Scientific Publications by Girish S. Agarwal

Books

- "Quantum Optics" (Cambridge University Press, Cambridge, 2012).
- "Quantum Statistical Theories of Spontaneous Emission and their Relation to other Approaches", Vol.70 of "Springer Tracts in Modern Physics" (Springer-Verlag, New York, 1974).
- "Stochastic Processes - Formalism and Applications", Springer Lecture Notes in Physics, Vol.184 (Springer-Verlag, Berlin, 1983), edited with S. Dattagupta.
- Selected Papers on "Fundamentals of Quantum Optics", SPIE Milestone Series, Vol. MS103 (SPIE - Optical Engineering Press, Washington, 1994), edited.
- Selected Papers on "Resonant and Collective Phenomena in Quantum Optics", SPIE Milestone Series, Vol. MS104 (SPIE - Optical Engineering Press, Washington, 1994), edited.

Review Articles

- "Master Equations in Quantum Optics", in Progress in Optics, ed. E. Wolf (North Holland, Amsterdam, Vol. XI, p.1-76 (1973)).
- "Collision Induced Coherences in Optical Physics" in Advances in Atomic, Molecular and Optical Physics", eds. Sir D.R. Bates and B. Bederson (Academic Press, New York, Vol.28, p.113-176 (1991)).

List of published articles by Girish S. Agarwal (H-index: 69)

1. **Ordering Theorems and Generalized Phase Space Distributions**
   G.S. Agarwal and E. Wolf
   Phys. Lett. **26A**, 485-486, 1968.
2. **Quantum Dynamics in Phase Space**
   G.S. Agarwal and E. Wolf
   Phys. Rev. Lett. **21**,180,1969.
3. **Ordering of Operators and Phase Space Descriptions in Quantum Optics**
   E. Wolf and G.S. Agarwal
   Contribution in *Polarization, Matiere et Rayonnement* published by Soc. Française de Physique, Presses Universitaires de France, Paris, p.541-556, 1969.
4. **A Generalized Wick Theorem and Phase Space Representation of Operators**
   G.S. Agarwal andE. Wolf
   Nuovo Cim. Lett. **1,** 140-144, 1969.
5. **Phase Space Analysis of Time Correlation Functions.**
   G.S. Agarwal
   Phys. Rev. **177**, 400-407, 1969.
6. **Maser Equations in Phase Space Formulation of Quantum Optics**
   G.S. Agarwal
   Phys. Rev. **178**, 2025-2035, 1969.

7. **Quantum Theory of Second Harmonic Generation.**
G.S. Agarwal
Opt. Commun. **1**, 132-134, 1969.

8. **Photoelectric Detection with Two Photon Absorption**
A.K. Jaiswal and G.S. Agarwal
J. Opt. Soc. America **59**, 1446-1452, 1969.

9. **Generalized Phase Space Distributions Associated with a Pseudo-oscillator.**
G.S. Agarwal
Nuovo Cim. **65B,** 266-279, 1970.

10. **Field Correlation Effects in Multiphoton Absorption Processes.**
G.S. Agarwal
Phys. Rev. A **1**, 1445-1459, 1970.

11. **Calculus for Functions of Non-commuting Operators and General Phase Space Methods in Quantum Mechanics Part I: Mapping Theorem and Ordering of Functions of Non-commuting Operators.**
G.S. Agarwal and E. Wolf
Phys. Rev. D **2**, 2161-2186, 1970.

12. **A Calculus for Functions of Non-commuting Operators and General Phase Space Methods in Quantum Mechanics Part II: Quantum Mechanics in Phase Space.**
G.S. Agarwal and E. Wolf
Phys. Rev. D **2**, 2187-2205, 1970.

13. **A Calculus for Functions of Non-commuting Operators and General Phase Space Methods in Quantum Mechanics Part III: A Generalized Wick Theorem and Multi-time Mapping.**
G.S. Agarwal and E. Wolf
Phys. Rev. D **2**, 2206-2225, 1970.

14. **Master Equation Approach to Spontaneous Emission.**
G.S. Agarwal
Phys. Rev. A **2**, 2038-2046, 1970.

15. **Master Equation Approach to Spontaneous Emission.**
G.S. Agarwal
Opt. Commun. **2**, 357-362, 1971.

16. **On the State of Unpolarized Radiation.**
G.S. Agarwal
Nuovo Cimento Lett**. 2**, 53-56, 1971.

17. **Entropy, Wigner Distribution Function and the Approach to Equilibrium of Coupled Harmonic Oscillator Systems.**
G.S. Agarwal
Phys. Rev. A **3**, 828-831, 1971.

18. **Master Equation Approach to Spontaneous Emission-II. Emission from a System of Harmonic Oscillators.**
G.S. Agarwal
Phys. Rev. A **3**, 1783-1793, 1971.

19. **Brownian Motion by a Quantum Oscillator.**
G.S. Agarwal
Phys. Rev. A **4**, 739-747, 1971.

20. **Approximate Methods in the Quantum Statistical Theory of Superradiance**.
G.S. Agarwal
Nuovo Cim. Letters **2**, 49-54, 1971.

21. **Rotating Wave Approximation and Spontaneous Emission.**
G.S. Agarwal
Phys. Rev. A **4,** 1778-1781, 1971.

22. **Master Equation Approach to Spontaneous Emission-III. Many Body Aspects of Emission from Two-level Atoms and the Effect of Inhomogeneous Broadening.**
G.S. Agarwal
Phys. Rev. A **4,** 1791-1801, 1971.

23. **On the Structure of the Electromagnetic Field in a Spatially Dispersive Media.**
G.S. Agarwal, D.N. Pattanayak and E. Wolf
Phys. Rev. Lett. **27,** 1022-1025, 1971.

24. **Refraction and Reflection on a Spatially Dispersive Medium.**
G.S. Agarwal, D.N. Pattanayak and E. Wolf
Opt. Commun. **4**, 255-259, 1971.

25. **Boundary Conditions on Exciton Polarization and Mode Coupling in a Spatially Dispersive Medium.**
G.S. Agarwal and D.N. Pattanayak and E. Wolf,
Opt. Commun. **4,** 260-264, 1971.

26. **Fluctuation-Dissipation Theorems for Systems in Non-thermal Equilibrium and Application to Laser Light.**
G.S. Agarwal
Phys. Lett. **38A,** 91-93, 1972.

27. **Fluctuation-Dissipation Theorems for Systems in Non-thermal Equilibrium and Applications.**
G.S. Agarwal
Z. Physik **252**, 25-38, 1972.

28. **A Generalized Extinction Theorem for Exciton Polarization in Spatially Dispersive Media.**
G.S. Agarwal and D.N. Pattanayak and E. Wolf
Phys. Lett. **40A**, 279-280, 1972.

29. **Relation between the statistical Representation of Real and Associated Complex Fields in Optical Coherence Theory.**
G.S. Agarwal andE. Wolf
J. Math. Phys. **13,** 1759-1765, 1972.

30. **Master Equations Techniques in Quantum Optics**
G.S. Agarwal
Progress in Optics, ed. E. Wolf
North Holland Publishing Amsterdam, Vol.**XI**, p.1-76, 1973.

31. **Master Equation in the Theory of Incoherent and Coherent Spontaneous Emission.**
G.S. Agarwal
In*"Coherence and Quantum Optics",* eds. L. Mandel and E. Wolf
Plenum, p.157-182, 1973.

32. **Surface Polaritons in a Spatially Dispersive Medium**.
G.S. Agarwal
Opt. Communication. **6,** 221-225, 1972.

33. **Rotating Wave Approximation and Spontaneous Emission**
G.S. Agarwal
Phys. Rev. A **7**, 1195-1197, Addendum to Publn.No.21, 1973.

34. **Open Quantum Markovian Systems and Microreversibility**
G.S. Agarwal
Z. Physik **258,** 409-422, 1973.

35. **Some Properties of Fokker-Planck Equations with Memory under Detailed Balance.**
G.S. Agarwal
Z. Physik **259,** 401-408, 1973.

36. **Surface Polariton Response Function Approach to Dispersion Forces between Macroscopic Bodies.**
G.S. Agarwal
Phys. Lett. **43A**, 447-449, 1973.

37. **On the Solution of the Partial Differential Equation** $\prod_{i=1}^{N}(\nabla^2 + K_1^{\,2})\Psi = 0$
G.S. Agarwal, A.J. Devaney and D.N. Pattanayak
J. Math. Phys. **14**, 908, 1973.

38. **New Method in the Theory of Surface Polaritons.**
G.S. Agarwal
Phys. Rev. B **8**, 4768-4779, 1973.

39. **Quantum Statistical Theory of Coherent Emission from a System of Multi-level Atoms.**
G.S. Agarwal
Phys. Lett. **45A**, 15-17, 1973.

40. **Radiation Reaction vs. Free Field.**
G.S. Agarwal
Phys. Rev. A **10**, 717-719, 1974.

41. **Coherence in Spontaneous Emission in Presence of a Dielectric.**
G.S. Agarwal
Phys. Rev. Lett. **32**, 703-706, 1974.

42. **Electromagnetic Fields in a Spatially Dispersive Medium.**
G.S. Agarwal and D.N. Pattanayak and E. Wolf
Phys. Rev. B **10**, 1447-1475, 1974.

43. **Quantum Electrodynamics in Presence of Dielectrics and Conductors-I.**
Electromagnetic Field Response Functions and Blackbody Fluctuations in Finite Geometries.
G.S. Agarwal
Phys. Rev. A **11**, 230-242,1975.

44. **Quantum Electrodynamics in Presence of Dielectrics and Conductors-II. Theory of Dispersion Forces.**
G.S. Agarwal
Phys. Rev. A **11**, 243-252, 1975.

45. Quantum Electrodynamics in Presence of Dielectrics and Conductors-III. Relations among One Photon Transition Probabilities in Stationary, Non-stationary Fields, Density of States, the Field Correlation Functions and Surface Dependent Response Functions.
G.S. Agarwal
Phys. Rev. A **11**, 253-264, 1975.

46. Structure of Electromagnetic Fields in Spatially Dispersive Media of Arbitrary Geometry.
G.S. Agarwal, D.N. Pattanayak and E. Wolf.
Phys. Rev. B **11**, 1342-1351, 1975.

47. Quantization of Surface Polariton Field and the Decay of an Atom in Presence of a Dielectric.
G.S. Agarwal
Opt. Commun. **13**, 375-379, 1975.

48. Scattering from Rough Surfaces.
G.S. Agarwal
Opt. Commun. **14,** 161-165, 1975.

49. Quantum Electrodynamics in Presence of Dielectrics and Conductors-IV.
General Theory for Spontaneous Emission in Finite Geometries.
G.S. Agarwal
Phys. Rev. A **12**, 1475-1497, 1975.

50. Some Aspects of Microreversibility for Open Systems.
G.S. Agarwal
Z. Physik B **22,** 177-180, 1975.

51. Comments on Bunching and Antibunching Effects in Thermal Beams
G.S. Agarwal
Z. Physik B **22**, 207-209, 1975.

52. Quantum Electrodynamics in Presence of Dielectrics and Conductors-V. The Extinction Theorem, Moment Theorem for Correlation Functions and Relativistic Aspects of Blackbody Fluctuations.
G.S. Agarwal
Phys. Rev. A **12**, 1974-1986, 1975.

53. Quantum Electrodynamics in Presence of Dielectrics and Conductors-VI. Theory of Lippmann Fringes.
G.S. Agarwal
Phys. Rev. A **12**, 1987-1992, 1975.

54. Coherence Matrices of Light Beams at Dielectric Interfaces and Goos-Hanchen Effect.
G.S. Agarwal
J. Opt. Soc. Am. **65,** 1475-1478, 1975.

55. Trapping Energy of Monopole in Magnetic Materials.
G.S. Agarwal and S.S. Jha
Pramana **6**, 349-362, 1976.

56. Integral Equation Treatment of Scattering from Rough Surfaces.
G.S. Agarwal
Phys. Rev. B **14,** 846-848, 1976.

57. Generalized Ewald-Oseen Extinction Theorem and the Integral Equation in Electromagnetic Scattering.
G.S. Agarwal
Opt. Commun. **18,** 238-241, 1976.

58. The Relation Between Waterman's Extended Boundary Condition and the Generalized Extinction Theorem.
G.S. Agarwal
Phys. Rev. D **14,** 1168-1171, 1976.

59. Superradiance from Three-level Systems in Atomic Coherent State Representation.
G.S. Agarwal andS.S. Trivedi
Opt. Commun. **18**, 417-420, 1976.

60. Exact Solution for the Influence of Laser Temporal Fluctuations on Resonance Fluorescence.
G.S. Agarwal
Phys. Rev. Lett. **37**, 1383-1386, 1976.

61. Time Factorization of Higher Order Intensity Correlation Functions in the Theory of Resonance Fluorescence.
G.S. Agarwal
Phys. Rev. A **15**, 814-816, 1977.

62. Interaction of Electromagnetic Waves at Rough Dielectric Surfaces.
G.S. Agarwal
Phys. Rev. B **15**, 2371-2383, 1977.

63. Surface Polariton Effect in SpontaneousEmissions.
G.S. Agarwal and H.D. Vollmer
Phys. Stat. Sol. **79(b),** 249-257, 1977.

64. **Collective Atomic Effects in Resonance Fluorescence.**
G.S. Agarwal, A.C. Brown, L.M. Narducci and G. Vemuri.
Phys. Rev. A **15**, 1613-1624, 1977.

65. **Quantum Beats in Correlation Functions of Spontaneously Emitted Radiation and Transition Rates of a Multi-level Atoms.**
G.S. Agarwal
Phys. Rev. A **15**, 2380-2391, 1977.

66. **Surface Polariton Effects in Spontaneous Emission-II. Effects of Spatial Dispersion.**
G.S. Agarwal and H.D. Vollmer
Phys. Stat. Solid, **85b**, 301-310, 1978.

67. **A Self-Consistent Approach to the Transport Equation for Moving Atoms in Interaction with Laser Fields.**
G.S. Agarwal
Opt. Commun. **24,** 285-288, 1978.

68. **Quantum Analysis of Optical Bistability and Spectrum of Fluctuations.**
L.M. Narducci, R. Gilmore, D.H. Feng and G.S. Agarwal
Opt. Lett. **2**, 88-90, 1978.

69. **Quantum Theory of Resonance Fluorescence with Recoil Effects.**
G.S. Agarwal and R. Saxena.
Opt. Commun. **26,** 202-206, 1978.

70. **Dynamical Approach to Steady State and Fluctuations in Optically Bistable Systems.**
G.S. Agarwal, L.M. Narducci, D.H. Feng and R. Gilmore.
Proc. Fourth Rochester Conference on "*Coherence on Quantum Optics*",
eds. L. Mandel and E. Wolf, Plenum Press, p.281-292 (1978)).

71. **Relationship between the Adiabatic Following Solutions of Bloch Equations and Solutions of Non-Markovian Pauli-type Master Equations.**
G.S. Agarwal
Phys. Rev. A **18**, 1618-1621, 1978.

72. **Quantum Statistical Theory of Optical Resonance Phenomena in Fluctuating Laser Fields.**
G.S. Agarwal
Phys. Rev. A **18**, 1490-1506, 1978.

73. **Theory of Heisenberg Ferromagnet in Spin Coherent State Representation.**
B.S. Shastry, G.S. Agarwal and I. Ramarao.
Pramana **11**, 85-99, 1978.

74. **Optical Bistability: A Self-Consistent Analysis of Fluctuations and the Spectrum of Scattered Light.**
G.S. Agarwal, L.M. Narducci, R. Gilmore and D.H. Feng.
Phys. Rev. A **18**, 620-634, 1978.

75. **Transient and Steady State Behavior of Collective Atomic Systems Driven by a Classical Field.**
L.M. Narducci, R. Gilmore, D.H. Feng and G.S. Agarwal
Phys. Rev. A **18**, 1571-1576, 1978.

76. **Absorption Spectra of Strongly Driven Two Level Atoms.**
G.S. Agarwal
Phys. Rev. A **19**, 923-926, 1979.

77. **Master Equations for Time Correlation Functions of a Quantum System Interacting with Stochastic Perturbations and Applications to Emission and Absorption Line Shapes.**
G.S. Agarwal
Z. PhysikB **33**, 111-124, 1979.

78. **Intensity Correlations of a Cooperative System.**
G.S. Agarwal, L.M. Narducci, D.H. Feng and R. Gilmore.
Phys. Rev. Letters **42**, 1260-1263, 1979.

79. **AC Stark Effect and Fluorescence in Modulated Laser Beams-I. Effect of Laser Fluctuations and Arbitrary Relaxation Parameters.**
R. Saxena and G.S. Agarwal
J. Phys. B **12,** 1939-1951, 1979.

80. **Theory of Resonant Raman Scattering in Intense Double Frequency Fields.**
G.S. Agarwal andS.S. Jha
J. Phys. B **12**, 2655-2673, 1979.

81. **Absorption Spectrum of Optically Bistable Systems.**
G.S. Agarwal, L.M. Narducci, D.H. Feng and R. Gilmore
Phys. Rev. A **20**, 545-549, 1979.

82. **Effect of Probe Field Strength and the Fluctuations of the Exciting Laser on the Asymmetry of Autler-Townes Doublet.**
G.S. Agarwal and P.A. Narayana

Optics, Commun. **30**, 364-368, 1979.

83. Coherent State Representation of the Spectrum of Scattered Light from a Co-operative System and Numerical Results.
G.S. Agarwal and L.M. Narducci, R. Gilmore, D.H. Feng and R.Tuft
Phys. Rev. A **20,** 2040-2046, 1979.

84. Absorption Spectra of a System of Atoms Under Co-operative Conditions
G.S. Agarwal and A. Suguna
Phys. Rev. A **20,** 2022-2028, 1979.

85. Anti-bunching Effects in Resonant Raman Scattering involving Laser Fields of Arbitrary Strengths.
G.S. Agarwal and S.S. Jha,
Z. Physik B **35,** 391-397, 1979.

86. Saturation Effects in Hyper-Raman Scattering and Other Resonant Three Photon Processes.
G.S. Agarwal
Optics Commun. **31**, 325-328, 1979.

87. Analytical Solution for the Spectrum of Resonance Fluorescence of a Co-operative System of Two Atoms and the Existence of Additional Side Bands.
G.S. Agarwal, R. Saxena, L.M. Narducci, D.H. Feng and R. Gilmore.
Phys. Rev. A **21**, 257-259, 1980.

88. AC Stark Effect and Fluorescence in Modulated Laser Beams-II. Two Photon Stepwise Excitations.
G.S. Agarwal and R. Saxena
J. Phys. B **13**, 453-467, 1980.

89. Fokker-Planck Approach to Optical Bistability:
G.S. Agarwal, D.H. Feng, R. Gilmore and L.M. Narducci
Phys. Rev. A **21**, 1029-1038, 1980.

90. Optical Bistability with Dispersion
G.S. Agarwal and S.P. Tewari
Phys. Rev. A **21**, 1638-1647, 1980.

91. Radiation Induced Bistability in Josephson Junctions.
G.S. Agarwal and S.R. Shenoy
Phys. Rev. Lett. **44**, 1524-1527, 1980.

92. Theory of Superfluorescence Beats
G.S. Agarwal, F. Haake and G. Schröder
Optics Commun. **34**, 283-286, 1980.

93. Stimulated Raman Scattering in Chaotic Fields
G.S. Agarwal
Optics Commun. **35**, 267-270, 1980.

94. Bistability in Coherent Two Photon Processes
G.S. Agarwal
Optics Commun. **35**, 149-152, 1980.

95. Co-operative Effects in Optical Double Resonance
G.S. Agarwal and P. Anantha Lakshmi
Optics Commun. **35**, 461-464, 1980.

96. Non-equilibrium Phase Transitions in a Radiation Driven Josephson Junction.
G.S. Agarwal and S.R. Shenoy
Phys. Rev. B **23**, 1977-1987, 1981.

97. Bistability in Irradiated Josephson Junctions
G.S. Agarwal
S.R. Shenoy, in *"Optical Bistability"*, eds. C.M. Bowden, M. Ciftan and H.R. Robl, Plenum, pp. 85-92, 1981.

98. Frequency Modulated Spectra of Coherently Driven Systems
G.S. Agarwal
Phys. Rev. A **23**, 1375-1381, 1981.

99. Effects of Dispersion Forces in Optical Resonance Phenomena
G.S. Agarwal, L.M. Narducci and E. Apostolidis
Optics. Commun. **36**, 285-289, 1981.
Also in Proceedings of the International Conference *"Laser 1980",* ed. C.B. Collins, pp. 767-776 (STS Press, McLean, VA (1981)).

100. Observability of Hysteresis in First Order Equilibrium and Non-Equilibrium Phase Transitions.
G.S. Agarwal and S.R. Shenoy
Phys. Rev. A **23**, 2719-2723, 1981.

101. Optical Hanle Effect in Fields of Arbitrary Strength and Bandwidth.
G.S. Agarwal and P. Anantha Lakshmi
Phys. Rev. A **23**, 2553-2562, 1981.