990).
- [CNLL02] Y.Y. Charng, K.W. Ng, C.Y. Lin and D.S. Lee, Photon production from non-equilibrium disoriented chiral condensates in a spherical expansion, *Phys. Lett.* **548B**, 175 (2002).
- [ChNuMi05] T. Charters, A. Nunes and J.P. Mimoso, Phase dynamics and particle production in preheating, *Phys. Rev. D* **71**, 083515 (2005).
- [Che62] S.S. Chern, Geometry of a quadratic differential form *J. Soc. Ind. Appl. Math.* **10**, 751 (1962).
- [ChWiDi77] Y. Choquet-Bruhat, C. deWitt-Morette and M. Dillard-Bleick, *Analysis, Manifolds and Physics* (North-Holland, Amsterdam, 1977).
- [ChoSuHa80] K. Chou, Z. Su and B. Hao, Closed time path Green’s functions and critical dynamics, *Phys. Rev. B* **22**, 3385 (1980).
- [CSHY85] K. Chou and Z. Su and B. Hao and L. Yu, Equilibrium and nonequilibrium formalisms made unified, *Phys. Rep.* **118**, 1 (1985).
- [ChCoPh95] Nobel Lectures: S. Chu. The manipulation of neutral particles, *Rev. Mod. Phys.* **70**, 685 (1998); C.N. Cohen-Tannoudji, Manipulating atoms with photons, *ibid.*, 707; W.D. Phillips, Laser cooling and trapping of neutral atoms, *ibid.*, 721.
- [Cla03a] N. Claussen, Dynamics of Bose–Einstein condensates near a Feshbach resonance in ^{85}Rb . Ph.D. Thesis, University of Colorado (2003).
- [Cla03b] N. Claussen *et al.*, Very-high-precision bound-state spectroscopy near a ^{85}Rb Feshbach resonance, *Phys. Rev. A* **67**, 060701(R) (2003).
- [Coh07] T.D. Cohen, Is there a “most perfect fluid” consistent with quantum field theory?, hep-th/0702136.
- [Col85] S. Coleman, *Aspects of Symmetry* (Cambridge University Press, Cambridge, 1985).
- [CoJaPo74] S. Coleman, R. Jackiw and H.D. Politzer, Spontaneous symmetry breaking in the O(N) model for large N, *Phys. Rev. D* **10**, 2491 (1974).

- [CoDuJo77] J.C. Collins, A. Duncan and S.D. Joglekar, Trace and dilatation anomalies in gauge theories, *Phys. Rev. D* **16**, 438 (1977).
- [CoPaPe95] G. Compagno, R. Passante and F. Persico, *Atom-Field Interactions and Dressed Atom* (Cambridge University Press, Cambridge, 1995).
- [CDHR98] F. Cooper, J. Dawson, S. Habib and R. Ryne, Chaos in time dependent variational approximations to quantum dynamics, *Phys. Rev. E* **57**, 1489 (1998).
- [CEKMS93] F. Cooper, J. Eisenberg, Y. Kluger, E. Mottola and B. Svetitsky, Particle production in the central rapidity region, *Phys. Rev. D* **48**, 190 (1993).
- [CooFry74] F. Cooper and G. Frye, Single-particle distribution in the hydrodynamic and statistical models of multiparticle production, *Phys. Rev. D* **10**, 186 (1974).
- [CoFrSc74] F. Cooper, G. Frye and E. Schonberg, Landau's hydrodynamic model of particle production and electron-positron annihilation into hadrons, *Phys. Rev. D* **11**, 192 (1974).
- [CHKM97] F. Cooper, S. Habib, Y. Kluger and E. Mottola, Nonequilibrium dynamics of symmetry breaking in $\lambda\Phi^4$ theory, *Phys. Rev. D* **55**, 6471 (1997).
- [CHKMPA94] F. Cooper, S. Habib, Y. Kluger, E. Mottola, J.P. Paz and P. Anderson, Nonequilibrium quantum fields in the large-N expansion, *Phys. Rev. D* **50**, 2848 (1994).
- [CoKIMo96] F. Cooper, Y. Kluger and E. Mottola, Anomalous transverse distribution of pions as a signal for the production of disoriented chiral condensates, *Phys. Rev. C* **54**, 3298 (1996).
- [CKMP95] F. Cooper, Y. Kluger, E. Mottola and J.P. Paz, Quantum evolution of disoriented chiral condensates, *Phys. Rev. D* **51**, 2377 (1995).
- [CooMot87] F. Cooper and E. Mottola, Initial-value problems in quantum field theory in the large-N approximation, *Phys. Rev. D* **36**, 3114 (1987).
- [CoPiSt86] F. Cooper, S.Y. Pi, and P. Stancioff, Quantum dynamics in a time dependent variational approximation, *Phys. Rev. D* **34**, 3831 (1986).
- [CoEnWi99] E.A. Cornell, J.R. Ensher and C.E. Wieman, Experiments in dilute atomic Bose-Einstein condensation, Varenna conference on Bose-Einstein condensation, July 1998 (cond-mat/9903109).
- [CorWie02] E.A. Cornell and C.E. Wieman, Nobel Lecture: Bose-Einstein condensation in a dilute gas, the first 70 years and some recent experiments, *Rev. Mod. Phys.* **74**, 875–893 (2002).
- [CoThWi06] S.L. Cornish, S.T. Thompson and C.E. Wieman, Formation of bright matter-wave solitons during the collapse of attractive Bose-Einstein condensates, *Phys. Rev. Lett.* **96**, 170401 (2006).
- [CoJaTo74] J.M. Cornwall, R. Jackiw and E. Tomboulis, Effective action for composite operators, *Phys. Rev. D* **10**, 2428 (1974).
- [Cro80] C. Cronstrom, A simple and complete Lorentz – covariant gauge condition, *Phys. Lett.* **90B**, 267 (1980).
- [Cse94] L.P. Csernai, *Introduction to Relativistic Heavy Ion Collisions* (John Wiley, Chichester, 1994).
- [Dad99] I. Dadic, Two mechanisms for the elimination of pinch singularities in out of equilibrium thermal field theories, *Phys. Rev. D* **59**, 125012 (1999).
- [DahLas67] H.D. Dahmen and G. Jona Lasino, Variational formulation of quantum field theory II Nuovo Cimento, **LIIA**, 807 (1967).
- [Dal98] D.A.R. Dalvit, Quantum corrections and effective action in field theory, doctoral thesis, University of Buenos Aires.
- [DaDzOn02] D.A.R. Dalvit, J. Dziarmaga and R. Onofrio, Continuous quantum measurement of a Bose-Einstein condensate: a stochastic Gross-Pitaevskii equation, *Phys. Rev. A* **65**, 053604 (2002).
- [DalMaz96] D.A.R. Dalvit and F.D. Mazzitelli, Exact CTP renormalization group equation for the coarse-grained effective action, *Phys. Rev. D* **54**, 6338 (1996).
- [Dan84a] P. Danielewicz, Quantum theory of nonequilibrium processes I, *Ann. Phys. (N.Y.)* **152**, 239 (1984).
- [Dan84b] P. Danielewicz, Quantum theory of nonequilibrium processes II. Application to nuclear collisions, *Ann. Phys. (N.Y.)* **152**, 305 (1984).

- [Davies76] E.B. Davies, *The Quantum Theory of Open Systems* (Academic Press, London, 1976).
- [DavFul77] P.C.W. Davies and S.A. Fulling, Radiation from moving mirrors and from black holes, *Proc. Roy. Soc. Lond. A* **356**, 237 (1977).
- [DavPaz97] L. Dávila Romero and J. Pablo Paz, Decoherence and initial correlations in quantum Brownian motion, *Phys. Rev. A* **55**, 4070–4083 (1997).
- [DaLiTo99] A.-C. Davis, M. Lilley and O. Tornkvist, Relaxing the bounds on primordial magnetic seed fields, *Phys. Rev. D* **60**, 021301 (1999).
- [DeGuLa92] N. Deruelle, C. Gundlach and D. Langlois, Vacuum density fluctuations in extended chaotic inflation, *Phys. Rev. D* **46**, 5337 (1992).
- [DeuDru02] P. Deuar and P. Drummond, Gauge P representations for quantum-dynamical problems, *Phys. Rev. A* **62**, 033812 (2002).
- [DeW64] B. DeWitt, Dynamical theory of groups and fields, in *Relativity, Groups and Topology*, ed. C. and B. DeWitt (Gordon and Breach, New York, 1964).
- [DeW67] B. DeWitt, Quantum theory of gravity I: the canonical theory, *Phys. Rev.* **160**, 1113 (1967).
- [DeW75] B. DeWitt, Quantum field theory in curved spacetime, *Phys. Rep.* **19**, 295 (1975).
- [DeW79] B. DeWitt, The formal structure of quantum gravity, in *Recent Developments in Gravitation*, ed. M. Levy and S. Deser (Plenum, New York, 1979).
- [DeW81] B. DeWitt, A gauge invariant effective action, in *quantum gravity 2*, ed. C. Isham, R. Penrose and D. Sciama (Clarendon Press, Oxford, 1981).
- [DeW84] B. DeWitt, The spacetime approach to quantum field theory, in *Relativity, Groups and Topology II*, ed. B. DeWitt and R. Stora (Elsevier, Amsterdam, 1984).
- [DeW86] B. DeWitt, Effective action for expectation values in *Quantum Concepts in Space and Time*, ed. R. Penrose and C.J. Isham (Clarendon Press, Oxford, Clarendon, 1986).
- [DeW87] B. DeWitt, The effective action, in *Quantum Field Theory and Quantum Statistics*, ed. I. Batalin, C. Isham and G. Vilkovisky (A. Hilger, Bristol, 1987).
- [DeWMol98] B. DeWitt, C. Molina-Paris, Quantum gravity without ghosts, *Mod. Phys. Lett. A* **13**, 2475–2478 (1998).
- [Dir50] P.A.M. Dirac, Generalized Hamiltonian dynamics, *Can. J. Math.* **2**, 129 (1950).
- [Dir58] P.A.M. Dirac, *The Principles of Quantum Mechanics* (Oxford University Press, Oxford, 1958).
- [Dir58b] P.A.M. Dirac, Generalized Hamiltonian dynamics, *Proc. R. Soc. London A* **246**, 326 (1958).
- [Dir65] P.A.M. Dirac, *Lectures on Quantum Field Theory* (Yeshiva University, New York, 1965).
- [Dod03] S. Dodelson, *Modern Cosmology* (Academic Press, Amsterdam, 2003).
- [DolJac74] L. Dolan and R. Jackiw, Symmetry behavior at finite temperature, *Phys. Rev. D* **9**, 3320 (1974).
- [DomMar64a] C. de Dominicis and P.C. Martin, Stationary entropy principle and renormalization in normal and superfluid systems I, *J. Math. Phys.* **5**, 14 (1964).
- [DomMar64b] C. de Dominicis and P.C. Martin, Stationary entropy principle and renormalization in normal and superfluid systems II, *J. Math. Phys.* **5**, 31 (1964).
- [DomRit02] P. Domokos and H. Ritsch, Collective cooling and self-organization of atoms in a cavity, *Phys. Rev. Lett.* **89**, 253003 (2002).
- [Don01] E. Donley *et al.*, Dynamics of collapsing and exploding Bose–Einstein condensates, *Nature* **412**, 295 (2001).
- [Dor81] R. Dorfman, Some recent development in the kinetic theory, in H.J. Raveché (editor) *Perspectives in Statistical Physics: M.S. Green Memorial Volume* (North Holland, Amsterdam, 1981).
- [Dor99] R. Dorfman, *An Introduction to Chaos in Nonequilibrium Statistical Mechanics* (Cambridge University Press, Cambridge, 1999).

- [DowKen96] F. Dowker and A. Kent, On the consistent histories approach to quantum mechanics, *J. Stat. Phys.* **82**, 1575 (1996).
- [DrDeKh04] P. Drummond, P. Deuar and K. Kheruntsyan, Canonical Bose gas simulations with stochastic gauges, *Phys. Rev. Lett.* **92**, 040405 (2004).
- [Dub67] D.F. DuBois, in *Lectures in Theoretical Physics*, vol. IX C, *Kinetic Theory*, ed. W.E. Brittin (Gordon and Breach, New York, 1967).
- [DuiSto01] R. Duine and H. Stoof, Stochastic dynamics of a trapped Bose-Einstein condensate, *Phys. Rev. A* **65**, 13603 (2001).
- [DuNaSt07] A. Dumitru, Y. Nara and M. Strickland, Ultraviolet avalanche in anisotropic non-abelian plasmas, *Phys. Rev. D* **75**, 025016 (2007).
- [Dzi05b] J. Dziarmaga, Images of a Bose-Einstein condensate at finite temperature, "Quantum Optics VI," June 13–18, 2005, Krynica, Poland (cond-mat/0506723).
- [DzLaZu99] J. Dziarmaga, P. Laguna and W.H. Zurek, Symmetry breaking with a slant: topological defects after an inhomogeneous quench, *Phys. Rev. Lett.* **82**, 4749 (1999).
- [DSZB04] J. Dziarmaga, A. Smerzi, W. Zurek and A. Bishop, Non-equilibrium Mott transition in a lattice of Bose-Einstein condensates, Proceedings of NATO ASI Patterns of symmetry breaking, Krakow, Poland, Sept. 2002, cond-mat/0403607.
- [EbJaPi88] O. Eboli, R. Jackiw and S.Y. Pi, Quantum fields out of thermal equilibrium, *Phys. Rev. D* **37**, 3557 (1988).
- [Efs03] G. Efstathiou, The statistical significance of the low CMB multipoles, *MNRAS* **346**, L26 (2003).
- [Efs04] G. Efstathiou, A maximum likelihood analysis of the low CMB multipoles from WMAP, *MNRAS* **348**, 885 (2004).
- [EiOCSt95] M. Van Eijck, D. O'Connor and C.R. Stephens, Critical temperature and amplitude ratios from a finite-temperature renormalization group, *Int. J. Mod. Phys. A* **10**, 3343 (1995).
- [Ein05] A. Einstein, On the movement of small particles suspended in a stationary liquid demanded by the molecular kinetic theory of heat, *Ann. der Phys.* **17**, 549 (1905), reprinted in [Fur56].
- [Ein17] A. Einstein, Zur Quantentheorie der Strahlung, *Physik Z.* **18**, 121 (1917) (Engl. tr. On the quantum theory of radiation, reprinted in B.L. van der Waerden, *Sources of Quantum Mechanics* (Dover, New York, 1968)).
- [Ein24] A. Einstein, Quantentheorie des einatomigen idealen Gases (Quantum theory of monatomic ideal gases), *Sitzungsberichte der Preussischen Akademie der Wissenschaften Physikalisch-Mathematische Klasse*: 261–267 (1924).
- [Ein25] A. Einstein, Quantentheorie des einatomigen idealen Gases, 2. Abhandlung. *Sitzungsberichte der Preussischen Akademie der Wissenschaften (Berlin)*, Physikalisch-mathematische Klasse: 3–14 (1925).
- [EiPoRo35] A. Einstein, B. Podolsky and N. Rosen, Can quantum-mechanical description of physical reality be considered complete?, *Phys. Rev.* **47**, 777 (1935); reprinted in J.A. Wheeler and W.H. Zurek (editors), *Quantum Theory and Measurement* (Princeton University Press, Princeton, 1983).
- [ElKrVo06] V.B. Eltsov, M. Krusius and G.E. Volovik, Transition to superfluid turbulence, *J. of Low Temp. Phys.* **145**, 89–106 (2006).
- [Elz02] H.-Th. Elze, Fluid dynamics of relativistic quantum dust, *J. Phys. G* **28**, 2235 (2002).
- [ElGyVa86] H.-Th. Elze, M. Gyulassy and D. Vasak, Transport equations for the QCD quark Wigner operator, *Nucl. Phys.* **B276**, 706 (1986).
- [EnNgOl88] K. Enqvist, K.-W. Ng and K.A. Olive, Cosmic abundances of very heavy neutrinos, *Nucl. Phys.* **B303**, 713 (1988).
- [EvCoMo93] D.J. Evans, E.G.D. Cohen and G.P. Morris, Probability of second law violations in shearing steady states, *Phys. Rev. Lett.* **71**, 2401 (1993).
- [EvaSea94] D.J. Evans and D.J. Searles, Equilibrium microstates which generate second law violating steady states, *Phys. Rev. E* **50**, 1645 (1994).
- [Far64] I. Farquhar, *Ergodic Theory in Statistical Mechanics* (John Wiley, New York, 1964).

- [FGGKLT01] G. Felder, J. Garcia-Bellido, P.B. Greene, L. Kofman, A. Linde and I. Tkachev, Dynamics of symmetry breaking and tachyonic preheating, *Phys. Rev. Lett.* **87**, 011601 (2001).
- [FelKof01] G. Felder and L. Kofman, The development of equilibrium after preheating, *Phys. Rev. D* **63**, 103503 (2001).
- [FeKoLi01] G. Felder, L. Kofman and A. Linde, Tachyonic instability and dynamics of spontaneous symmetry breaking, *Phys. Rev. D* **64**, 123517 (2001).
- [FelTka00] G. Felder and I. Tkachev, LATTICEEASY: A program for lattice simulations of scalar fields in an expanding universe, hep-ph/0011159.
- [FeyHib65] R. Feynman and A. Hibbs, *Quantum Mechanics and Path Integrals* (McGraw-Hill, New York, 1965).
- [FeyVer63] R. Feynman and F. Vernon, The theory of a general quantum system interacting with a linear dissipative system, *Ann. Phys. (N.Y.)* **24**, 118 (1963).
- [FiGaJe06] F. Filion-Gourdeau, J.-S. Gagnon and S. Jeon, All orders Boltzmann collision term from the multiple scattering expansion of the self-energy, *Phys. Rev. D* **74**, 025010 (2006).
- [Fin00] F. Finelli, Cosmological magnetic fields by parametric resonance, astro-ph/0007290.
- COSMO 99: 3rd International Conference on Particle Physics and the Early Universe, Trieste, Italy, 27 Sep.–3 Oct. 1999.
- [FiHaHu79] M.V. Fischetti, J.B. Hartle and B.L. Hu, Quantum effects in the early universe I: Influence of trace anomalies on homogeneous, isotropic, classical geometries, *Phys. Rev. D* **20**, 1757 (1979).
- [Fis74] M. Fisher, The renormalization group in the theory of critical behavior, *Rev. Mod. Phys.* **46**, 597 (1974).
- [Fis83] M. Fisher, in *Critical Phenomena*, ed. F.J.W. Hahne (Springer-Verlag, Berlin 1983).
- [FWGF89] M. Fisher, P. Weichman, G. Grinstein and D. Fisher, Boson localization and the superfluid-insulator transition, *Phys. Rev. B* **40**, 546 (89).
- [Foc37] V.A. Fock, Die Eigenzeit in der klassischen und in der Quantenmechanik, *Phys. Zeit. Sowjetunion* **12**, 404 (1937).
- [Fon94] O. Fonarev, Wigner function and QKT in curved space-time and external fields, *J. Math. Phys.* **35**, 2105 (1994).
- [FoKaMa65] G.W. Ford, M. Kac and P. Mazur, Statistical mechanics of assemblies of coupled oscillators, *J. Math. Phys.* **6**, 504 (1965).
- [ForPar77] L. Ford and L. Parker, Quantized gravitational wave perturbations in Robertson–Walker universes, *Phys. Rev. D* **16**, 1601 (1977).
- [FoxUhl70a] R. Fox and G. Uhlembeck, Contributions to non-equilibrium thermodynamics. I. Theory of hydrodynamical fluctuations, *Phys. Fluids* **13**, 1893 (1970).
- [FoxUhl70b] R. Fox and G. Uhlembeck, Contributions to nonequilibrium thermodynamics. II. Fluctuation theory for the Boltzmann equation, *Phys. Fluids* **13**, 2881 (1970).
- [FrGiSh91] E.S. Fradkin, D.M. Gitman, and S.M. Shvartsman, *Quantum Electrodynamics with Unstable Vacuum* (Springer-Verlag, Berlin, 1991).
- [FASA05] P. Freire, N. Antunes, P. Salmi and A. Achúcarro, The role of dissipation in biasing the vacuum selection in quantum field theory at finite temperature, *Phys. Rev. D* **72**, 045017 (2005).
- [FEOS96] F. Freire, M. Van Eijck, D. O’Connor and C.R. Stephens, Finite-temperature renormalization group predictions: The critical temperature exponents, and amplitude ratios, preprint hep-th/9601165.
- [FreTay90] J. Frenkel and J. Taylor, High temperature limit of thermal QCD, *Nucl. Phys. B* **334**, 199 (1990).
- [Fri95] U. Frisch, *Turbulence, the Legacy of A. N. Kolmogorov* (Cambridge University Press, Cambridge, 1995).
- [FroNov93] V. Frolov and I.D. Novikov, Dynamical origin of the entropy of a black hole, *Phys. Rev. D* **48**, 4545 (1993).
- [Fuj80] K. Fujikawa, Comment on chiral and conformal anomalies, *Phys. Rev. Lett.* **44**, 1733 (1980).

- [FKYY96] H. Fujisaki, K. Kumekawa, M. Yamaguchi and M. Yoshimura, Particle production and dissipative cosmic field, *Phys. Rev. D* **53**, 6805 (1996).
- [Ful72] S.A. Fulling, Scalar quantum field theory in a closed universe of constant curvature. Ph.D. Thesis, Princeton University (1972).
- [Ful89] S.A. Fulling, *Aspects of Quantum Field Theory in Curved Spacetime* (Cambridge University Press, Cambridge, 1989).
- [Ful95] S.A. Fulling (ed.) *Heat Kernel Techniques and Quantum Gravity* (Texas A&M Press, College Station, 1995).
- [FulDav76] S.A. Fulling and P.C.W. Davies, Radiation from a moving mirror in two dimensional space-time: conformal anomaly, *Proc. R. Soc. Lond. A* **348**, 393 (1976).
- [FulPar74] S.A. Fulling and L. Parker, Renormalization in the theory of a quantized scalar field interacting with a Robertson–Walker spacetime, *Ann. Phys. (N.Y.)* **87**, 176 (1974).
- [FuPaHu74] S.A. Fulling, L. Parker and B.L. Hu, Conformal energy-momentum tensor in curved spacetime: Adiabatic regularization and renormalization, *Phys. Rev. D* **10**, 3905 (1974); Erratum: *Phys. Rev. D* **11**, 1714 (1975).
- [Fur56] R. Furth (ed.), *Investigations on the Theory of the Brownian Movement* (Dover, New York, 1956).
- [Gal98] G. Gallavotti, Chaotic dynamics, fluctuations, nonequilibrium ensembles, *Chaos* **8**, 384 (1998).
- [GalCoh95] G. Gallavotti and E. Cohen, Dynamical ensembles in nonequilibrium statistical mechanics, *Phys. Rev. Lett.* **74**, 2694 (1995).
- [GaFrTo01] A. Gammal, T. Frederico and L. Tomio, Critical number of atoms for attractive Bose–Einstein condensates with cylindrically symmetric traps, *Phys. Rev. A* **64**, 055602 (2001).
- [Gar90] C.W. Gardiner, *Handbook of Stochastic Methods* (Springer-Verlag, Berlin, 1990).
- [Gar97] C. Gardiner, Particle-number-conserving Bogoliubov method which demonstrates the validity of the time-dependent Gross–Pitaevskii equation for a highly condensed Bose gas, *Phys. Rev. A* **56**, 1414 (1997).
- [GaAnFu01] C. Gardiner, J. Anglin and T. Fudge, The stochastic Gross–Pitaevskii equation, *J. Phys. B At. Mol. Opt. Phys.* **35**, 1555 (2002).
- [GarDav03] C. Gardiner and M. Davis, The stochastic Gross–Pitaevskii equation II, cond-mat/0308044.
- [GarZol97] C. Gardiner and P. Zoller, Quantum kinetic theory, *Phys. Rev. A* **55**, 2902 (1997).
- [GarZol98] C. Gardiner and P. Zoller, Quantum kinetic theory III, *Phys. Rev. A* **58**, 536 (1998).
- [GarZol00a] C. Gardiner and P. Zoller, Quantum kinetic theory V: quantum kinetic master equation for mutual interaction of condensate and noncondensate, *Phys. Rev. A* **61**, 033601 (2000).
- [GarZol00b] C.W. Gardiner and P. Zoller, *Quantum Noise* (Springer-Verlag, Berlin, 2000).
- [GJDCZ00] S. Gardiner, D. Jaksch, R. Dum, J. Cirac and P. Zoller, Nonlinear matter wave dynamics with a chaotic potential, *Phys. Rev. A* **62**, 23612 (2000).
- [GarMor07] S. Gardiner and S.A. Morgan, A number-conserving approach to a minimal self-consistent treatment of condensate and non-condensate dynamics in a degenerate Bose gas, *Phys. Rev. A* **75**, 043621 (2007).
- [GBSS05] T. Gasenzer, J. Berges, M. Schmidt and M. Seco, Nonperturbative dynamical many-body theory of a Bose–Einstein condensate, *Phys. Rev. A* **72**, 063604 (2005).
- [GBSS07] T. Gasenzer, J. Berges, M. Schmidt and M. Seco, Ultracold quantum gases far from equilibrium, *Nucl. Phys. A* **785**, 214–217 (2007).
- [Gas98] P. Gaspard, *Chaos, Scattering and Statistical Mechanics* (Cambridge University Press, Cambridge, 1998).
- [Gas04] P. Gaspard, Time-reversed dynamical entropy and irreversibility in Markovian random processes, *J. Stat. Phys.* **117**, 599 (2004).
- [Gas05] P. Gaspard, Dynamical systems theory of irreversibility in P. Collet *et al.* (eds.), *Chaotic Dynamics and Transport in Classical and Quantum Systems* (Kluwer, Dordrecht, 2005).

- [Gas06] P. Gaspard, Hamiltonian dynamics, nanosystems, and nonequilibrium statistical mechanics, Lecture Notes for the International Summer School, *Fundamental Problems in Statistical Physics XI* (Leuven, Belgium, September 4–17, 2005).
- [GasGio93] M. Gasperini and M. Giovanni, Entropy production in the cosmological amplification of the vacuum fluctuations, *Phys. Lett.* **301B**, 334 (1993).
- [GasGioVen93] M. Gasperini, M. Giovanni and G. Veneziano, Squeezed thermal vacuum and the maximum scale for inflation, *Phys. Rev. D* **48**, R439 (1993).
- [Gei96] K. Geiger, Quantum field kinetics of QCD: Quark–gluon transport theory for light-cone dominated processes, *Phys. Rev. D* **54**, 949 (1996).
- [Gei97] K. Geiger, Nonequilibrium QCD: Interplay of hard and soft dynamics in high-energy multigluon beams, *Phys. Rev. D* **56**, 2665 (1997).
- [Gei99] K. Geiger, Propagation of gluons from a nonperturbative evolution equation in axial gauges, *Phys. Rev. D* **60**, 034012 (1999).
- [GeScSe01] F. Gelis, D. Schiff and J. Serreau, Simple out-of-equilibrium field theory formalism?, *Phys. Rev. D* **64**, 56006 (2001).
- [GelHar90] M. Gell-Mann and J.B. Hartle, Quantum mechanics in the light of quantum cosmology in *Complexity, Entropy and the Physics of Information*, ed. W.H. Zurek (Addison-Wesley, Reading, MA, 1990).
- [GelHar] M. Gell-Mann and J.B. Hartle, Quantum mechanics in the light of quantum cosmology, in *Proceedings of the Third International Symposium on the Foundations of Quantum Mechanics in the Light of New Technology*, ed. S. Kobayashi. S. Kobayashi, H. Ezawa, Y. Murayama and S. Nomura (Physical Society of Japan, Tokyo, 1990).
- [GelHar06] M. Gell-Mann and J.B. Hartle, Quasiclassical coarse graining and thermodynamic entropy, quant-ph/0609190. Dedicated to Rafael Sorkin on his 60th birthday.
- [GerReb03] A. Gerhold and A. Rebhan, Gauge dependence identities for color superconducting QCD, *Phys. Rev. D* **68**, 011502 (2003).
- [Ger95] R. Geroch, Relativistic theories of dissipative fluids, *J. Math. Phys.* **36**, 4226 (1995).
- [Ger01] R. Geroch, On hyperbolic “theories” of relativistic dissipative fluids, gr-qc/0103112.
- [GerLin90] R. Geroch and L. Lindblom, Dissipative relativistic fluid theories of divergence type, *Phys. Rev. D* **41**, 1855 (1990).
- [GiHaSt87] G.W. Gibbons, S.W. Hawking and J.M. Stewart, A natural measure on the set of all universes, *Nucl. Phys.* **B281**, 736 (1987).
- [Ginz87] V.L. Ginzburg (ed.) *Issues in Intense Field Quantum Electrodynamics*, Proc. Lebedev Phys. Inst. Sci. USSR, vol. **168** (Nova Science, Commack, 1987).
- [Ginz95] V.L. Ginzburg (ed.) *Quantum Electrodynamics with Unstable Vacuum*, Proc. Lebedev Phys. Inst. Sci. Rus., vol. **220** (Nova Science, Commack, 1995).
- [GioSha00] M. Giovannini and M. Shaposhnikov, Primordial magnetic fields from inflation?, *Phys. Rev. D* **62**, 103512 (2000).
- [Gir60] M. Girardeau, Relationship between systems of impenetrable bosons and fermions in one dimension, *J. Math. Phys.* **1**, 516 (1960).
- [GirArn98] M. Girardeau, Comment on Particle-number-conserving Bogoliubov method which demonstrates the validity of the time-dependent Gross–Pitaevskii equation for a highly condensed Bose gas, *Phys. Rev. A* **58**, 775 (1998).
- [GirArn59] M. Girardeau and R. Arnowitt, Theory of many-boson systems: Pair theory, *Phys. Rev.* **113**, 755 (1959).
- [GKJKSZ96] D. Giulini, C. Kiefer, E. Joos, J. Kupsch, I.O. Stamatescu and H.D. Zeh, *Decoherence and the Appearance of a Classical World in Quantum Theory* (Springer-Verlag, Berlin, 1996).
- [Gla05] J.R. Glauber, 100 Years of Light Quanta, Nobel Lecture (2005).
- [GlMaRa82] M. Gleiser, G.C. Marques and R.O. Ramos, Evaluation of thermal corrections to false vacuum decay rates, *Phys. Rev. D* **48**, 1571 (1993).
- [GleRam94] M. Gleiser and R. Ramos, Microphysical approach to nonequilibrium dynamics of quantum fields, *Phys. Rev. D* **50**, 2441 (1994).
- [Gold61] J. Goldstone, Field theories with superconductor solutions, *Nuovo Cimento* **19**, 154 (1961).

- [GoPaSa95] J. Gomis, J. Paris and S. Samuel, Antibracket, antifields and gauge theory quantization, *Phys. Rep.* **259**, 1 (1995).
- [GonLin86] A.S. Goncharov and A.D. Linde, Tunneling in an expanding universe: Euclidean and Hamiltonian approaches, *Sov. J. Part. Nucl.* **17**, 369 (1986).
- [GoLiMu87] A.S. Goncharov, A.D. Linde, and V. F. Mukhanov, The global structure of the inflationary universe, *Int. J. Mod. Phys. A* **2**, 561 (1987).
- [GKGB04] K. Goral, T. Kohler, T. Gasenzer and K. Burnett, Dynamics of correlations in atomic Bose-Einstein condensates, *J. Mod. Opt.* **51**, 1731 (2004).
- [GorKar04] A. Gorban and I. Karlin, Uniqueness of thermodynamic projector and kinetic basis of molecular individualism, *Physica A* **336**, 391 (2004).
- [GoKaZi04] A. Gorban, I. Karlin and A. Zinovyev, Constructive methods of invariant manifolds for kinetic problems, *Phys. Rep.* **396**, 197 (2004).
- [Gra82] H. Grabert, *Projection Operator Techniques in Nonequilibrium Statistical Mechanics* (Springer-Verlag, Berlin, 1982).
- [GrScIn88] H. Grabert, P. Schramm and G.L. Ingold, Quantum Brownian motion, the functional integral approach, *Phys. Rep.* **168**, 115 (1988).
- [GraRub01] D. Grasso and H. Rubinstein, Magnetic fields in the early universe, *Phys. Rep.* **348**, 163 (2001).
- [GKLS97] P. Greene, L. Kofman, A. Linde and A. Starobinsky, Structure of resonance in preheating after inflation, *Phys. Rev. D* **56**, 6175 (1997).
- [GreLeu98] C. Greiner and S. Leupold, Stochastic interpretation of Kadanoff-Baym equations and their relation to Langevin processes, *Ann. Phys. (N.Y.)* **270**, 328–390 (1998).
- [GreMul97] C. Greiner and B. Müller, Classical fields near thermal equilibrium, *Phys. Rev. D* **55**, 1026 (1997).
- [GMEHB02] C. Greiner *et al.*, Quantum phase transition from a superfluid to a Mott insulator in a gas of ultracold atoms, *Nature* **415**, 39 (2002).
- [Greiner] W. Greiner, B. Müller and J. Rafelski, *Quantum Electrodynamics of Strong Fields* (Springer-Verlag, Berlin, 1985).
- [GrReBr96] W. Greiner, J. Reinhardt and D.A. Bromley, *Field Quantization* (Springer-Verlag, Berlin, 1996).
- [GrMaMo88] A.A. Grib, S.G. Mamaev and V.M. Mostepanenko, *Vacuum Quantum Effects in Strong Fields* (Atomizdat, Moscow, 1988; Friedmann Laboratory Publishing, St. Petersburg, 1994).
- [Gri96] A. Griffin, Conserving and gapless approximations for an inhomogeneous Bose gas at finite temperatures, *Phys. Rev. B* **53**, 9341 (1996).
- [Gri84] R.B. Griffiths, Consistent histories and the interpretation of quantum mechanics, *J. Stat. Phys.* **36**, 219 (1984).
- [Gri93] R.B. Griffiths, Consistent interpretation of quantum mechanics using quantum trajectories, *Phys. Rev. Lett.* **70**, 2201 (1993).
- [Gri74] L. Grishchuk, Amplification of gravitational waves in an isotropic universe, *Zh. Eksp. Teor. Fiz.* **67**, 825 (1974) (*Sov. Phys. JETP* **40**, 409 (1975)).
- [GriSid90] L. Grishchuk and Y.V. Sidorov, Squeezed quantum states of relic gravitons and primordial density fluctuations, *Phys. Rev. D* **42**, 3413 (1990).
- [GrLeWe80] S.R. de Groot, W.A. van Leeuwen and Ch.G. van Weert, *Relativistic Kinetic Theory* (North-Holland, Amsterdam, 1980).
- [Guth81] A.H. Guth, Inflationary universe: A possible solution to the horizon and flatness problems, *Phys. Rev. D* **23**, 347 (1981).
- [GuthPi82] A.H. Guth and S.Y. Pi, Fluctuations in the new inflationary universe, *Phys. Rev. Lett.* **49**, 1110 (1982).
- [GutPi85] A.H. Guth and S.Y. Pi, Quantum mechanics of the scalar field in the new inflationary universe, *Phys. Rev. D* **32**, 1899 (1985).
- [Gyu01] M. Gyulassy, Lectures on the theory of high energy A+A at RHIC, *Lect. Notes Phys.* **583**, 37–79 (2002) (nucl-th/0106072).
- [GyKaWi79] M. Gyulassy, S. Kauffmann and L. Wilson, Pion interferometry of nuclear collisions. I. Theory, *Phys. Rev. C* **20**, 2267 (1979).

- [GyRiZh96a] M. Gyulassy, D. Rischke and B. Zhang, Transverse shocks in the turbulent gluon plasma produced in ultra-relativistic A+A, nucl-th/9606045. Proc. of the Int. Conf. on Nucl. Phys. “Structure of Vacuum and Elementary Matter,” March 10-16, Wilderness, South Africa.
- [GyRiZh97] M. Gyulassy, D. Rischke and B. Zhang, Hot spots and turbulent initial conditions of quark-gluon plasmas in nuclear collisions, *Nucl. Phys.* **A613**, 397–434 (1997).
- [Hab90] S. Habib, Exact Langevin equation in a cosmological setting, *Phys. Rev. D* **39**, 2871 (1990).
- [Hab92] S. Habib, Stochastic inflation: Quantum phase-space approach, *Phys. Rev. D* **46**, 2408 (1992).
- [Hab04] S. Habib, Gaussian dynamics is classical dynamics, quant-ph/0406011.
- [HKMP96] S. Habib, Y. Kluger, E. Mottola and J. Paz, Dissipation and decoherence in mean field theory, *Phys. Rev. Lett.* **76**, 4660 (1996).
- [HabLaf90] S. Habib and R. Laflamme, Wigner function and decoherence in quantum cosmology, *Phys. Rev. D* **42**, 4056 (1990).
- [HabLyt00] S. Habib and G. Lythe, Dynamics of kinks: nucleation, diffusion and annihilation, *Phys. Rev. Lett.* **84**, 1070 (2000).
- [HaMoMo99] S. Habib, C. Molina-Paris and E. Mottola, Energy-momentum tensor of particles created in an expanding universe, *Phys. Rev. D* **61**, 024010 (1999).
- [HakAmb85] V. Hakim and V. Ambegaokar, Quantum theory of a free particle interacting with a linearly dissipative environment, *Phys. Rev. A* **32**, 423 (1985).
- [Hal81] F. Haldane, Effective harmonic-fluid approach to low-energy properties of one-dimensional quantum fluids, *Phys. Rev. Lett.* **47**, 1840 (1981).
- [Hal89] J.J. Halliwell, Decoherence in quantum cosmology, *Phys. Rev. D* **39**, 2912 (1989).
- [Hal93] J.J. Halliwell, Quantum-mechanical histories and the uncertainty principle: Information-theoretic inequalities, *Phys. Rev. D* **48**, 2739, 4785 (1993).
- [Hal98] J.J. Halliwell, Decoherent histories and hydrodynamic equations, *Phys. Rev. D* **58**, 105015 (1998).
- [HaPeZu94] J. Halliwell, J. Perez Mercader and W. Zurek (eds.), *The Physical Origin of Time Asymmetry* (Cambridge University Press, Cambridge, 1994).
- [HalYu96] J.J. Halliwell and T. Yu, Alternative derivation of the Hu-Paz-Zhang master equation of quantum Brownian motion, *Phys. Rev. D* **53**, 2012 (1996).
- [Har70] E. Harrison, Fluctuations at the threshold of classical cosmology, *Phys. Rev. D* **1**, 2726 (1970).
- [Hart93] C.F. Hart, Theory and renormalization of the gauge-invariant effective action, *Phys. Rev. D* **28**, 1993 (1983).
- [Har80] J.B. Hartle, Quantum effects in the early universe IV: nonlocal effects in particle production in anisotropic models, *Phys. Rev. D* **22**, 2091 (1980).
- [Har81] J.B. Hartle, Quantum effects in the early universe V: finite particle production without trace anomalies, *Phys. Rev. D* **23**, 2121 (1981).
- [Har92] J.B. Hartle, Spacetime quantum mechanics and the quantum mechanics of spacetime, Lectures given at Summer School, NATO ASI, Session, LVII: Gravitation and Quantifications, B. Juliz & J. Zinn-Justin (eds). Les Houches, France, 1992 (Elsevier, Amsterdam, 1995).
- [Har93] J.B. Hartle, Quantum mechanics of closed systems, in *Directions in General Relativity*, vol. 1, ed. B.L. Hu, M.P. Ryan and C.V. Vishveswara (Cambridge University Press, Cambridge, 1993).
- [HarGel93] J.B. Hartle and M. Gell-Mann, Classical equations for quantum systems, *Phys. Rev. D* **47**, 3345 (1993).
- [HarHaw83] J.B. Hartle and S.W. Hawking, Wave function of the universe, *Phys. Rev. D* **28**, 2960 (1983).
- [HarHor81] J.B. Hartle and G. Horowitz, Ground-state expectation value of the metric in the 1 / N or semiclassical approximation to quantum gravity, *Phys. Rev. D* **24**, 257 (1981).

- [HarHu79] J.B. Hartle and B.L. Hu, Quantum effects in the early universe II: effective action for scalar fields in homogeneous cosmologies with small anisotropy, *Phys. Rev. D* **20**, 1772 (1979).
- [HarHu80] J.B. Hartle and B.L. Hu, Quantum effects in the early universe III: dissipation of anisotropy by scalar particle production, *Phys. Rev. D* **21**, 2756 (1980).
- [HaLaMa95] J.B. Hartle, R. Laflamme, and D. Marolf, Conservation laws in the quantum mechanics of closed systems, *Phys. Rev. D* **51**, 7007 (1995).
- [HatKug80] H. Hata and T. Kugo, Operator formalism of statistical mechanics of gauge theory in covariant gauges, *Phys. Rev. D* **21**, 3333 (1980).
- [Haw75] S.W. Hawking, Particle creation by black holes, *Commun. Math. Phys.* **43**, 199 (1975).
- [Haw82] S.W. Hawking, The development of irregularities in a single bubble inflationary universe, *Phys. Lett.* **115B**, 295 (1982).
- [HawPag88] S.W. Hawking and Don N. Page, How probable is inflation?, *Nucl. Phys.* **B298**, 789 (1988).
- [HeeKno02a] H. van Hees and J. Knoll, Renormalization in self-consistent approximation schemes at finite temperature: Theory, *Phys. Rev. D* **65**, 25010 (2002).
- [HeeKno02b] H. van Hees and J. Knoll, Renormalization of self-consistent approximation schemes at finite temperature. II. Applications to the sunset diagram, *Phys. Rev. D* **65**, 105005 (2002).
- [HeeKno02c] H. van Hees and J. Knoll, Renormalization in self-consistent approximation schemes at finite temperature. III. Global symmetries, *Phys. Rev. D* **66**, 25028 (2002).
- [Hei83] U. Heinz, Kinetic theory for plasmas with non-Abelian interactions, *Phys. Rev. Lett.* **51**, 351 (1983).
- [Hei96] U. Heinz, Hanbury-Brown/Twiss interferometry for relativistic heavy ion collisions: theoretical aspects, nucl-th/9609029. Lectures given at the NATO ASI on “Correlations and Clustering Phenomena in Subatomic Physics” at Dronten, Netherlands, Aug. 4–18, 1996, to be published in the NATO ASI Proceedings Series by Plenum Publ. Corp. (M.N. Harakeh, O. Scholten, and J.K. Koch, eds.)
- [HeiKol02a] U. Heinz and P. Kolb, Early thermalization at RHIC, *Nucl. Phys.* **A702**, 269–280 (2002).
- [HeiKol02b] U.W. Heinz and P.F. Kolb, Two RHIC puzzles: Early thermalization and the HBT problem, in *Proc. 18th Winter Workshop on Nuclear Dynamics*, ed. R. Bellwied, J. Harris, and W. Bauer, pp. 205–216. (EP Systema, Debrecen, Hungary, 2002) (hep-ph/0204061).
- [HeiWon02] U. Heinz and S. Wong, Elliptic flow from a transversally thermalized fireball, *Phys. Rev. C* **66**, 014907 (2002).
- [Hei94] H. Heiselberg, Viscosities of quark-gluon plasma, *Phys. Rev. D* **49**, 4739 (1994).
- [HeiEul36] W. Heisenberg and H. Euler, Consequences of the Dirac theory of the positron, *Z. Physik* **98**, 14 (1936).
- [HelJan07] M.P. Heller and R.A. Janik, Viscous hydrodynamics relaxation time from AdS/CFT, hep-th/0703243.
- [HenTei92] M. Henneaux and C. Teitelboim, *Quantization of Gauge Systems* (Princeton University Press, Princeton, NJ, 1992).
- [Hen95] P. Henning, A transport equation for quantum fields with continuous mass spectrum, *Nucl. Phys.* **A582**, 633 (1995).
- [Her02] C.P. Herzog, The hydrodynamics of M-theory, *JHEP* **0212**, 026 (2002).
- [Her03] C.P. Herzog, Sound of M theory, *Phys. Rev. D* **68**, 024013 (2003).
- [HerSon03] C.P. Herzog and D.T. Son, Schwinger-Keldysh propagators from AdS/CFT correspondence, *JHEP* **03**, 46 (2003).
- [HOSW84] M. Hillery, R.F. O’Connell, M.O. Scully and E.P. Wigner, Distribution functions in physics: Fundamentals, *Phys. Rep.* **106**, 121 (1984).
- [Hin07] G. Hinshaw *et al.*, Three-year Wilkinson Microwave Anisotropy Probe (WMAP) Observations: Temperature Analysis, *ApJS*, 170, 288 (2007).

- [Hin75] J.O. Hinze, *Turbulence* (McGraw-Hill, New York, 1975).
- [Hir01] T. Hirano, Is early thermalization achieved only near midrapidity in Au+Au collisions at $\sqrt{s_{NN}} = 130$ GeV?, *Phys. Rev. C* **65**, 11901(R) (2001).
- [HirNar04] T. Hirano and Y. Nara, Hydrodynamic afterburner for the color glass condensate and the parton energy loss, *Nucl. Phys.* **A743**, 305 (2004).
- [HirTs02] T. Hirano and K. Tsuda, Collective flow and two-pion correlations from a relativistic hydrodynamic model with early chemical freeze-out, *Phys. Rev. C* **66**, 054905 (2002).
- [HisLin83] W. Hiscock and L. Lindblom, Stability and causality in dissipative relativistic fluids, *Ann. Phys. (N.Y.)* **151**, 466 (1983).
- [HisLin85] W. Hiscock and L. Lindblom, Generic instabilities in first-order dissipative relativistic fluid theories, *Phys. Rev. D* **31**, 725 (1985).
- [Hod90] H.M. Hodges, Is double inflation likely?, *Phys. Rev. Lett.* **64**, 1080 (1990).
- [HACCES06] M.A. Hoefer *et al.*, On dispersive and classical shock waves in Bose-Einstein condensates and gas dynamics, *Phys. Rev. A* **74**, 023623 (2006).
- [HohMar65] P. Hohenberg and P. Martin, Microscopic theory of superfluid helium, *Ann. Phys. (N.Y.)* **34**, 291 (1965).
- [HolWal02] S. Hollands and R.M. Wald, Comment on inflation and alternative cosmology, hep-th/0210001.
- [HorSch87] R. Horsley and W. Schoenmaker, Quantum field theories out of thermal equilibrium I, *Nucl. Phys.* **B280**, 716 (1987); II: *Nucl. Phys.*, 735 (1987).
- [HosSak84] A. Hosoya and M. Sakagami, Time development of Higgs field at finite temperature, *Phys. Rev. D* **29**, 2228 (1984).
- [HoSata84] A. Hosoya, M. Sakagami and M. Tasaki, Nonequilibrium thermodynamics in field theory: transport coefficients, *Ann. Phys.* **154**, 229 (1984).
- [Hu72] B.L. Hu, Scalar waves and tensor perturbation, in the mixmaster universe Ph.D. Thesis, Princeton University, 1972.
- [Hu74] B.L. Hu, Scalar waves in the mixmaster universe II: Particle creation, *Phys. Rev. D* **9**, 3263 (1974).
- [Hu81] B.L. Hu, Effect of finite temperature quantum fields on the early universe, *Phys. Lett. B* **103**, 331 (1981).
- [Hu82] B.L. Hu, Vacuum viscosity description of quantum processes in the early universe, *Phys. Lett.* **90A**, 375 (1982).
- [Hu83] B.L. Hu, Quantum dissipative processes and gravitational entropy of the universe, *Phys. Lett.* **97A**, 368 (1983).
- [Hu84] B.L. Hu, Vacuum viscosity and entropy generation quantum gravitational processes in the early universe, in *Cosmology of the Early Universe* ed. L.Z. Fang and R. Ruffini (World Scientific, Singapore, 1984).
- [Hu89] B.L. Hu, Dissipation in quantum fields and semiclassical gravity, *Physica A* **158**, 399–424 (1989).
- [Hu91] B.L. Hu, Coarse graining and back reaction in inflationary and minisuperspace cosmology in *Relativity and Gravitation: Classical and Quantum, Proceedings of the SILARG VII Symposium*, Cocoyoc, Mexico, 1990, ed. J.C. D'Olivo *et al.* (World Scientific, Singapore, 1991), p. 33.
- [Hu94a] B.L. Hu, Fluctuation, dissipation and irreversibility in cosmology, in *The Physical Origin of Time-Asymmetry*, Huelva, Spain, 1991 ed. J.J. Halliwell, J. Perez-Mercader and W.H. Zurek (Cambridge University Press, Cambridge, 1994).
- [Hu94b] B.L. Hu, Quantum statistical fields in gravitation and cosmology, in *Proc. Third International Workshop on Thermal Field Theory and Applications*, ed. R. Kobes and G. Kunstatter (World Scientific, Singapore, 1994), gr-qc/9403061.
- [Hu99] B.L. Hu, Stochastic gravity, *Int. J. Theor. Phys.* **38**, 2987 (1999).
- [Hu02] B.L. Hu, A kinetic theory approach to quantum gravity, *Int. J. Theor. Phys.* **41**, 2111–2138 (2002).
- [Hu05] B.L. Hu, Can Spacetime be a Condensate? *Int. J. Theor. Phys.* **44**, 1785–1806 (2005).

- [HuKan87] B.L. Hu and H.E. Kandrup, Entropy generation in cosmological particle creation and interactions: A statistical subdynamics analysis, *Phys. Rev. D* **35**, 1776 (1987).
- [HuKaMa94] B.L. Hu, G.W. Kang and A. Matacz, Squeezed vacua and the quantum statistics of cosmological particle creation, *Int. J. Mod. Phys. A* **9**, 991 (1994).
- [HuMat94] B.L. Hu and A. Matacz, Quantum Brownian motion in a bath of parametric oscillators, *Phys. Rev. D* **49**, 6612 (1994).
- [HuMat95] B.L. Hu and A. Matacz, Einstein–Langevin equation for backreactions in semiclassical cosmology, *Phys. Rev. D* **51**, 1577 (1995).
- [HuMat96] B.L. Hu and A. Matacz, Quantum noise in gravitation and cosmology, invited talk at the Workshop on *Fluctuations and Order*, ed. M. Millonas (Springer-Verlag, Berlin, 1996). Univ. Maryland preprint 94-44 (1994).
- [HuPar77] B.L. Hu and L. Parker, Effect of gravitation creation in isotropically expanding universes, *Phys. Lett.* **63A**, 217 (1977).
- [HuPar78] B.L. Hu and L. Parker, Anisotropy damping through quantum effects in the early universe, *Phys. Rev. D* **17**, 933 (1978).
- [HuPav86] B.L. Hu and D. Pavón, Intrinsic measures of field entropy in cosmological particle creation, *Phys. Lett.* **180B**, 329 (1986).
- [HuPaZh92] B.L. Hu, J.P. Paz and Y. Zhang, Quantum Brownian motion in a general environment: Exact master equation with nonlocal dissipation and colored noise, *Phys. Rev. D* **45**, 2843 (1992).
- [HuPaZh93a] B.L. Hu, J.P. Paz and Y. Zhang, Quantum Brownian motion in a general environment. II. Nonlinear coupling and perturbative approach, *Phys. Rev. D* **47**, 1576 (1993).
- [HuPaZh93b] B.L. Hu, J.P. Paz, and Y. Zhang, in *The Origin of Structure in the Universe*, ed. E. Gunzig and P. Nardone (NATO ASI Series) (Plenum Press, New York, 1993).
- [HuRav96] B.L. Hu and A. Raval, Thermal radiation from black holes and cosmological spacetimes, *Mod. Phys. Lett. A* **32/33**, 2625–2638 (1996).
- [HuSin95] B.L. Hu and S. Sinha, Fluctuation-dissipation relation in cosmology, *Phys. Rev. D* **51**, 1587 (1995).
- [HuVer02] B.L. Hu and E. Verdaguer, Recent advances in stochastic gravity: Theory and issues, in P. Bergmann and V. de Sabata (eds.), *Advances in the Interplay between Quantum and Gravity Physics* (Kluwer, Amsterdam, 2002).
- [HuVer03] B.L. Hu and E. Verdaguer, Stochastic gravity: a primer with applications, *Class. Q. Grav.* **20**, R1 (2003).
- [HuVer04] B.L. Hu and E. Verdaguer, Stochastic gravity: theory and applications, living reviews in relativity, **7**, 3 (2004). [update in arXiv:0802.0658]
- [HuZha93b] B.L. Hu and Yuhong Zhang, Squeezed states and uncertainty relation at finite temperature, *Mod. Phys. Lett. A* **8**, 3575 (1993).
- [HuZha95] B.L. Hu and Yuhong Zhang, Uncertainty relation for a quantum open system, *Int. J. Mod. Phys. A* **10**, 4537 (1995).
- [Hua87] K. Huang, *Statistical Physics* (John Wiley, New York, 1987).
- [Hua98] K. Huang, *Quantum Field Theory* (Wiley-Interscience, New York, 1998).
- [HugPin59] N.M. Hugenholtz and D. Pines, Ground-state energy and excitation spectrum of a system of interacting bosons, *Phys. Rev.* **116**, 489 (1959).
- [Hum06] T. Humanic, Can hadronic rescattering explain the large elliptic flow and small HBT radii seen at RHIC?, *Acta Phys. Hung. A* **25**, 1–9 (2006).
- [HKHRV01] P. Huovinen, P.F. Kolb, U.W. Heinz, P.V. Ruuskanen and S.A. Voloshin, Radial and elliptic flow at RHIC: further predictions, *Phys. Lett.* **503B**, 58 (2001).
- [IaleMc02] E. Iancu, A. Leonidov and L. McLerran, The colour glass condensate: An introduction, hep-ph/0202270.
- [IbaCal99] D. Ibáñeta and E. Calzetta, Counting defects in an instantaneous quench, *Phys. Rev. E* **60**, 2999 (1999).
- [Idz05a] Z. Idziaszek, Microcanonical fluctuations of the condensate in a weakly interacting Bose gas, *Phys. Rev. A* **71**, 053604 (2005).

- [Ike04] T. Ikeda, Effect of memory on relaxation in a scalar field theory, *Phys. Rev. D* **69**, 105018 (2004).
- [IItMa75] J. Iliopoulos, C. Itzykson and A. Martin, Functional methods and perturbation theory, *Rev. Mod. Phys.* **47**, 165 (1975).
- [Inc56] E. Ince, *Ordinary Differential Equations* (Dover, New York, 1956).
- [Isr72] W. Israel, The relativistic Boltzmann equation, in L. O’Raifeartaigh (ed.), *General Relativity: Papers in Honour of J. L. Synge* (Clarendon Press, Oxford, 1972).
- [Isr88] W. Israel, Covariant fluid mechanics and thermodynamics: an introduction, in A. Anile and Y. Choquet-Bruhat (eds.), *Relativistic Fluid Dynamics* (Springer, New York, 1988).
- [ItzZub80] C. Itzykson and J.-B. Zuber, *Quantum Field Theory* (McGraw-Hill, New York, 1980).
- [IvKnVo99] Yu.B. Ivanov, J. Knoll and D.N. Voskresensky, Self-consistent approximations to non-equilibrium many-body theory, *Nucl. Phys.* **A657**, 413 (1999).
- [IvKnVo00] Yu.B. Ivanov, J. Knoll, D. Voskresensky, Resonance transport and kinetic entropy, *Nucl. Phys.* **A672**, 313 (2000).
- [IvKnVo03] Yu.B. Ivanov, J. Knoll and D.N. Voskresensky, Self-consistent approach to off-shell transport, nucl-th/0303006. Submitted to issue of *Phys. Atom. Nucl.* dedicated to S.T. Belyaev on the occasion of his 80th birthday.
- [Jac74] R. Jackiw, Functional evaluation of the effective potential, *Phys. Rev. D* **9**, 1686 (1974).
- [JacKer79] R. Jackiw and A. Kerman, Time-dependent variational principle and the effective action, *Phys. Lett.* **71A**, 158 (1979).
- [Jac02] J.D. Jackson, From Lorentz to Coulomb and other explicit gauge transformations, *Am. J. Phys.* **70**, 917 (2002).
- [Jaigar04] P. Jain and C. Gardiner, A phase space method for the Bose–Hubbard model, cond-mat/0404642.
- [Jak02] A. Jakovac, Generalized BE for on-shell particle production in a hot plasma, *Phys. Rev. D* **66**, 125003 (2002).
- [JGGZ98] D. Jaksch, C.W. Gardiner, K.M. Gheri and P. Zoller, Quantum kinetic theory IV, *Phys. Rev. A* **58**, 1450 (1998).
- [JaGaZo97] D. Jaksch, C.W. Gardiner and P. Zoller, Quantum kinetic theory II, *Phys. Rev. A* **56**, 575 (1997).
- [JakZol04] D. Jaksch and P. Zoller, The cold atom Hubbard toolbox, *Annals of Physics*, **315**, 52 (2005). (cond-mat/0410614).
- [Jar97] C. Jarzynski, Nonequilibrium equality for free energy differences, *Phys. Rev. Lett.* **78**, 2690 (1997).
- [Jeo93] S. Jeon, Computing spectral densities in finite temperature field theory, *Phys. Rev. D* **47**, 4586 (1993).
- [Jeo95] S. Jeon, Hydrodynamic transport coefficients in relativistic scalar field theory, *Phys. Rev. D* **52**, 3591 (1995).
- [JeoYaf96] S. Jeon and L. Yaffe, From quantum field theory to hydrodynamics, *Phys. Rev. D* **53**, 5799 (1996).
- [JooZeh85] E. Joos and H.D. Zeh, *Z. Phys. B* **59**, 223 (1985).
- [Jor86] R.D. Jordan, Effective field equations for expectation values, *Phys. Rev. D* **33**, 444 (1986).
- [JuCaGr04] S. Juchem, W. Cassing and C. Greiner, Quantum dynamics and thermalization for out-of equilibrium ϕ^4 theory, *Phys. Rev. D* **69**, 025006 (2004).
- [KacLog76] M. Kac and J. Logan, Fluctuations and the Boltzmann equation. I, *Phys. Rev. A* **13**, 458 (1976).
- [KacLog79] M. Kac and J. Logan, Fluctuations, in *Fluctuation Phenomena*, ed. E. Montroll and J. Lebowitz (Elsevier, New York, 1979).
- [Kad76] L. Kadanoff, Notes on Migdal’s recursion formulas, *Ann. Phys. (N.Y.)* **100**, 359 (1976).
- [Kad77] L. Kadanoff, The application of renormalization group techniques to quarks and strings, *Rev. Mod. Phys.* **49**, 267 (1977).

- [KadBay62] L. Kadanoff and G. Baym, *Quantum Statistical Mechanics* (Benjamin, New York, 1962).
- [KadMar63] L. Kadanoff and P. Martin, Hydrodynamic equations and correlation functions, *Ann. Phys. (N.Y.)* **24**, 419 (1963).
- [KaSuSh96] Yu. Kagan, E. Surkov and G. Shlyapnikov, Evolution of a Bose-condensed gas under variations of the confining potential, *Phys. Rev. A* **54**, R1753 (1996).
- [KaSuSh97] Yu. Kagan, E. Surkov and G. Shlyapnikov, Evolution and global collapse of trapped Bose condensates under variations of the scattering length, *Phys. Rev. Lett.* **79**, 2604 (1997).
- [KamUme64] S. Kamemfuchi and H. Umezawa, Bose fields and inequivalent representations, *Nuovo Cimento* **31**, 429 (1964) Appendix A.
- [Kam81] N.G. van Kampen, *Stochastic Processes in Physics and Chemistry* (North-Holland, Amsterdam, 1985).
- [Kam85] N.G. van Kampen, Elimination of fast variables, *Phys. Rep.* **124**, 70 (1985).
- [Kan88a] H.E. Kandrup, Entropy generation, particle creation, and quantum field theory in a cosmological spacetime: When do number and entropy increase?, *Phys. Rev. D* **37**, 3505 (1988).
- [Kan88b] H.E. Kandrup, Particle number and random phases, *Phys. Rev. D* **38**, 1773 (1988).
- [KCMW00] A. Kandus, E. Calzetta, F. Mazzitelli and C. Wagner, Cosmological magnetic fields from gauge mediated supersymmetry breaking models, *Phys. Lett.* **472B**, 287 (2000).
- [KanKad65] J.W. Kane and L. Kadanoff, Green's functions and superfluid hydrodynamics, *J. Math. Phys.* **6**, 1902 (1965).
- [Kap38] P. Kapitza, Viscosity of liquid helium below the λ -point, *Nature* **141**, 74 (1938).
- [Kap89] J. Kapusta, *Finite Temperature Field Theory* (Cambridge University Press, Cambridge, 1989).
- [KarGor02] I. Karlin and A. Gorban, Hydrodynamics from Grad's equations, *Ann. Phys. (Leipzig)* **V11**, 783 (2002) (cond-mat/0209560).
- [KarGor03] I. Karlin and A. Gorban, Methods of nonlinear kinetics, cond-mat/0306062.
- [KarRiv97] G. Karra and R.J. Rivers, Initial vortex densities after a temperature quench, *Phys. Lett.* **414B**, 28 (1997).
- [Kel64] L.V. Keldysh, Diagram technique for nonequilibrium processes, *Zh. Eksp. Teor. Fiz.* **47**, 1515 (1964) (*Sov. Phys. JETP* **20**, 1018 (1965)).
- [Kes94] E. Keski-Vakkuri, Coarse-grained entropy and stimulated emission in curved space-time, *Phys. Rev. D* **49**, 2122 (1994).
- [Ket02] W. Ketterle, Nobel lecture: When atoms behave as waves: Bose–Einstein condensation and the atom laser, *Rev. Mod. Phys.* **74**, 1131–1151 (2002).
- [KhaLev01] D. Kharzeev and E. Levin, Manifestations of high density QCD in the first RHIC data, *Phys. Lett.* **B523**, 79–87 (2001).
- [KhLeNa01] D. Kharzeev, E. Levin and M. Nardi, The onset of classical QCD dynamics in relativistic heavy ion collisions, hep-ph/0111315.
- [KhlTka96] S.Yu. Khlebnikov and I. Tkachev, Classical decay of the inflaton, *Phys. Rev. Lett.* **77**, 219 (1996).
- [Kib76] T.W.B. Kibble, Topology of cosmic domains and strings, *J. Phys. A* **9**, 1387 (1976).
- [Kib80] T.W.B. Kibble, Some implications of a cosmological phase transition, *Phys. Rep.* **67**, 183 (1980).
- [Kib88] T.W.B. Kibble, Topology of cosmic domains and strings, *J. Phys. A* **9**, 1387 (1988).
- [Kib02] T.W.B. Kibble, Symmetry breaking and defects, Lectures at NATO ASI “Patterns of symmetry breaking,” Cracow, Sept. 2002, cond-mat/0211110.
- [KiPoSt98] C. Kiefer, D. Polarski, and A.A. Starobinsky, Quantum to classical transition for fluctuations in the early universe, *Int. J. Mod. Phys. D* **7**, 455 (1998).
- [KiPoSt00] C. Kiefer, D. Polarski and A.A. Starobinsky, Entropy of gravitons produced in the early universe, *Phys. Rev. D* **62**, 043518 (2000).
- [Kle29] O. Klein, Die Reflexion von Elektronen an einem Potentialsprung nach der relativistischen Dynamic von Dirac, *Z. Phys.* **53**, 157 (1929).

- [Kle90] H. Kleinert. *Path Integrals in Quantum Mechanics, Statistics, and Polymer Physics* (World Scientific, Singapore, 1990).
- [KESCM92] Y. Kluger, J.M. Eisenberg, B. Svetisky, F. Cooper and E. Mottola, Fermion pair production in a strong electric field, *Phys. Rev. D* **45**, 4659 (1992).
- [KIMoEi98] Y. Kluger, E. Mottola and J.M. Eisenberg, Quantum Vlasov equation and its Markov limit, *Phys. Rev. D* **58**, 125015 (1998).
- [KnIvVo01] J. Knoll, Yu. Ivanov, D.N. Voskresensky, Exact conservation laws of the gradient expanded KBEs, *Ann. Phys. (N.Y.)* **293**, 126 (2001).
- [KoEzMuNo90] S. Kobayashi, H. Ezawa, Y. Murayama and S. Nomura, *Proceedings of the 3rd International Symposium on the Foundations of Quantum Mechanics in the Light of New Technology* (Physical Society of Japan, Tokyo, 1989).
- [KobKun89] R. Kobes and G. Kunstatter, The gauge dependence of the gluon damping constant, *Physica A* **158**, 192 (1989).
- [KoKuRe91] R. Kobes, G. Kunstatter and A. Rebhan, Gauge dependence identities and their application at finite temperature, *Nucl. Phys.* **B355**, 1 (1991).
- [KKHOSK06] V.V. Kocharovsky *et al.*, Fluctuations in ideal and interacting Bose–Einstein condensates, *Adv. Atom., Mol. Opt. Phys.* **53**, 291 (2006).
- [KBHP91] L. Kofman, G.R. Blumenthal, H. Hodges and J.R. Primack, Generation of nonflat and non-Gaussian perturbations from inflation, *ASP Conf. Ser.* **15**, 339 (1991).
- [KoLiMu02] Lev Kofman, Andrei Linde and V. Mukhanov, Inflationary theory and alternative cosmology, *JHEP* **0210**, 057 (2002).
- [KoLiSt94] L. Kofman, A. Linde and A.A. Starobinsky, Reheating after inflation, *Phys. Rev. Lett.* **73**, 3195 (1994).
- [KoLiSt97] L. Kovman, A. Linde and A.A. Starobinsky, Towards the theory of reheating after inflation, *Phys. Rev. D* **56**, 3258 (1997).
- [Koh05] M. Köhl *et al.*, Superfluid to Mott insulator transition in one, two and three dimensions, *J. Low T. Phys.* **138**, 635 (2005).
- [KohBur02] T. Kohler and K. Burnett, Microscopic quantum dynamics approach to the dilute condensed Bose gas, *Phys. Rev. A* **65**, 033601 (2002).
- [Koi02] T. Koide, Derivation of transport equations using the time-dependent projection operator method, *Prog. Theor. Phys.* **107**, 525 (2002).
- [Koi07] T. Koide, Microscopic formula of transport coefficients for causal hydrodynamics, *Phys. Rev. E* **75**, 060103(R) (2007).
- [Kok96] D. Koks, Decoherence, entropy and thermal radiance using influence functionals. Ph.D. Thesis, University of Adelaide (1996).
- [KoMaHu97] D. Koks, Andrew Matacz and B.L. Hu, Entropy and uncertainty of squeezed quantum open systems, *Phys. Rev. D* **55**, 5917 (1997).
- [KolRap03] P.F. Kolb and R. Rapp, Transverse flow and hadrochemistry in Au+Au collisions at $\sqrt{sNN}=200$ GeV, *Phys. Rev. C* **67**, 044903 (2003).
- [KoSohHe00] P. Kolb, J. Sollfrank and U. Heinz, Anisotropic transverse flow and the quark-hadron phase transition, *Phys. Rev. C* **62**, 54909 (2000).
- [KoSoSt05] P.K. Kovtun, D.T. Son and A.O. Starinets, Viscosity in strongly interacting quantum field theories from black hole physics, *Phys. Rev. Lett.* **94**, 111601 (2005).
- [KowTay92] K.L. Kowalski and C.C. Taylor, Disoriented chiral condensate: A white paper for the full acceptance detector, hep-ph/9211282.
- [KraReb04] U. Kraemmer and A. Rebhan, Advances in perturbative thermal field theory, *Rep. Prog. Phys.* **67**, 351 (2004).
- [Kra60] R. Kraichnan, Dynamics of nonlinear stochastic systems, *J. Math. Phys.* **2**, 124 (1960).
- [Kra40] H.A. Kramers, Brownian motion in a field of force and the diffusion model of chemical reactions, *Physica* **7**, 284 (1940).
- [KrNaVe02] A. Krasnitz, Y. Nara and R. Venugopalan, Elliptic flow of colored glass in high energy heavy ion collisions, hep-ph/0204361.
- [KrNaOrRe97] H.-O. Kreiss, G. Nagy, O. Ortiz and O. Reula, Global existence and exponential decay for hyperbolic dissipative relativistic fluid theories, *J. Math. Phys.* **38**, 5272 (1997).

- [KBKS97] D. Kremp, M. Bonitz, W.D. Kraeft and M. Schlanges, Non-Markovian Boltzmann equation, *Ann. Phys. (NY)* **258**, 320 (1997).
- [Kre81] H.J. Kreuzer, *Nonequilibrium Thermodynamics and its Statistical Foundations* (Oxford University Press, Oxford, 1981).
- [KrOxZa94] M. Kruczynski, L.E. Oxman and M. Zaldarriaga, Large squeezing behavior of cosmological entropy generation, *Class. Quant. Grav.* **11**, 2317 (1994).
- [Kry44] N.N. Krylov, Relaxation processes in statistical physics, *Nature* **153**, (1944) 709.
- [Kry79] N.N. Krylov, *Works on the Foundations of Statistical Mechanics* (Princeton University Press, Princeton, NJ, 1979).
- [Kub57] R. Kubo, Statistical-mechanical theory of irreversible processes I, *J. Phys. Soc. Japan* **12**, 570 (1957).
- [KuToHa91] R. Kubo, M. Toda and N. Hashitsume, *Statistical Physics II, Nonequilibrium Statistical Mechanics* (Springer-Verlag, Berlin, 1991).
- [ToKuSa92] R. Kubo, M. Toda and N. Saito, *Statistical Physics I, Equilibrium Statistical Mechanics* (Springer-Verlag, Berlin, 1992).
- [KuYoNa57] R. Kubo, M. Yokota and S. Nakajima, Statistical-mechanical theory of irreversible processes. II, *J. Phys. Soc. Japan* **12**, 1203 (1957).
- [KUMS97] Hiroto Kubotani, Tomoko Uesugi, Masahiro Morikawa and Akio Sugamoto, Classicalization of quantum fluctuations in an inflationary universe, *Prog. of Theor. Phys.*, **98**, 1063 (1997).
- [KugOji79] T. Kugo and I. Ojima, Local covariant operator formalism of non-abelian gauge theories and quark confinement problem, *Supp. Prog. Theo. Phys.* **66**, 1 (1979).
- [KunTsu06] T. Kunihiro and K. Tsumura, Application of the renormalization group method to the reduction of transport equations, *J. Phys. A* **39**, 8089–8104 (2006).
- [Kur98] J. Kurchan, Fluctuation theorem for stochastic dynamics, *J. Phys. A* **31**, 3719 (1998).
- [Kur05] J. Kurchan, Non-equilibrium work relations, cond-mat/0511073.
- [LafMat93] R. Laflamme and A. Matacz, Decoherence functional and inhomogeneities in the early universe, *Int. J. Mod. Phys. D* **2**, 171–182 (1993).
- [LagZur97] P. Laguna and W. Zurek, Density of kinks after a quench: When symmetry breaks, how big are the pieces?, *Phys. Rev. Lett.* **78**, 2519 (1997).
- [LagZur98] P. Laguna and W. Zurek, Critical dynamics of symmetry breaking: quenches, dissipation and cosmology, *Phys. Rev. D* **58**, 085021 (1998).
- [LaDaCo96] M. Lampert, J. Dawson and F. Cooper, Time evolution of the chiral phase transition during a spherical expansion, *Phys. Rev. D* **54**, 2213 (1996).
- [LanLif57] L. Landau and E. Lifshitz, *J. Exptl. Theor. Phys. (USSR)* **32**, 618 (1957) (Engl. trans. *Sov. Phys. JETP* **5**, 512 (1957)).
- [LanLif59] L. Landau and E. Lifshitz, *Fluid Mechanics* (Pergamon Press, Oxford, 1959).
- [LanLif69] L. Landau and E. Lifshitz, *Mécanique* (Mir, Moscow, 1969). Mechanics, Pergamon Press, Oxford, 1960.
- [LanLif76] L. Landau and E. Lifshitz, *Meccanica Quantistica* (Mir, Moscow, 1976). Quantum Mechanics, The non-relativistic theory, Pergamon Press, Oxford, 1958.
- [LanLif72] L. Landau and E. Lifchitz, *Relativistic Quantum Theory* (Pergamon Press, Oxford, 1972).
- [LaLiPi80a] L. Landau, E. Lifshitz and L. Pitaevskii, *Statistical Physics*, vol. I (Pergamon Press, London, 1980).
- [LaLiPi80b] L. Landau, E. Lifshitz and L. Pitaevskii, *Statistical Physics*, vol. II (Pergamon Press, London, 1980).
- [LanPom53a] L. Landau and I. Pomeranchuk Limit on the applicability of electron Bremsstrahlung theory and pair creation at high energies. *Doklady Akad. Nauk. SSSR* **92**, 535 (1953).
- [LanPom53b] L. Landau and I. Pomeranchuk Avalanche processes of electrons at high energies. *Doklady Akad. Nauk. SSSR* **92**, 735 (1953).
- [LanReb92] P. Landshoff and A. Rebhan, Covariant gauges at finite temperature, *Nucl. Phys.* **B383**, 607 (1992).

- [LanReb93] P. Landshoff and A. Rebhan, Thermalization of longitudinal gluons, *Nucl. Phys.* **B410**, 23 (1993).
- [LanWer87] N.P. Landsman and Ch.G. van Weert, Real and imaginary time field theory at finite temperature and density, *Phys. Rep.* **145**, 141 (1987).
- [Lan75] O.E. Lanford, Time evolution of large classical systems, in J. Moser (ed.), *Dynamical Systems, Theory and Applications* (Springer, New York, 1975).
- [LaCaId99] R. Laura, M. Castagnino and R. Id Betan, Perturbative method for generalized spectral decompositions, *Physica A* **271**, 357 (1999).
- [Law89] I. Lawrie, Perturbative description of dissipation in nonequilibrium field theory, *Phys. Rev. D* **40**, 3330 (1989).
- [Law92] I. Lawrie, Feynman rules for nonequilibrium field theory, *J. Phys. A* **25**, 6493 (1992).
- [Law99] I. Lawrie, Perturbative nonequilibrium dynamics of phase transitions in an expanding universe, *Phys. Rev. D* **60**, 63510 (1999).
- [LawKer00] I. Lawrie and D. McKernan, Nonequilibrium perturbation theory for spin-1/2 fields, *Phys. Rev. D* **62**, 105032 (2000).
- [Lea01] S.M. Leach *et al.*, Enhancement of superhorizon scale inflationary curvature perturbations, *Phys. Rev. D* **64**, 023512 (2001).
- [LeB91] M. Le Bellac, *Quantum and Statistical Field Theory* (Oxford University Press, Oxford, 1991).
- [LeB96] M. Le Bellac, *Thermal Field Theory* (Cambridge University Press, Cambridge, 1996).
- [Leb93] J.L. Lebowitz, Macroscopic laws, microscopic dynamics, time's arrow and Boltzmann's entropy, *Physica A* **194**, 1 (1993).
- [Lee81] T.D. Lee, *Particle Physics and Introduction to Field Theory* (Harwood, Zurich, 1981).
- [LeeBoy93] D.S. Lee and D. Boyanovsky, Dynamics of phase transitions induced by a heat bath, *Nucl. Phys.* **B406**, 631 (1993).
- [Lee04] W. Lee, Y.Y. Charng, D.S. Lee, and L.Z. Fang, Off-equilibrium dynamics of the primordial perturbations in the inflationary universe: The O(N) model, *Phys. Rev. D* **69**, 123522 (2004).
- [Leg06] A. J. Leggett, *Quantum Liquids* (Oxford University Press, Oxford, 2006).
- [LePoSt97] J. Lesgourges, D. Polarski and A.A. Starobinsky, Quantum-to-classical transition of cosmological perturbations for non-vacuum initial states, *Nucl. Phys.* **B497**, 479 (1997).
- [Lib98] R. Liboff, *Kinetic Theory* (John Wiley, New York, 1998).
- [Lif46] E.M. Lifshitz, On the gravitational stability of the expanding universe, *Zh. Eksp. Teor. Phys.* **16**, 587 (1946) (*J. Phys. USSR* **10**, 116 (1946)).
- [LifKal63] E.M. Lifshitz and I. Khalatnikov, Investigations in relativistic cosmology, *Adv. Phys.* **12**, 185 (1963).
- [LifPit81] E. Lifshitz and L.P. Pitaevskii, *Physical Kinetics* (Pergamon Press, Oxford, 1981).
- [LMMR04] M. Liguori, S. Matarrese, M.A. Musso and A. Riotto, Stochastic inflation and the lower multipoles in the CMB anisotropies, *JCAP* **0408**, 011 (2004).
- [Lin82] A.D. Linde, Coleman–Weinberg theory and the new inflationary universe scenario, *Phys. Lett.* **114B**, 431 (1982).
- [Lin85] A. Linde, Initial conditions for inflation, *Phys. Lett.* **162B**, 281 (1985).
- [Lin90] A.D. Linde, *Particle Physics and Inflationary Cosmology* (Harwood, Chur, Switzerland, 1990).
- [LiLiMe94] A.D. Linde, D.A. Linde and A. Mezhlumian, From the Big Bang theory to the theory of a stationary universe, *Phys. Rev. D* **49**, 1783 (1994).
- [LinWes90] K. Lindenberg and B.J. West, *The Nonequilibrium Statistical Mechanics of Open and Closed Systems* (VCH Press, New York, 1990).
- [Lin87] J. Lindig, Not all adiabatic vacua are physical states, *Phys. Rev. D* **59**, 064011 (1999).
- [Lit98] D. Litim, Wilsonian flow equations and thermal field theory, hep-ph/9811272 (1998).
- [LitMan02] D. Litim and C. Manuel, Semiclassical transport theory for non-abelian plasmas, *Phys. Rep.* **364**, 451 (2002).

- [LomMaz96] F.C. Lombardo and F.D. Mazzitelli, Coarse graining and decoherence in quantum field theory, *Phys. Rev. D* **53**, 2001 (1996).
- [LomMaz97] F.C. Lombardo and F.D. Mazzitelli, Einstein–Langevin equations from running coupling constants, *Phys. Rev. D* **55**, 3889 (1997).
- [LomMaz98] F.C. Lombardo and F.D. Mazzitelli, Influence functional in two-dimensional dilaton gravity, *Phys. Rev. D* **58**, 024009 (1998).
- [LoMaMo00] F.C. Lombardo, F.D. Mazzitelli and D. Monteloliva, Classicality of the order parameter during a phase transition, *Phys. Rev. D* **62**, 045016 (2000).
- [LoMaRi01] F.C. Lombardo, F.D. Mazzitelli and R.J. Rivers, Classical behaviour after a phase transition, *Phys. Lett.* **B523**, 317 (2001).
- [LoMaRi03] F.C. Lombardo, F.D. Mazzitelli and R.J. Rivers, Decoherence in field theory: general couplings and slow quenches, *Nucl. Phys.* **B672**, 462 (2003).
- [LomNac05] F.C. Lombardo and D. Nacir, Decoherence during inflation: The generation of classical inhomogeneities, *Phys. Rev. D* **72**, 063506 (2005).
- [LoRiVi07] F.C. Lombardo, R.J. Rivers and P. Villar, Decoherence of domains and defects at phase transitions, *Phys. Lett.* **648B**, 64 (2007).
- [LomVil05] F.C. Lombardo and P. Villar, Decoherence induced by zero-point fluctuations in quantum Brownian motion, *Phys. Lett.* **336A**, 16 (2005).
- [Lon38] F. London, The λ -phenomenon of liquid helium and the Bose–Einstein degeneracy, *Nature* **141**, 643.
- [Lon98] M.S. Longair, *Galaxy Formation* (Springer-Verlag, Berlin, 1998).
- [LucMat85] F. Lucchin and S. Matarrese, Power-law inflation, *Phys. Rev. D* **32**, 1316 (1985).
- [LunRam02] E. Lundh and J. Rammer, Effective action approach to a trapped Bose gas, *Phys. Rev. A* **66**, 33607 (2002).
- [LutWar60] J. Luttinger and J. Ward, Ground-state energy of many-fermion systems, *Phys. Rev.* **118**, 1417 (1960).
- [LynBel77] D. Lynden-Bell and R.M. Lynden-Bell, On the negative specific heat paradox, *MNRAS* **181**, 405 (1977).
- [LytRio99] D.H. Lyth and A. Riotto, Particle physics models of inflation and the cosmological density perturbation, *Phys. Rep.* **314**, 1 (1999).
- [Ma76] S.K. Ma, *Modern Theory of Critical Phenomena* (Benjamin, London, 1976).
- [Ma85] S.K. Ma, *Statistical Mechanics* (World Scientific, Singapore, 1985).
- [Mac74] G.W. Mackey, Ergodic theory and its significance for statistical mechanics and probability theory, *Adv. Maths.* **12**, 178–268 (1974).
- [Mac92] M.C. Mackey, *Time’s Arrow: The Origin of Thermodynamic Behavior* (Springer-Verlag, New York, 1992).
- [Mad27] E. Madelung, Quantentheorie in hydrodynamischer Form, *Zeitschrift fur Physik* **XL**, 322 (1927).
- [Mal99] J. Maldacena, The Large-N limit of superconformal field theories and supergravity, *Int. J. Theor. Phys.* **38**, 1113 (1999).
- [Man95] L. Mandel and E. Wolf, *Optical Coherence and Quantum Optics* (Cambridge University Press, Cambridge, 1995).
- [ManMro06] C. Manuel and S. Mrowcynski, Chromo-hydrodynamic approach to the unstable quark-gluon plasma, hep-ph/0606276.
- [MarSch59] P. Martin and J. Schwinger, Theory of many-particle systems I, *Phys. Rev.* **115**, 1342 (1959).
- [MarVer99a] R. Martin and E. Verdaguer, On the semiclassical Einstein–Langevin equation, *Phys. Lett.* **465B**, 113 (1999).
- [MarVer99b] R. Martin and E. Verdaguer, Stochastic semiclassical gravity, *Phys. Rev. D* **60**, 084008 (1999).
- [MarVer99c] R. Martin and E. Verdaguer, An effective stochastic semiclassical theory for the gravitational field, *Int. J. Theor. Phys.* **38**, 3049 (1999).
- [MarVer00] R. Martin and E. Verdaguer, Stochastic semiclassical fluctuations in Minkowski spacetime, *Phys. Rev. D* **61**, 124024 (2000).
- [Mat93] A.L. Matacz, The emergence of classical behaviour in the quantum fluctuations of a scalar field in an expanding universe, *Class. Quant. Grav.* **10**, 509 (1993).

- [Mat94] A.L. Matacz, The coherent state representation of quantum fluctuations in the early universe, *Phys. Rev. D* **49**, 788–798 (1994).
- [Mat97a] A. Matacz, A new theory of stochastic inflation, *Phys. Rev. D* **55**, 1860 (1997).
- [Mat97b] A. Matacz, Inflation and the fine-tuning problem, *Phys. Rev. D* **56**, 1836 (1997).
- [Mat90] S. Matarrese, Statistical properties of curvature perturbations generated during inflation, in *6th Moriond Astrophysics Meeting: The Early Universe and Cosmic Structures*, ed. J.M. Alimi *et al.* Proceedings of the 25th Rencontre de Moriond (Editions Frontières, Paris, 1990), p. 21.
- [MaMuRi04] S. Matarrese, M. A. Musso, and A. Riotto, The influence of super-horizon scales on cosmological observables generated during inflation, *J. Cosmol. Astropart. Phys.* **5**, 8 (2004).
- [MazMon70] P. Mazur and E. Montroll, Poincaré cycles, ergodicity, and irreversibility in assemblies of coupled harmonic oscillators, *J. Math. Phys.* **1**, 70–84 (1970).
- [MazPaz89] F.D. Mazzitelli and J.P. Paz, Gaussian and 1/N approximations in semiclassical cosmology, *Phys. Rev. D* **39**, 2234 (1989).
- [MaPaHa89] F.D. Mazzitelli, J.P. Paz and C. El Hasi, Reheating of the Universe and evolution of the inflaton, *Phys. Rev. D* **40**, 955 (1989).
- [MazSpe95] F.D. Mazzitelli and F. Spedalieri, Scalar electrodynamics and primordial magnetic fields, *Phys. Rev. D* **52**, 6694 (1995).
- [McC94] W.D. McComb, *The Physics of Fluid Turbulence* (Clarendon Press, Oxford, 1994).
- [McL72a] D.W. McLaughlin, Path integrals, asymptotics and singular perturbations, *J. Math. Phys.* **13**, 734 (1972).
- [McL72b] D.W. McLaughlin, Complex time, contour independent path integrals, and barrier penetration, *J. Math. Phys.* **13**, 1099 (1972).
- [McLVen94a] L.D. McLerran and R. Venugopalan, Computing quark and gluon distribution functions for very large nuclei, *Phys. Rev. D* **49**, 2233 (1994).
- [McLVen94b] L.D. McLerran and R. Venugopalan, Gluon distribution functions for very large nuclei at small transverse momentum, *Phys. Rev. D* **49**, 3352 (1994).
- [McLVen94c] L.D. McLerran and R. Venugopalan, Green's function in the color field of a large nucleus, *Phys. Rev. D* **50**, 2225 (1994).
- [MicTka04] R. Micha and I. Tkachev, Turbulent thermalization, *Phys. Rev. D* **70**, 043538 (2004).
- [Mig56] A.B. Migdal, Bremsstrahlung and pair production in condensed media at high energies, *Phys. Rev.* **103**, 1811 (1956).
- [MACDH00] B. Mihaila, T. Athan, F. Cooper, J. Dawson and S. Habib, Exact and approximated dynamics of the quantum mechanical $O(N)$ model, *Phys. Rev. D* **62**, 125015 (2000).
- [MiDaCo01] B. Mihaila, J. Dawson and F. Cooper, Resumming the large-N approximation for time evolving quantum systems, *Phys. Rev. D* **63**, 096003 (2001).
- [Mij90] M. Mijic, Random walk after the big bang, *Phys. Rev. D* **42**, 2469 (1990).
- [MilWya83] K. Milfeld and R. Wyatt, Study, extension, and application of Floquet theory for quantum molecular systems in an oscillating field, *Phys. Rev. A* **27**, 72 (1983).
- [Mil69] R. Mills, *Propagators for Many-particle Systems* (Gordon and Breach, New York, 1969).
- [MINIMAX03] MINIMAX Collaboration, Search for disoriented chiral condensate at the Fermilab Tevatron, *Phys. Rev. D* **61**, 032003 (2000).
- [MiThWh72] C. Misner, K. Thorne and J.A. Wheeler, *Gravitation* (Freeman, San Francisco, 1972).
- [MohSer05] B. Mohanty and J. Serreau, Disoriented chiral condensate: Theory and experiment, *Phys. Rep.* **414**, 263 (2005).
- [MMOL91] S. Mollerach, S. Matarrese, A. Ortolan and F. Lucchin, Stochastic inflation in a simple two field model, *Phys. Rev. D* **44**, 1670 (1991).
- [Mol67] B.R. Mollow, Quantum statistics of coupled oscillator systems, *Phys. Rev.* **162**, 1256 (1967).
- [MolGyu00] D. Molnar and M. Gyulassy, New solutions to covariant nonequilibrium dynamics, *Phys. Rev. C* **62**, 054907 (2000).

- [MonPaz01] D. Monteoliva and J.P. Paz, Decoherence in a classically chaotic quantum system: Entropy production and quantum-classical correspondence, quant-ph/0106090.
- [Moo05] G.D. Moore, Numerical studies of QGP plasma instabilities and implications, hep-ph/0511203.
- [MorCas03] C. Mora and Y. Castin, Extension of Bogoliubov theory to quasicondensates, *Phys. Rev. A* **67**, 053615 (2003).
- [MorCal87] C. Morais Smith, A.O. Caldeira, Generalized Feynman–Vernon approach to dissipative quantum systems, *Phys. Rev. A* **36**, 3509 (1987).
- [Mor51] C. Morette, On the definition and approximation of Feynman’s path integrals, *Phys. Rev.* **81**, 848 (1951).
- [Mor99] S. Morgan, A gapless theory of Bose–Einstein condensation in dilute gases at finite temperature, D.Phil. Thesis, Oxford University.
- [Mor00] S. Morgan, A gapless theory of Bose–Einstein condensation in dilute gases at finite temperature, *J. Phys. B: At. Mol. Opt. Phys.* **33**, 3847 (2000).
- [Mor04] S. Morgan, The response of Bose–Einstein condensates to external perturbations at finite temperature, *Phys. Rev. A* **69**, 023609 (2004).
- [MCBEB98] S.A. Morgan, S. Choi, K. Burnett and M. Edwards, Nonlinear mixing of quasiparticles in an inhomogeneous Bose condensate, *Phys. Rev. A* **57**, 3818 (1998).
- [Mor58] H. Mori, Statistical-mechanical theory of transport in fluids, *Phys. Rev.* **112**, 1829 (1958).
- [Mor65] H. Mori, Transport, collective motion, and Brownian motion, *Prog. Theor. Phys.* **42**, 1338 (1965).
- [Mor86] M. Morikawa, Classical fluctuations in dissipative quantum systems, *Phys. Rev. D* **33**, 3607 (1986).
- [Mor90] M. Morikawa, Dissipation and fluctuation of quantum fields in expanding universes, *Phys. Rev. D* **42**, 1027 (1990).
- [MorSas84] M. Morikawa and M. Sasaki, Entropy production in the inflationary universe, *Prog. Theor. Phys.* **72**, 782 (1984).
- [MMNH02] K. Morita, S. Muroya, C. Nonaka and T. Hirano, Comparison of space-time evolutions of hot/dense matter in $\sqrt{s_{NN}}=17$ and 130 GeV relativistic heavy ion collisions based on a hydrodynamical model, *Phys. Rev. C* **66**, 054904 (2002).
- [MorRop99] V. Morozov and G. Röpke, The mixed Green’s function approach to QK with initial correlations, *Ann. Phys.* **278**, 127 (1999).
- [Mos02] I. Moss, Derivative expansions of the non-equilibrium effective action, *Nucl. Phys. B* **631**, 500 (2002).
- [Mot86] E. Mottola, Quantum fluctuation-dissipation theorem for general relativity, *Phys. Rev. D* **33**, 2136 (1986).
- [Mot03] E. Mottola, Gauge invariance in 2PI effective actions, Proceedings of SEWM 2002, hep-ph/0304279.
- [Moy49] J.E. Moyal, Stochastic processes and statistical physics, *J. R. Stat. Soc. London, Ser. B* **11**, 150 (1949).
- [Mro89] S. Mrowczynski, Kinetic-theory approach to quark-gluon plasma oscillations, *Phys. Rev. D* **39**, 1940 (1989).
- [Mro94a] S. Mrowczynski, Plasma instability at the initial stage of ultrarelativistic heavy-ion collisions, *Phys. Lett.* **314B**, 118 (1994).
- [Mro94b] S. Mrowczynski, Color collective effects at the early stage of ultrarelativistic heavy-ion collisions, *Phys. Rev. C* **49**, 2191 (1994).
- [Mro97] S. Mrowczynski, Transport theory of massless fields, *Phys. Rev. D* **56**, 2265 (1997).
- [Mro05] S. Mrowczynski, Instabilities driven equilibration of the quark-gluon plasma, hep-ph/0511052.
- [Mro06] S. Mrowczynski, Early stage thermalization via instabilities, hep-ph/0611067.
- [Mro07] S. Mrowczynski, private communication.
- [MroDan90] S. Mrowczynski and P. Danielewicz, Green function approach to transport theory of scalar fields, *Nucl. Phys. B* **342**, 345 (1990).
- [MroHei94] St. Mrowczynski and U. Heinz, Towards relativistic transport-theory of nuclear matter, *Ann. Phys.* **229**, 1 (1994).

- [MroMul95] S. Mrowczynski and B. Muller, Reheating after supercooling in the chiral phase transition, *Phys. Lett.* **363B**, 1 (1995).
- [Mue00a] A.H. Mueller, The Boltzmann equation for gluons at early times after a heavy ion collision, *Phys. Lett.* **475B**, 220 (2000).
- [Mue00b] A.H. Mueller, Toward equilibration in the early stages after a high energy heavy ion collision, *Nucl. Phys.* **B572**, 227 (2000).
- [Mue01] A.H. Mueller, Parton saturation – An overview, hep-ph/0111244.
- [MuShWo05] A.H. Mueller, A.I. Shoshi and S.M.H. Wong, A modified bottom-up thermalization in heavy ion collisions, *Eur. Phys. J.* **A29**, 49 (2006).
- [MuShWo07] A.H. Mueller, A.I. Shoshi and S.M.H. Wong, On Kolmogorov wave turbulence in QCD, *Nucl. Phys.* **B760**, 145 (2007).
- [MueSon04] A.H. Mueller and D.T. Son, On the equivalence between the Boltzmann equation and classical field theory at large occupation numbers, *Phys. Lett.* **582B**, 279 (2004).
- [Muk05] V. Mukhanov, *Physical Foundations of Cosmology* (Cambridge University Press, Cambridge, 2005).
- [MukChi82] V.F. Mukhanov and V.F. Chibisov, Vacuum energy and large-scale structure of the universe, *JETP* **83**, 475–487 (1982).
- [MuFeBr92] V. Mukhanov, H. Feldman and R. Brandenberger, Theory of cosmological perturbations, *Phys. Rep.* **215**, 203 (1992).
- [MulNag06] B. Muller and J. Nagle, Results from the Relativistic Heavy Ion Collider, nucl-th/0602029 (Ann. Rev. Nucl. and Part. Phys. 2006).
- [NaOrRe94] G. Nagy, O. Ortiz and O. Reula, The behavior of hyperbolic heat equations' solutions near their parabolic limits, *J. Math. Phys.* **35**, 4334 (1994).
- [Nak58] S. Nakajima, On quantum theory of transport phenomena – steady diffusion, *Progr. Theor. Phys.* **20**, 948 (1958).
- [Nak66] N. Nakanishi, Covariant quantization of the electromagnetic field in the Landau gauge, *Prog. Theor. Phys.* **35**, 1111 (1966).
- [NaNaSa88] K. Nakao, Y. Nambu and M. Sasaki, Stochastic dynamics of new inflation, *Prog. Theor. Phys.* **80**, 1041 (1988).
- [Nam89] Y. Nambu, Stochastic dynamics of an inflationary model and initial distribution of universes, *Prog. Theor. Phys.* **81**, 1037 (1989).
- [NamSas89] Y. Nambu and M. Sasaki, Stochastic approach to chaotic inflation and the distribution of universes, *Phys. Lett.* **219B**, 240 (1989).
- [NegOrl98] J. Negele and H. Orland, *Quantum Many-particle Systems* (Perseus, New York, 1998).
- [NeuHil27] J. von Neumann and D. Hilbert, Über die Grundlagen der Quantenmechanik, *Mathematische Annalen* (1927), in von Neumann's *Collected Works* (Pergamon, Oxford, 1961), **1**, 111.
- [NiCsKi98] S. Nickerson, T. Csorgo and D. Kiang, Testing the core-halo model on Bose–Einstein correlation functions, *Phys. Rev. C* **57**, 3251 (1998).
- [Nic95] G. Nicolis, *Introduction to Nonlinear Science* (Cambridge University Press, Cambridge, 1995).
- [Nie02] A. Niegawa, Fermion propagator in out of equilibrium quantum-field system and the Boltzmann equation, *Phys. Rev. D* **65**, 56009 (2002).
- [Nie75] N.K. Nielsen, On the gauge dependence of spontaneous symmetry breaking in gauge theories, *Nucl. Phys.* **B101**, 173 (1975).
- [NieSem84a] A.J. Niemi and G.W. Semenoff, Finite-temperature quantum field theory in Minkowski space, *Ann. Phys. (N.Y.)* **152**, 105 (1984).
- [NieSem84b] A.J. Niemi and G.W. Semenoff, Thermodynamic calculations in relativistic finite-temperature quantum field theories, *Nucl. Phys.* **B230**, 181 (1984).
- [NobaGa05] A.A. Norrie, R.J. Ballagh and C.W. Gardiner, Quantum turbulence in condensate collisions: an application of the classical field method, *Phys. Rev. Lett.* **94**, 040401 (2005).
- [NobaGa06] A.A. Norrie, R.J. Ballagh and C.W. Gardiner, Quantum turbulence and correlations in Bose–Einstein condensate collisions, *Phys. Rev. A* **73**, 043617 (2006).

- [NorCor75] R. Norton and J. Cornwall, On the formalism of relativistic many body theory, *Ann. Phys.* (N.Y.) **91**, 106 (1975).
- [Nov65] E.A. Novikov, Functionals and the random-force method in turbulence theory, *Sov. Phys. JETP* **20**, 1290 (1965).
- [Nyq28] H. Nyquist, Thermal agitation of electric charge in conductors, *Phys. Rev.* **32**, 110 (1928).
- [OCoSte94a] D.J. O'Connor and C.R. Stephens, “Environmentally friendly” renormalization, *Int. J. Mod. Phys. A* **9**, 2805 (1994).
- [OCoSte94b] D.J. O'Connor and C.R. Stephens, Effective critical exponents for dimensional crossover and quantum systems from an environmentally friendly renormalization group, *Phys. Rev. Lett.* **72**, 506 (1994).
- [Oji81] I. Ojima, Gauge fields at finite temperature: Thermo field dynamics and the KMS condition and their extension to gauge theories, *Ann. Phys.* (N.Y.) **137**, 1 (1981).
- [OTZH04] A. de Oliveira-Costa, M. Tegmark, M. Zaldarriaga and A. Hamilton, The significance of the largest scale CMB fluctuations in WMAP, *Phys. Rev. D* **69**, 063516 (2004).
- [Omn88] R. Omnès, Logical reformulation of quantum mechanics I. Foundations, *J. Stat. Phys.* **53**, 893, 933, 957 (1988).
- [Omn90] R. Omnès, From Hilbert space to common sense: A synthesis of recent progress in the interpretation of quantum mechanics, *Ann. Phys.* (N.Y.) **201**, 354 (1990).
- [Omn92] R. Omnès, Consistent interpretations of quantum mechanics, *Rev. Mod. Phys.* **64**, 339 (1992).
- [Omn94] R. Omnès, *The Interpretation of Quantum Mechanics* (Princeton University Press, Princeton, NJ, 1994).
- [Oos02] D. van Oosten, P. van der Straaten and H.T.C. Stoof, Mott insulators in an optical lattice with high filling factors, cond-mat/0205066.
- [OrbBel67] J. Orban and A. Bellemann, Velocity-inversion and irreversibility in a dilute gas of hard disks, *Phys. Lett.* **24A**, 620–1 (1967).
- [Pag93] D.N. Page, Average entropy of a subsystem, *Phys. Rev. Lett.* **71**, 1291 (1993).
- [Pap84] A. Papoupolis, *Probability of Random Variables and Stochastic Processes* (McGraw-Hill, New York, 1984).
- [Par04] B. Paredes *et al.*, Tonks–Girardeau gas of ultracold atoms in an optical lattice, *Nature* **429**, 277 (2004).
- [Par88] G. Parisi, *Statistical Field Theory* (Addison-Wesley, Reading, Massachusetts, 1988).
- [Park66] L. Parker, The creation of particles in an expanding universe. Ph.D. Thesis, Harvard University (1966).
- [Park68] L. Parker, Particle creation in expanding universes, *Phys. Rev. Lett.* **21**, 562 (1968).
- [Park69] L. Parker, Quantized fields and particle creation in expanding universes. I, *Phys. Rev.* **183**, 1057 (1969).
- [Park71] L. Parker, Quantized fields and particle creation in expanding universes. II, *Phys. Rev. D* **3**, 346 (1971).
- [Park76] L. Parker, Thermal radiation produced by the expansion of the universe, *Nature* **261**, 20 (1976).
- [Park77] L. Parker, The production of elementary particles in strong gravitational fields, in *Asymptotic Structure of Space-Time*, ed. F.P. Esposito and L. Witten (Plenum Press, New York, 1977).
- [ParFul73] L. Parker and S.A. Fulling, Quantized matter fields and the avoidance of singularities in general relativity, *Phys. Rev. D* **7**, 2357 (1973).
- [ParFul74] L. Parker and S.A. Fulling, Adiabatic regularization of the energy-momentum tensor of a quantized field in homogeneous spaces, *Phys. Rev. D* **9**, 341 (1974).
- [ParSim93] L. Parker and J. Simon, Einstein equations with quantum corrections reduced to second order, *Phys. Rev. D* **47**, 1339 (1993).
- [ParZha93] L. Parker and Y. Zhang, Relativistic condensate as a source for inflation, *Phys. Rev. D* **47**, 416 (1993).

- [ParZha95] L. Parker and Y. Zhang, Cosmological perturbations of a relativistic condensate, *Phys. Rev. D* **51**, 2703 (1995).
- [PLURH00] H. Pastawski, P. Levstein, G. Usaj, J. Raya and J. Hirschinger, A nuclear magnetic resonance answer to the Boltzmann–Loschmidt controversy?, *Physica A* **283**, 166 (2000).
- [Paz90a] J.P. Paz, Anisotropy dissipation in the early universe: Finite-temperature effects reexamined, *Phys. Rev. D* **41**, 1054 (1990).
- [Paz90b] J.P. Paz, Dissipative effects during the oscillations around a true vacuum, *Phys. Rev. D* **42**, 529 (1990).
- [Paz94] J.P. Paz, Decoherence in quantum Brownian motion, in *The Physical Origin of Time-Asymmetry*, Huelva, Spain, 1991 ed. J.J. Halliwell, J. Perez-Mercader and W.H. Zurek (Cambridge University Press, Cambridge, 1994).
- [PaHaZu93] J.P. Paz, S. Habib and W.H. Zurek, Reduction of the wave packet: Preferred observable and decoherence time scale, *Phys. Rev. D* **47**, 488 (1993).
- [Paz00] J.P. Paz and W. Zurek, Environment-induced decoherence and the transition from quantum to classical, lectures at the 72nd Les Houches Summer School “Coherent Matter Waves” (1999) (quant-ph/0010011).
- [Pee80] P.J.E. Peebles, *Large Scale Structure of the Universe* (Princeton University Press, Princeton, NJ, 1980).
- [PeeVil99] P.J.E. Peebles and A. Vilenkin, Quintessential inflation, *Phys. Rev. D* **59**, 063505 (1999).
- [Pen70] O. Penrose, *Foundations of Statistical Mechanics* (Pergamon Press, Oxford, 1970).
- [Pen79] O. Penrose, Foundations of statistical mechanics, *Rep. Prog. Phys.* **42**, 1937–2006 (1979).
- [PenOns56] O. Penrose and L. Onsager, Bose–Einstein condensation and liquid helium, *Phys. Rev.* **104**, 576 (1956).
- [Per98] I. Percival, *Quantum State Diffusion* (Cambridge University Press, Cambridge, 1998).
- [Per93] A. Peres, *Quantum Theory: Concepts and Methods* (Kluwer, Dordrecht, 1993).
- [PesSch95] M. Peskin and D. Schroeder, *An Introduction to Quantum Field Theory* (Addison-Wesley, New York, 1995).
- [PetSmi02] C. Pethick and H. Smith, *Bose–Einstein Condensation in Dilute Gases* (Cambridge University Press, Cambridge, 2002).
- [Pet69] A.Z. Petrov, *Einstein Spaces* (Pergamon Press, Oxford, 1969).
- [PHENIX05] PHENIX Collaboration, Formation of dense partonic matter in relativistic nucleus–nucleus collisions at RHIC: Experimental evaluation by the PHENIX collaboration, *Nucl. Phys. A* **757**, 184 (2005).
- [PHOBOS05] PHOBOS Collaboration, The PHOBOS perspective on discoveries at RHIC, *Nucl. Phys. A* **757**, 28 (2005).
- [PinRam06] M. Pinto and R. Ramos, Inverse symmetry breaking in multi-scalar field theories, *J. Phys. A* **39**, 6649–6655 (2006).
- [PRSC02] M. Pinto, R. Ramos and F. de Souza Cruz, Unusual transition patterns in Bose–Einstein condensation, cond-mat/0204416.
- [Pis89a] R. Pisarski, Renormalized gauge propagator in hot gauge theories, *Physica A* **158**, 146 (1989).
- [Pis89b] R. Pisarski, How to compute scattering amplitudes in hot gauge theories, *Physica A* **158**, 246 (1989).
- [Pla59] M. Planck, *The Theory of Heat Radiation* (Dover, New York, 1959).
- [PFPKP06] D. Podolsky, G. Felder, L. Kovman and M. Peloso, Equation of state and beginning of thermalization after preheating, *Phys. Rev. D* **73**, 023501 (2006).
- [PolSta96] D. Polarski and A.A. Starobinsky, Semiclassicality and decoherence of cosmological perturbations, *Class. Quantum Grav.* **13**, 377 (1996).
- [PoSoSt02a] G. Policastro, D.T. Son and A.O. Starinets, From AdS/CFT correspondence to hydrodynamics, *JHEP* **0209**, 43 (2002).
- [PoSoSt02b] G. Policastro, D.T. Son and A.O. Starinets, From AdS/CFT correspondence to hydrodynamics, II. Sound waves, *JHEP* **0212**, 54 (2002).

- [Pol06] J. Polonyi, Quantum-classical crossover in electrodynamics, *Phys. Rev. D* **74**, 065014 (2006).
- [Pri62] I. Prigogine, *Nonequilibrium Statistical Mechanics* (John Wiley, New York, 1962).
- [Pri73] I. Prigogine, Irreversibility as a symmetry-breaking process, *Nature* **246**, 67–71 (1973).
- [PrBuSt98] N.P. Proukakis, K. Burnett and H.T.C. Stoof, Microscopic treatment of binary interactions in the nonequilibrium dynamics of partially Bose-condensed trapped gases, *Phys. Rev. A* **57**, 1230 (1998).
- [Pup04] G. Pupillo *et al.*, Scalable quantum computation in systems with Bose–Hubbard dynamics, *J. Mod. Opt.* **51**, 16 (2004).
- [PuWiPr06] G. Pupillo, C. Williams and N. Prokof’ev, Effects of finite temperature on the Mott insulator state, *Phys. Rev. A* **73**, 013408 (2006).
- [RajMar82] A.K. Rajagopal and J.T. Marshall, New coherent states with applications to time-dependent systems, *Phys. Rev. A* **26**, 2977 (1982).
- [Raj87] R. Rajaraman, *Solitons and Instantons* (Elsevier, Amsterdam, 1987).
- [Ram98] J. Rammer, *Quantum Transport Theory* (Perseus, MA, 1998).
- [Ram80] P. Ramond, *Field Theory, a Modern Primer* (Addison-Wesley, New York, 1980).
- [RamNav00] R. Ramos and F. Navarro, Chaotic symmetry breaking and dissipative two-field dynamics, *Phys. Rev. D* **62**, 85016 (2000).
- [RamHu97a] S. Ramsey and B.L. Hu, O(N) quantum fields in curved spacetime, *Phys. Rev. D* **56**, 661 (1997).
- [RamHu97b] S. Ramsey and B.L. Hu, Nonequilibrium inflaton dynamics and reheating: Back reaction of parametric particle creation and curved spacetime effects, *Phys. Rev. D* **56**, 678 (1997).
- [RaStHu98] S. Ramsey, A. Stylianopoulos and B.L. Hu, Nonequilibrium inflaton dynamics and reheating. II. Fermion production, noise and stochasticity, *Phys. Rev. D* **57**, 6003 (1998).
- [Ran97] J. Randrup, Mean-field treatment of the linear σ model in dynamical calculation of DCC observables, *Nucl. Phys. A* **616**, 531 (1997).
- [Rau94] J. Rau, Pair production in the quantum Boltzmann equation, *Phys. Rev. D* **50**, 6911 (1994).
- [RauMue96] J. Rau and B. Mueller, From reversible quantum microdynamics to irreversible quantum transport, *Phys. Rep.* **272**, 1 (1996).
- [RaHuAn96] A. Raval, B.L. Hu and J. Anglin, Stochastic theory of accelerated detectors in quantum fields, *Phys. Rev. D* **53**, 7003–7019 (1996).
- [RaHuKo97] A. Raval, B.L. Hu and D. Koks, Near-thermal radiation in detectors, mirrors, and black holes: A stochastic approach, *Phys. Rev. D* **55**, 4795 (1997).
- [Reb87] A. Rebhan, The Vilkovisky–DeWitt effective action and its application to Yang–Mills theories, *Nucl. Phys.* **B288**, 832 (1987).
- [Reg04] C.A. Regal, M. Greiner and D.S. Jin, Observation of resonance condensation of fermionic atom pairs, *Phys. Rev. Lett.* **92**, 040403 (2004).
- [Rei98] L. Reichl, *A Modern Course in Statistical Physics* (John Wiley, New York, 1998).
- [Rei65] F. Reif, *Fundamentals of Statistical and Thermal Physics* (McGraw-Hill, New York, 1965).
- [Rei67] F. Reif, *Statistical Physics – Berkeley Physics Course* (McGraw-Hill, New York, 1967).
- [ReiToe94] P.-G. Reinhard and C. Toeffer, Correlations in nuclei and nuclear dynamics, *Int. J. Mod. Phys. E* **3**, 436 (1994).
- [ReiSer06] U. Reinosa and J. Serreau, 2PI effective action for gauge theories: renormalization, *JHEP* **0607**, 028 (2006).
- [Rei05] A. Reischl, K. Schmidt and G. Uhrig, Temperature in one-dimensional bosonic Mott insulators, *Phys. Rev. A* **72**, 063609 (2005).
- [Rey04] A.M. Rey, Ultra cold bosonic atoms in optical lattices, D.Phil. Thesis, Maryland University at College Park (2004).
- [ReBlCl03] A.M. Rey, P.B. Blakie and C.W. Clark, Dynamics of a period 3 pattern-loaded BEC in an optical lattice, *Phys. Rev. A* **67**, 053610 (2003).

- [RHCC05] A.M. Rey, B.L. Hu, E. Calzetta and C. Clark, Quantum kinetic theory of a Bose–Einstein gas confined in a lattice, *Phys. Rev. A* **72**, 023604 (2005).
- [RHCRC04] A.M. Rey, B.L. Hu, E. Calzetta, A. Roura and C. Clark, Nonequilibrium dynamics of optical lattice-loaded BEC atoms: Beyond HFB approximation, *Phys. Rev. A* **69**, 033610 (2004).
- [Rey87] S.J. Rey, Dynamics of inflationary phase transition, *Nucl. Phys.* **B284**, 706 (1987).
- [RhPiWa71] W.-K. Rhim, A. Pines and J. Waugh, Violation of the spin-temperature hypothesis, *Phys. Rev. Lett.* **25**, 218–220 (1971).
- [Rio02] A. Riotto, “Inflation and the theory of cosmological perturbations,” Lecture given at ICTP Summer School on Astroparticle Physics and Cosmology, Trieste, Italy, 17 Jun – 5 Jul 2002, published in Trieste 2002, *Astroparticle physics and cosmology*, 317–413.
- [Ris98] D. Rischke, Fluid dynamics for relativistic nuclear collisions, Proceedings of the 11th Chris Engelbrecht Summer School in Theoretical Physics, Cape Town, Feb. 4–13, 1998 (nucl-th/9809044).
- [Ris89] H. Risken, *The Fokker–Planck Equation* (Springer-Verlag, Berlin, 1989).
- [Riv01] R.J. Rivers, Zurek–Kibble causality bounds in time-dependent Ginzburg–Landau theory and quantum field theory, *J. Low T. Phys.* **124**, 41 (2001).
- [RiKaKa00] R.J. Rivers, E. Kavoussanaki, and G. Karra, The onset of phase transitions in condensed matter and relativistic QFT, *Cond. Matt. Phys.* **3**, 133 (2000).
- [RivLom05] R.J. Rivers and F.C. Lombardo, Onset of classical behaviour after a phase transition, *Braz. J. Phys.* **35**, 397–402 (2005).
- [RiLoMa02] R.J. Rivers, F.C. Lombardo, and F.D. Mazzitelli, The formation of classical defects after a slow quantum phase transition, *Phys. Lett.* **B539**, 1 (2002).
- [Rob05] D.C. Roberts, Probing Landau and Beliaev damping rates in Bose–Einstein condensates using ultraslow light experiments, *Phys. Rev. A* **72**, 065602 (2005).
- [Rom69] P. Roman, *Introduction to Quantum Field Theory* (John Wiley, New York, 1969).
- [RomReb06] P. Romatschke and A. Rebhan, Plasma instabilities in an anisotropically expanding geometry, hep-ph/0605064.
- [RomVen06] P. Romatschke and R. Venugopalan, The unstable glasma, hep-ph/0605045.
- [Roo74] R. Root, Effective potential for O(N) model to order 1/N, *Phys. Rev. D* **10**, 3322 (1974).
- [Rou02] A. Roura, Descripció estocàstica de sistemes quàntics oberts i pertorbacions cosmològiques, Ph.D. Thesis, University of Barcelona (2001).
- [RouVer99] A. Roura and E. Verdaguer, Mode decomposition and renormalization in semiclassical gravity, *Phys. Rev. D* **60**, 107503 (1999).
- [Rub60] R.J. Rubin, Statistical dynamics of simple cubic lattices. Model for the study of Brownian motion, *J. Math. Phys.* **1**, 309 (1960).
- [Rub61] R.J. Rubin, Statistical dynamics of simple cubic lattices. Model for the study of Brownian motion. II, *J. Math. Phys.* **2**, 373 (1961).
- [Rue76] D. Ruelle, A measure associated with Axiom-A attractors, *Am. J. Math.* **98**, 619 (1976).
- [RueEck85] D. Ruelle and J.P. Eckmann, Ergodic theory of chaos and strange attractors, *Rev. Mod. Phys.* **57**, 617 (1985).
- [RueSin86] D. Ruelle and Ya.G. Sinai, From dynamical systems to statistical mechanics and back, *Physica A* **140**, 1 (1986).
- [Sac99] S. Sachdev, *Quantum Phase Transitions* (Cambridge University Press, Cambridge, 1999).
- [SaiUed03] H. Saito and M. Ueda, A consistent picture of a collapsing Bose–Einstein condensate, *J. Phys. Soc. Japan* **72** (Suppl. C), 127 (2003).
- [Sak66] A.D. Sakharov, The initial stage of an expanding universe and the appearance of a nonuniform distribution of matter, *Sov. Phys. JETP* **22**, 241 (1966).
- [SalBon91] D.S. Salopek and J.R. Bond, Stochastic inflation and nonlinear gravity, *Phys. Rev. D* **43**, 1005 (1991).
- [SanMig89] J.M. Sancho and M. San Miguel, Langevin equations with colored noise, in *Noise in Nonlinear Dynamical Systems: Theory Experiment, Simulation*, vol 1, ed. F. Moss and P.V.E. McClintock (Cambridge University Press, Cambridge, 1989), pp. 110–160.

- [SanShl02] L. Santos and G. Shlyapnikov, Collapse dynamics of trapped Bose–Einstein condensates, *Phys. Rev. A* **66**, 011602(R) (2002).
- [Sato81] K. Sato, Cosmological baryon-number domain structure and the first order phase transition of a vacuum, *Phys. Lett.* **99B**, 66 (1981).
- [Sau31] F. Sauter, Über das Verhalten eines Elektrons in homogen elektrischen Feld nach der relativistischen Theorie Diracs, *Z. Phys.* **69**, 742 (1931).
- [Sau32] F. Sauter, Zum ‘kleinschen Paradoxon’, *Z. Phys.* **73**, 547 (1932).
- [SaRoHo03] C. Savage, N. Robins and J. Hope, Bose–Einstein condensate collapse: A comparison between theory and experiment, *Phys. Rev. A* **67**, 014304 (2003).
- [SaOHTh97] T. Savard, K. O’Hara and J. Thomas, Laser-noise-induced heating in far-off resonance optical traps, *Phys. Rev. A* **56**, R1095 (1997).
- [SSMKE04] C. Schori *et al.*, Excitations of a superfluid in a 3D optical lattice, *Phys. Rev. Lett.* **93**, 240402 (2004).
- [Sch81] L.S. Schulman, *Techniques and Applications of Path Integration* (John Wiley, New York, 1981).
- [Sch97] L.S. Schulman, *Time’s Arrow and Quantum Measurement* (Cambridge University Press, Cambridge, 1997).
- [Sch86] B.L. Schumacher, Quantum mechanical pure states with Gaussian wave functions, *Phys. Rep.* **135**, 317 (1986).
- [Sch51] J. Schwinger, On gauge invariance and vacuum polarization, *Phys. Rev.* **82**, 664 (1951).
- [Sch60] J. Schwinger, Field theory methods in non-field-theory contexts, Brandeis 1960 Summer Institute in Theoretical Physics.
- [Sch61] J. Schwinger, Brownian motion of a quantum oscillator, *J. Math. Phys.* **2**, 407 (1961).
- [Sch70] J. Schwinger, *Particles, Sources and Fields*, vol. 1 (Addison-Wesley, Reading, MA, 1970).
- [Sci79] D.W. Sciama, Thermal and quantum fluctuations in special and general relativity: An Einstein synthesis, in *Relativity, Quanta and Cosmology – Centenario di Einstein* ed. F. DeFinis (Editrici Giunti Barbera Universitaria, Florence, Italy, 1979).
- [ScHuGa06] R.G. Scott, D.A.W. Hutchinson and C.W. Gardiner, Disruption of reflecting Bose–Einstein condensates due to inter-atomic interactions and quantum noise, [cond-mat/0608135](#).
- [SelCre06] U. Seljak and P. Creminelli, ICTP Workshop on non-Gaussianity in Cosmology, July 2006.
- [SelZal96] U. Seljak and M. Zaldarriaga, A line of sight integration approach to cosmic microwave background anisotropies, *Astrophys. J.* **469**, 437 (1996).
- [SeKrBo00] D. Semkat, D. Kremp and M. Bonitz, Kadanoff–Baym equations and non-Markovian BE in generalized T-matrix approximation, *J. Math. Phys.* **41**, 7458 (2000).
- [SexUrb69] R.U. Sexl and H.K. Urbantke, Production of particles by gravitational fields, *Phys. Rev.* **179**, 1247 (1969).
- [ShiGri98] H. Shi and A. Griffin, Finite-temperature excitations in a dilute Bose-condensed gas, *Phys. Rep.* **304**, 1 (1998).
- [Shi65] J. Shirley, Solution of the Schrodinger equation with a Hamiltonian periodic in time, *Phys. Rev.* **138**, B979 (1965).
- [ShTrBr95] Y. Shtanov, J. Traschen and R. Brandenberger, Universe reheating after inflation, *Phys. Rev. D* **51**, 5438–5455 (1995).
- [Shu88] E.V. Shuryak, *The QCD Vacuum, Hadrons and the Superdense Matter* (World Scientific, Singapore, 1988).
- [Sinai72] Ya.G. Sinai, Gibbs measures in ergodic theory, *Russ. Math. Surveys* **27**, 21 (1972).
- [SiCaWi06] A. Sinatra, Y. Castin and E. Witkowska, Non-diffusive phase spreading of a Bose–Einstein condensate at finite temperature, *Phys. Rev. A* **75**, 0033616 (2007).
- [Sin97] S. Sinha, Decoherence at absolute zero, *Phys. Lett. A* **228** (1997).
- [SinHu89] S. Sinha and B.L. Hu, Symmetry behavior in cosmological spacetimes: Effect of slowly varying background fields, *Phys. Rev. D* **38**, 2423 (1989).

- [SinHu91] S. Sinha and B.L. Hu, Validity of the minisuperspace approximation: An example from interacting quantum field theory, *Phys. Rev. D* **44**, 1028 (1991).
- [Sin99] Y. Sinyukov, Boson spectra and correlations for thermally locally equilibrium systems, *Heavy Ion Phys.* **10**, 113–136 (1999).
- [SiAkHa02] Y. Sinyukov, S. Akkelin and Y. Hama, On freeze-out problem in hydro-kinetic approach to A+A collisions, *Phys. Rev. Lett.* **89**, 052301 (2002).
- [SRSBTP97] S.A. Smolyansky, G. Roepke, S. Schmidt, D. Blaschke, V.D. Toneev and A.V. Prozorkevich, Dynamical derivation of a quantum kinetic equation for particle production in the Schwinger mechanism, hep-ph/9712377 (unpublished).
- [SoBaDi01] S. Sofi, S. Bass and A. Dumitru, Pion Interferometry at RHIC: Probing a thermalized quark-gluon plasma?, *Phys. Rev. Lett.* **86**, 3981 (2001).
- [Son96] D.T. Son, Reheating and thermalization in a simple scalar model, *Phys. Rev. D* **54**, 3745 (1996).
- [Son97] D.T. Son, Effective non-perturbative real-time dynamics of soft modes in hot gauge theories, hep-ph/9707351.
- [Sou02] K. Southwell (ed.), Nature insight: Ultracold matter, *Nature* **416**, 205 (2002).
- [SPRS02] F. de Souza Cruz, M. Pinto, R. Ramos and P. Sena, Higher order evaluation of the critical temperature for interacting homogeneous dilute Bose gases, *Phys. Rev. A* **65**, 053613 (2002).
- [Spe03] D.N. Spergel *et al.*, First year Wilkinson Microwave Anisotropy Probe (WMAP) observations: Determination of cosmological parameters, *Astrophys. J. Suppl.* **148**, 175 (2003).
- [Spo91] H. Spohn, *Large Scale Dynamics of Interacting Particles* (Springer-Verlag, Berlin, 1991).
- [STAR05] STAR Collaboration, Experimental and theoretical challenges in the search for the quark-gluon plasma: The STAR Collaboration's critical assesment of the evidence from RHIC collisions, *Nucl. Phys. A* **757**, 102 (2005).
- [Sta82] A.A. Starobinsky, Dynamics of phase transition in the new inflationary universe scenario and generation of perturbations, *Phys. Lett.* **117B**, 175 (1982).
- [Sta86] A.A. Starobinsky, Stochastic De Sitter inflationary stage in the early universe in *Field Theory, Quantum Gravity and Strings*, ed. H. J. de Vega and N. Sanchez (Springer-Verlag, Berlin, 1986).
- [StaYok94] A.A. Starobinsky and J. Yokoyama, Equilibrium state of a self-interacting scalar field in the de Sitter background, *Phys. Rev. D* **50**, 6357–6368 (1994).
- [Ste98] M.J. Steel *et al.*, Dynamical quantum noise in trapped Bose–Einstein condensates, *Phys. Rev. A* **58**, 4824 (1998).
- [SteTur84] P.J. Steinhardt and M.S. Turner, Prescription for successful new inflation, *Phys. Rev. D* **29**, 2162–2171 (1984).
- [Ste98] C.R. Stephens, Why two renormalization groups are better than one, *Int. J. Mod. Phys. B* **12**, 1379–1396 (1998).
- [Ste00] G.J. Stephens, Unraveling critical dynamics: The formation and evolution of textures, *Phys. Rev. D* **61**, 085002 (2000).
- [StBeZu02] G. Stephens, L. Bettencourt and W. Zurek, Critical dynamics of gauge systems: spontaneous vortex formation in 2D superconductors, *Phys. Rev. Lett.* **88**, 137004 (2002).
- [SCHR99] G. Stephens, E. Calzetta, B.L. Hu and S. Ramsey, Defect formation and critical dynamics in the early Universe, *Phys. Rev. D* **59**, 045009 (1999).
- [Ste02] E.D. Stewart, Spectrum of density perturbations produced during inflation to leading order in a general slow-roll approximation, *Phys. Rev. D* **65**, 103508 (2002).
- [SMSKE04] T. Stoferle *et al.*, Transition from a strongly interacting 1D superfluid to a Mott insulator, *Phys. Rev. Lett.* **92**, 130403 (2004).
- [Sto99] H. Stoof, Field theory for trapped atomic gases, *J. Low Temp. Phys.* **114**, 11 (1999) (cond-mat/9910441).
- [StrWig80] R.F. Streater and A.S. Wightman, *PCT, Spin and Statistics, and All That* (Benjamin/Cummings, New York, 1980).
- [Str06] M. Strickland, Thermalization and plasma instabilities, hep-ph/0608173.

- [StrVaf96] A. Strominger and C. Vafa, Mirror symmetry is T duality, spectroscopy of the quantum black hole, *Nucl. Phys.* **B479**, 243 (1996).
- [SCYC88] Z. Su, L.Y. Chen, X. Yu and K. Chou, Influence functional and closed-time-path Green's function, *Phys. Rev. B* **37**, 9810 (1988).
- [Sun82] K. Sundermeyer, *Constrained Dynamics* (Springer-Verlag, Berlin, 1982).
- [TayWon90] J.C. Taylor and S.M. Wong, The effective action of hard thermal loops in QCD, *Nucl. Phys.* **B346**, 115 (1990).
- [Tea03] D. Teaney, The effect of shear viscosity on spectra, elliptic flow, and HBT radii, *Phys. Rev. C* **68**, 034913 (2003).
- [TeLaSh01] D. Teaney, J. Lauret and E.V. Shuryak, A hydrodynamic description of heavy ion collisions at the SPS and RHIC, [nucl-th/0110037](#).
- [TeCoHa03] M. Tegmark, A. de Oliveira-Costa and A. Hamilton, A high resolution foreground cleaned CMB map from WMAP, *Phys. Rev. D* **68**, 123523 (2003).
- [TemGas06] K. Temme and T. Gasenzer, Non-equilibrium dynamics of a Bose–Einstein condensate in an optical lattice in the 2PI 1/N approach, [cond-mat/0607116](#).
- [Tin96] M. Tinkham, *Introduction to Superconductivity* (McGraw-Hill, New York, 1996).
- [TsaKan05] C. Tsagas and A. Kandus, Superadiabatic-type magnetic amplification in conventional cosmology, *Phys. Rev. D* **71**, 123506 (2005).
- [TsaWoo05] N.C. Tsamis and R.P. Woodard, Stochastic quantum gravitational inflation, *Nucl. Phys. B* **724**, 295–328 (2005).
- [TsuGri03] S. Tsuchiya and A. Griffin, Damping of Bogoliubov excitations in optical lattices, [cond-matt/0311321](#).
- [TsuGri05] S. Tsuchiya and A. Griffin, Landau damping of Bogoliubov excitations in optical lattices at finite temperature, [cond-mat/0506016](#).
- [TurWid88] M.S. Turner and L.M. Widrow, Inflation-produced, large-scale magnetic fields, *Phys. Rev. D* **37**, 2743 (1988).
- [UedSai03] M. Ueda and H. Saito, A consistent picture of a collapsing Bose–Einstein condensate, *J. Phys. Soc. Jpn.* **72** (Suppl. C), 127 (2003).
- [UmMaTa82] H. Umezawa, H. Matsumoto and M. Tachiki, *Thermo Field Dynamics and Condensed States* (North-Holland, Amsterdam, 1982).
- [UMDdemo] University of Maryland Lecture Demonstration F4-12.
<http://www.physics.umd.edu/deptinfo/facilities/lecdem/f4-12.html>.
- [Unr76] W.G. Unruh, Notes on black-hole evaporation, *Phys. Rev. D* **14**, 870 (1976).
- [UnrSch07] W.G. Unruh and R. Schutzhold (eds.), *Quantum Analogues from Phase Transitions to Black holes and Cosmology* (LNP718, Springer, New York 2007).
- [UnrZur89] W.G. Unruh and W.H. Zurek, Reduction of a wave packet in quantum Brownian motion, *Phys. Rev. D* **40**, 1071 (1989).
- [Vac01] T. Vachaspati, Estimate of the primordial magnetic field helicity, *Phys. Rev. Lett.* **87**, 251302 (2001).
- [Ven07] R. Venugopalan, Multiparticle production in the Glasma at NLO and plasma instabilities, [hep-ph/0702019](#).
- [Vil83a] A. Vilenkin, Quantum fluctuations in the new inflationary universe, *Nucl. Phys.* **B226**, 527 (1983).
- [Vil83b] A. Vilenkin, Birth of inflationary universes, *Phys. Rev. D* **27**, 2848 (1983).
- [VilFor82] A. Vilenkin and L.H. Ford, Gravitational effects upon cosmological phase transitions, *Phys. Rev. D* **26**, 1231 (1982).
- [VilLea82] A. Vilenkin and D.A. Leahy, Parity nonconservation and the origin of cosmic magnetic fields, *Ap. J.* **254**, 77 (1982).
- [VilShe00] A. Vilenkin and E.P.S. Shellard, *Cosmic Strings and Other Topological Defects* (Cambridge University Press, Cambridge, 2000).
- [Vil84] G.A. Vilkovisky, The gospel according to DeWitt, in *Quantum Theory of Gravity*, ed. S.M. Christensen (Hilger, Bristol, 1984).
- [Vle28] J.H. Van Vleck, The correspondence principle in the statistical interpretation of quantum mechanics, *Proc. N.A.S.* **14**, 178 (1928).

- [VolZha96] S. Voloshin and Y. Zhang, Flow study in relativistic nuclear collisions by Fourier expansion of azimuthal particle distributions, *Z. Phys. C* **70**, 665 (1996). (hep-ph/9407282).
- [WWCH01] J. Wachter, R. Walser, J. Cooper and M. Holland, Equivalence of kinetic theories of Bose–Einstein condensation, *Phys. Rev. A* **64**, 053612 (2001).
- [WWCH02a] J. Wachter, R. Walser, J. Cooper and M. Holland, Erratum: Equivalence of kinetic theories of Bose–Einstein condensation, *Phys. Rev. A* **65**, 039904 (2002).
- [WWCH02b] J. Wachter, R. Walser, J. Cooper and M. Holland, Gapless kinetic theory beyond the Popov approximation, cond-mat/0212432.
- [WaCoHo00] R. Walser, J. Cooper and M. Holland, Reversible and irreversible evolution of a condensed bosonic gas, *Phys. Rev. A* **63**, 013607 (2000).
- [WWCH99] R. Walser, J. Williams, J. Cooper, M.J. Holland *et al.*, Quantum kinetic theory for a condensed bosonic gas, *Phys. Rev. A* **59**, 3878 (1999).
- [Wan97] X.N. Wang, A pQCD-based approach to parton production and equilibration in high energy nuclear collisions, *Phys. Rep.* **280**, 287 (1997).
- [WBVS00] S.Y. Wang, D. Boyanovsky, H. de Vega and D.S. Lee, Real time nonequilibrium dynamics in hot QED plasmas: dynamical renormalization group approach *Phys. Rev. D* **62**, 105026 (2000).
- [WanHei99] E. Wang and U. Heinz, Non-perturbative calculation of shear viscosity, *Phys. Lett.* **471B**, 208 (1999).
- [WanHei02] E. Wang and U. Heinz, A generalized fluctuation-dissipation theorem for nonlinear response functions, *Phys. Rev. D* **66**, 025008 (2002).
- [WaHeZh96] E. Wang, U. Heinz and X. Zhuang, Viscosity in hot scalar field theory, *Phys. Rev. D* **53**, 5978 (1996).
- [WRSG02] Q. Wang, K. Redlich, H. Stocker and W. Greiner, Kinetic equation for gluons in the background gauge of QCD, *Phys. Rev. Lett.* **88**, 132303 (2002).
- [WRSG03] Q. Wang, K. Redlich, H. Stöcker and W. Greiner, From the Dyson–Schwinger to the transport equation in the background field gauge of QCD, *Nucl. Phys.* **A714**, 293–334 (2003).
- [WegHou73] F. Wegner and A. Houghton, Renormalization group equation for critical phenomena, *Phys. Rev. A* **8**, 401 (1973).
- [Wei72] S. Weinberg, *Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity* (John Wiley, New York, 1972).
- [Wei74] S. Weinberg, Gauge and global symmetries at high temperatures, *Phys. Rev. D* **9**, 3357 (1974).
- [Wei95] S. Weinberg, *The Quantum Theory of Fields*, vol. I: *Foundations* (Cambridge University Press, Cambridge, 1995).
- [Wei96] S. Weinberg, *The Quantum Theory of Fields*, vol. II: *Modern Applications* (Cambridge University Press, Cambridge, 1996).
- [Wei00] S. Weinberg, *The Quantum Theory of Fields*, vol. III: *Supersymmetry* (Cambridge University Press, Cambridge, 2000).
- [Wei05a] S. Weinberg, Quantum contributions to cosmological correlations, *Phys. Rev. D* **72**, 043514 (2005).
- [Wei06] S. Weinberg, Quantum contributions to cosmological correlations. II. Can these corrections become large?, *Phys. Rev. D* **74**, 023508 (2006).
- [Wei05b] S. Weinstock, Boltzmann collision term, *Phys. Rev. D* **73**, 025005 (2006).
- [Wei93] U. Weiss, *Quantum Dissipative Systems* (World Scientific, Singapore, 1993).
- [Wei88] M. Weissbluth, *Photon-Atom Interactions* (Academic Press, San Diego, 1988), Chapter 1.
- [WhiWat40] E. Whittaker and G. Watson, *A Course of Modern Analysis* (Cambridge University Press, Cambridge, 1940).
- [WieHei99] U. Wiedemann and U. Heinz, Particle interferometry for relativistic heavy-ion collisions, *Phys. Rept.* **319**, 145–230 (1999).
- [Wig32] E. Wigner, On the quantum correction for thermodynamic equilibrium, *Phys. Rev.* **40**, 749 (1932).

- [Wig68] E.P. Wigner, Application of group theory to the special functions of mathematical physics (Unpublished lecture notes, Princeton University, Princeton NJ, 1955); see also J. Talman, Special functions: A group theoretical approach (Benjamin, New York, 1968), based on Wigner's Lectures.
- [WilPic74] C.R. Willis and R.H. Picard, Time-dependent projection-operator approach to master equations for coupled systems, *Phys. Rev. A* **9**, 1343 (1974).
- [Wil82] K. Wilson, The renormalization group and critical phenomena, *Rev. Mod. Phys.* **55**, 583 (1982).
- [WilKog74] K. Wilson and J. Kogut, The renormalization group and the ϵ expansion, *Phys. Rep.* **12**, 75 (1974).
- [Win06] S. Winitzki, Predictions in eternal inflation, gr-qc/0612164.
- [WinVil00] S. Winitzki and A. Vilenkin, Effective noise in stochastic description of inflation, *Phys. Rev. D* **61**, 084008 (2000).
- [Win84] J. Winter, Covariant extension of the Wigner transformation to non-Abelian Yang–Mills symmetries for a Vlasov equation approach to the quark-gluon plasma, *J. Phys. (Paris)* **45**, C6 (1984).
- [Win85] J. Winter, Wigner transformation in curved space-time and the curvature correction of the Vlasov equation for semiclassical gravitating systems, *Phys. Rev. D* **32**, 1871 (1985).
- [Won94] C.-Y. Wong, *Introduction to High-Energy Heavy Ion Collisions* (World Scientific, Singapore, 1994).
- [Won70] S.K. Wong, Field and particle equations for the classical Yang–Mills field and particles with isotopic spin, *Nuovo Cim.* **65A**, 689 (1970).
- [Won04] S.M.H. Wong, Out-of-equilibrium collinear enhanced equilibration in the bottom-up thermalization scenario in heavy ion collisions, hep-ph/0404222.
- [Woo05a] R.P. Woodard, A leading logarithm approximation for inflationary quantum field theory, *Nucl. Phys. B – Proceedings Supplements* **148**, 108–119 (2005).
- [Woo06] R.P. Woodard, Generalizing Starobinskii's formalism to Yukawa theory and to scalar QED, Proceedings of NEB XII, Nauplion, Greece, June 29 – July 2, 2006 (gr-qc/0608037).
- [WuNgLeeLeeCha06] Chun-Hsien Wu, Kin-Wang Ng, Wolung Lee, Da-Shin Lee and Yeo-Yie Charng, Quantum noise and large-scale cosmic microwave background anisotropy, *JCAP* **0702**, 006 (2007).
- [WuHoSa05] S. Wüster, J. Hope and C. Savage, Collapsing Bose–Einstein condensates beyond the Gross–Pitaevskii approximation, *Phys. Rev. A* **71**, 033604 (2005).
- [WDBDBH07] S. Wurster *et al.*, Quantum depletion of collapsing Bose–Einstein condensates, *Phys. Rev. A* **75**, 043611 (2007).
- [YIKM06] D.G. Yamazaki, K. Ichiki, T. Kajino and G.J. Mathews, Constraints on the evolution of the primordial magnetic field from the small-scale cosmic microwave background angular anisotropy, *Astrophys. J.* **646**, 719–729 (2006).
- [YatZur98] A. Yates and W. Zurek, Vortex formation in two dimensions: when symmetry breaks, how big are the pieces?, *Phys. Rev. Lett.* **80**, 5477 (1998).
- [YiVis92] I. Yi and E.T. Vishniac, Scaling solution for cosmological fluctuations and large scale structure, *Phys. Rev. D* **45**, 3441 (1992).
- [YiVis93] I. Yi and E.T. Vishniac, Stochastic analysis of the initial condition constraints on chaotic inflation, *Phys. Rev. D* **47**, 5280, 5295 (1993).
- [YiVis93b] I. Yi and E.T. Vishniac, Inflationary stochastic dynamics and the statistics of large-scale structure, *Astrophys. J. Suppl.* **86**, 333 (1993).
- [YiViMi91] I. Yi, E.T. Vishniac and S. Mineshige, Generation of non-Gaussian fluctuations during chaotic inflation, *Phys. Rev. D* **43**, 362 (1991).
- [Yur02] V.A. Yurovsky, Quantum effects on dynamics of instabilities in Bose–Einstein condensates, *Phys. Rev. A* **65**, 33605 (2002).
- [ZaLvFa92] V.E. Zakharov, V.S. L'vov and G. Falkovich, *Kolmogorov Spectra of Turbulence I: Wave Turbulence* (Springer-Verlag, Berlin, 1992).
- [ZMCB98] V. Zanchin, A. Maia Jr., W. Craig and R. Brandenberger, Reheating in the presence of noise, *Phys. Rev. D* **57**, 4651 (1998).

- [ZMCB99] V. Zanchin, A. Maia Jr., W. Craig and R. Brandenberger, Reheating in the presence of inhomogeneous noise, *Phys. Rev. D* **60**, 023505 (1999).
- [ZanCal06b] J. Zanella and E. Calzetta, Renormalization group study of damping in nonequilibrium field theory, hep-th/0611222 (2006).
- [ZanCal07a] J. Zanella and E. Calzetta, Inflation and nonequilibrium renormalization group, *J. Phys. A: Math. Theor.* **40**, 7037–7041 (2007).
- [Zel70] Ya.B. Zel'dovich, Particle production in cosmology, *Pis'ma Zh. Eksp. Teor. Fiz.* **12**, 443 (1970) (*JETP Lett.* **12**, 307 (1970)).
- [Zel72] Ya.B. Zel'dovich, A hypothesis, unifying the structure and the entropy of the Universe, *MNRAS* **160**, 1P (1972).
- [ZelNov85] Ya.B. Zel'dovich and I.D. Novikov, *Relativistic Cosmology*, vol. 2 (University of Chicago Press, Chicago, 1985).
- [ZelSta71] Ya.B. Zel'dovich and A.A. Starobinsky, Particle production and vacuum polarization in an anisotropic gravitational field, *Zh. Teor. Eksp. Fiz.* **61**, 2161 (1971) (*Sov. Phys. JETP* **34**, 1159 (1972)).
- [Zha90] Yuhong Zhang, Stochastic properties of interacting quantum fields, Ph.D. Thesis, University of Maryland, 1990.
- [ZhaHei96a] P. Zhuang and U. Heinz, Relativistic kinetic equations for electromagnetic, scalar and pseudoscalar interactions, *Phys. Rev. D* **53**, 2096 (1996).
- [ZhaHei96b] P. Zhuang and U. Heinz, Relativistic quantum transport theory for electrodynamics, *Ann. Phys. (N.Y.)* **245**, 311 (1996).
- [ZhuHei98] P. Zhuang and U. Heinz, Equal-time hierarchies for quantum transport theory, *Phys. Rev. D* **57**, 6525 (1998).
- [ZiBrSc01] J.P. Zibin, R. Brandenberger and D. Scott, Backreaction and the parametric resonance of cosmological fluctuations, *Phys. Rev. D* **63**, 043511 (2001).
- [Zin93] J. Zinn-Justin, *Quantum Field Theory and Critical Phenomena* (Clarendon Press, Oxford, 1993).
- [Zub74] D.N. Zubarev, *Nonequilibrium Statistical Thermodynamics* (Plenum, New York, 1974).
- [Zur81] W.H. Zurek, Pointer basis of quantum apparatus: Into what mixture does the wave packet collapse?, *Phys. Rev. D* **24**, 1516 (1981).
- [Zur82] W.H. Zurek, Environment-induced superselection rules, *Phys. Rev. D* **26**, 1862 (1982); and in *Frontiers of Nonequilibrium Statistical Physics*, ed. G.T. Moore and M.O. Scully (Plenum, New York, 1986).
- [Zur85] W.H. Zurek, Cosmological experiments in superfluid helium?, *Nature* **317**, 505 (1985).
- [Zur91] W.H. Zurek, Decoherence and the transition from quantum to classical, *Physics Today* **44**, 36 (1991).
- [Zur93] W.H. Zurek, Preferred states, predictability, classicality and the environment-induced decoherence, *Prog. Theor. Phys.* **89**, 281 (1993).
- [Zur96] W.H. Zurek, Cosmological experiments in condensed matter systems, *Phys. Rep.* **276**, 177 (1996).
- [Zur03] W.H. Zurek, Decoherence, einselection, and the quantum origins of the classical, *Rev. Mod. Phys.* **75**, 715–775 (2003).
- [ZuHaPa03] W.H. Zurek, S. Habib and J.P. Paz, Coherent states via decoherence, *Phys. Rev. Lett.* **70**, 1187 (1993).
- [ZurTho85] W.H. Zurek and K.S. Thorne, Statistical mechanical origin of the entropy of a rotating, charged black hole, *Phys. Rev. Lett.* **54**, 2171 (1985).
- [Zwa60] R. Zwanzig, Ensemble method in the theory of irreversibility, *J. Chem. Phys.* **33**, 1338 (1960).
- [Zwa61] R. Zwanzig, Statistical mechanics of irreversibility, in *Lectures in Theoretical Physics III*, ed. W.E. Britten, B.W. Downes and J. Downs (Interscience, New York 1961) pp. 106–141.
- [Zwa73] R. Zwanzig, Nonlinear generalized Langevin equations, *J. Stat. Phys.* **9**, 215 (1973).
- [Zwa01] R. Zwanzig, *Nonequilibrium Statistical Mechanics* (Oxford University Press, Oxford, 2001).