Julio R. Gea-Banacloche

Curriculum Vitae (December 2018)

**Address:**

Department of Physics

University of Arkansas

Fayetteville, AR 72701

**Personal data:**

Date and place of birth: May 29, 1957, Seville (Spain)

Visa status: U.S. citizen

**Education:**

Ph.D. (Physics) : University of New Mexico, December 1985. Dissertation advisor, Prof. M. O. Scully. Dissertation title: Quantum Theory of the Free-Electron Laser.

Graduate School, Aug. 1981 to Dec. 1985, University of New Mexico; Oct. 1979 to June 1981, Universidad Autónoma de Madrid, Spain.

Previous degree: Licenciado en Ciencias Físicas, Universidad Autónoma de Madrid (1980).

**Main research field:** Quantum Information/Quantum Optics/Laser Physics (theoretical).

**Past research areas:** Free-electron lasers, ring laser gyros, quantum noise in high-precision interferometry (including gravitational-wave detection), correlated emission lasers, squeezed states.

**Current interests:** Quantum computers. Quantum-classical correspondence in quantum optics and cavity quantum electrodynamics, including: semiclassical dynamics, decoherence, macroscopic quantum superpositions, and pure quantum-field effects.

**Special skills:** Familiarity with several computer languages, including Java and C (also some Fortran and Objective-C). Experience programming graphical interfaces on MacOS.

Fluent in English and Spanish, can read French and Italian, some knowledge of German and Japanese.

**Impact metrics** (all data according to Google Scholar, December 10, 2018)

Citations: 6347 (total). Since 2013: 1748

h-index: 34

**Work experience:**

August 2000—present: Professor (Physics) at the University of Arkansas, Fayetteville.

July 2011—June 2017: Chair, Department of Physics, University of Arkansas at Fayetteville

October 2000—September 2012: Associate Editor, Physical Review A (section: Quantum Information)

August 1994—July 2000: Associate Professor (Physics) at the University of Arkansas, Fayetteville.

January 1990—June 1994: Assistant Professor (Physics) at the University of Arkansas, Fayetteville.

May 1988—June 1991: Staff Researcher at the Instituto de Optica, Consejo Superior de Investigaciones Científicas, Madrid (Spain). (On leave of absence from Jan. 1990 through June 1991.)

August 1987—May 1988: Visiting Assistant Professor at Miami University, Oxford, Ohio.

June 1986—August 1987: Visiting Scientific Collaborator at the Max-Planck Institut für Quantenoptik, Munich.

January 1985—May 1986: Research Associate at the Center for Advanced Studies, University of New Mexico.

January 1982—December 1985: Research Assistant with the Institute for Modern Optics, University of New Mexico.

August 1981—December 1981: Graduate Assistant at the Department of Physics, University of New Mexico.

January 1979—August 1981: Graduate Research Fellowship from the Spanish Government. Work at the Universidad Autónoma de Madrid and at the Istituto Nazionale di Ottica in Florence (Italy).

September 1978—December 1980: Teaching Assistant in the Department of Physics, Universidad Autónoma de Madrid.

**Publications:**

**(A) In refereed journals:**

1. “[Analytical results for a conditional phase shift between single-photon pulses in a nonlocal nonlinear medium](https://journals.aps.org/pra/abstract/10.1103/PhysRevA.97.032314)”, Balakrishnan Viswanathan and Julio Gea-Banacloche, Phys. Rev. A **97**, 032314 (2018).
2. “[One- and two-photon scattering by two atoms in a waveguide](https://journals.aps.org/pra/abstract/10.1103/PhysRevA.96.063826)” William Konyk and Julio Gea-Banacloche, Phys. Rev. A **96**, 063826 (2017).
3. “Two-level-atom excitation probability for single- and N-photon wave packets,” Hemlin Swaran Rag and Julio Gea-Banacloche, Phys. Rev. A **96**, 033817 (2017).
4. “Quantum multimode treatment of light scattering by an atom in a waveguide,” William Konyk and Julio Gea-Banacloche, Phys. Rev. A **93**, 063807 (2016).
5. “Two photons co- and counterpropagating through N cross-Kerr sites,” Daniel J. Brod, Joshua Combes, and Julio Gea-Banacloche, Phys. Rev. A **94**, 023833 (2016).
6. “Multimode analysis of a conditional phase gate based on second-order nonlinearity,” Balakrishnan Viswanathan and Julio Gea-Banacloche, Phys. Rev. A **92**, 042330 (2015).
7. “Wavefunction exchange and entanglement in one-dimensional collisions,” Hemlin Swaran Rag and Julio Gea-Banacloche, Am. J. Phys. **83**, 305 (2015).
8. “Conditional phase gate using an optomechanical resonator,” J. Gea-Banacloche and Nikolett Német, Phys. Rev. A **89**, 052327 (2014).
9. “Oscillator tunneling dynamics in the Rabi model,” E. K. Irish and J. Gea-Banacloche, Phys. Rev. B, **89**, 085421 (2014)
10. “Photon subtraction and addition by a three-level atom in an optical cavity,” Julio Gea-Banacloche and William Wilson, Phys. Rev. A **88**, 033832 (2103).
11. “Space-time descriptions of quantum fields interacting with optical cavities,” Julio Gea-Banacloche, Phys. Rev. A **87**, 023832 (2013).
12. “Single-photon, cavity-mediated gates: Detuning, losses, and nonadiabatic effects,” Julio Gea-Banacloche and Leno M. Pedrotti, Phys. Rev. A **86**, 052311 (2012).
13. “Simple model to estimate the contribution of atmospheric CO2 to the Earth’s greenhouse effect,” Derrek J. Wilson and J. Gea-Banacloche, Am. J. Phys. **80**, 306-315 (2012).
14. “Comparative model study of two-photon deterministic passive quantum logical gates,” J. Gea-Banacloche and Leno M. Pedrotti, Phys. Rev. A **83**, 042333 (2011).
15. “Understanding cavity resonances with intracavity dispersion properties,” J. Sheng, H. Wu, M. Mumba, J. Gea-Banacloche, and Min Xiao, Phys. Rev. A **83**, 023829 (2011).
16. “Impossibility of large phase shifts via the giant Kerr effect with single-photon wave packets,'' J. Gea-Banacloche, Phys. Rev. A **81**, 043823 (2010).
17. “Energy constraints for quantum logic via nonlinear optical processes,” J. Gea-Banacloche, Opt. Commun. **283**, 719–723 (2010).
18. “Splitting of atom-cavity polariton peaks for three-level atoms in an optical cavity,” Haibin Wu, J. Gea-Banacloche, and Min Xiao, Phys. Rev. A **80**, 033806 (2009).
19. “Gate fidelity of arbitrary single-qubit gates constrained by conservation laws,” Tokishiro Karasawa, Julio Gea-Banacloche, and Masanao Ozawa, J. Phys. A: Math. Theor. **42** (2009) 225303.
20. “Evidence of lasing without inversion in a hot rubidium vapor under electromagnetically-induced-transparency conditions,” Haibin Wu, Min Xiao, and J. Gea-Banacloche, Phys. Rev. A **78**, 041802 (2008).
21. “Quantum logic with quantized control fields beyond the 1/n limit: Mathematically possible, physically unlikely,” Julio Gea-Banacloche and Mayo Miller, Phys. Rev. A **78**, 032331 (2008).
22. “Transmission spectrum of Doppler-broadened two-level atoms in a cavity in the strong-coupling regime,” J. Gea-Banacloche, Haibin Wu, and Min Xiao, Phys. Rev. A **78**, 023828 (2008).
23. “Observation of Intracavity Electromagnetically Induced Transparency and Polariton Resonances in a Doppler-Broadened Medium,” Haibin Wu, J. Gea-Banacloche, and Min Xiao, Phys. Rev. Lett. **100**, 173602 (2008).
24. “Minimum-energy pulses for quantum logic cannot be shared,” J. Gea-Banacloche and M. Ozawa, Phys. Rev. A **74**, 060301(R) (2006).
25. “Adiabatic geometric phase gate with a quantized control field,” S. Siddiqui and J. Gea-Banacloche, Phys. Rev. A **74**, 052337 (2006).
26. “Optical switching in arrays of quantum dots with dipole-dipole interactions,” J. Gea-Banacloche, Mambwe Mumba and Min Xiao, Phys. Rev. B **74**, 165330 (2006).
27. “Steady State Entanglement in Cavity QED,” P. R. Rice, J. Gea-Banacloche, M. L. Terraciano, D. L. Freimund and L. A. Orozco, Optics Express **14**, Issue 10, pp. 4514-4524 (May 2006).
28. “Two-reservoir model of quantum error correction,” James P. Clemens and Julio Gea-Banacloche, Phys. Rev. A **73**, 022337 (2006).
29. “Mean-field treatment of the damping of the oscillations of a one-dimensional Bose gas in an optical lattice,” Julio Gea-Banacloche, Ana María Rey, Guido Pupillo, Carl J. Williams, and Charles W. Clark, Phys. Rev. A **73**, 013605 (2006).
30. “Effects of random localizing events on matter waves: formalism and examples,” Julio Gea-Banacloche, J. Phys. B: At. Mol. Opt. Phys. **39**, 69-84 (2006).
31. “Quantum version of the Szilard one-atom engine and the cost of raising energy barriers,“ Julio Gea-Banacloche and Harvey S. Leff, Fluctuation and Noise Letters **5**, n 4, p C39-C47 (2005).
32. “Dynamics of a two-level system strongly coupled to a high-frequency quantum oscillator,” E.K. Irish, J. Gea-Banacloche, I. Martin and K.C. Schwab, Phys. Rev. B **72**, 195410 (2005).
33. “Future directions in electronic computing and information processing,'” J. Gea-Banacloche and L. B. Kish, Proceedings of the IEEE, **93**, no. 10, p. 1858-63 (2005)
34. “A comparison of decoherence-free subsystem/subspace for partially broken symmetry,” S. Siddiqui and J. Gea-Banacloche, Quantum Information and Computation **5**, 573-582 (2005).
35. “Constraints for quantum logic arising from conservation laws and field fluctuations,” J. Gea-Banacloche and M. Ozawa, J. Opt. B.: Quantum Semiclass. Opt. **7**, S326-S332 (2005)
36. “Entangled and Disentangled Evolution for a Single Atom in a Driven Cavity,” J. Gea-Banacloche, T. C. Burt, P. R. Rice, and L. A. Orozco, Phys. Rev. Lett. **94**, 053603 (2005).
37. “Quantum error correction against correlated noise,” J. P. Clemens, S. Siddiqui, and J. Gea-Banacloche, Phys. Rev. A **69**, 062313 (2004).
38. “Comparison of energy requirements for classical and quantum information processing,” J. Gea-Banacloche and L. B. Kish, Fluctuation and Noise Letters, **3**, C3-C7 (2003)
39. Reply II to ``Comment on `Some implications of the quantum nature of laser fields for quantum computations' '' J. Gea-Banacloche, Phys. Rev. A **68**, 046303 (2003)
40. “Addendum: Extracting an entangled state of *n-t* qubits from an *n*-qubit entangled state after errors at *t* sites,” M. A. Teplitsky and J. Gea-Banacloche, Phys. Rev. A **67**, 014307 (2003)
41. “Minimum energy requirements for quantum computation,” J. Gea-Banacloche, Phys. Rev. Lett. **89**, 217901 (2002)
42. “Hiding messages in quantum data,” J. Gea-Banacloche, J. Math. Phys. **43**, 4531-4536 (2002)
43. “Splitting the wavefunction of a particle in a box,” J. Gea-Banacloche, Am. J. Phys. **70**, 307-312 (2002)
44. “CEL gyroscope with injected squeezed vacuum,” J. A. Bergou, J. Gea-Banacloche and M. O. Scully, J. mod. Optics, **49**, 453-463 (2002).
45. “Some implications of the quantum nature of laser fields for quantum computations,” J. Gea-Banacloche, Phys. Rev. A **65**, 022308 (2002).
46. “Teleportation of rotations and receiver-encoded secret sharing,” C. P. Yang and J. Gea-Banacloche, J. Opt. B: Quantum Semiclass. Opt. **3**, 407-411 (2001).
47. “Extracting an entangled state of *n-t* qubits from an *n*-qubit entangled state after errors at *t* sites,” C. P. Yang and J. Gea-Banacloche, Phys. Rev. A **64**, 032309 (2001).
48. “Two-state system driven by imperfect π pulses: an estimate of the error accumulation in bang-bang control methods,” J. Gea-Banacloche, J. mod. Optics, **48**, 927-934 (2001).
49. “A method to protect quantum entanglement against certain kinds of phase and exchange errors,” C.-P. Yang and J. Gea-Banacloche, J. Opt. B: Quantum Semiclass. Opt. **3**, S30-S33 (2001).
50. “A three-qubit quantum error-correction scheme for collective decoherence,” C.-P. Yang and J. Gea-Banacloche, Phys. Rev. A **63**, 022311 (2001).
51. “Error correction for mutually interacting qubits,” J. Gea-Banacloche, Phys. Rev. A **62**, 062313 (2000).
52. “A bouncing wavepacket: finite wall and resonance effects,” J. Gea-Banacloche, Opt. Commun. **179**, 117 (2000).
53. “Quantum codes and macroscopic superpositions,” J. Gea-Banacloche, Phys. Rev. A **61**, 022302 (2000).
54. “A quantum bouncing ball,” J. Gea-Banacloche, Am. J. Phys., **67**, 776 (1999).
55. “Qubit-qubit interaction in quantum computers. II: Adder algorithm with diagonal and offdiagonal interactions,” J. Gea-Banacloche, Phys. Rev. A., **60**, 185 (1999).
56. “Comment on ‘Optical coherence: A convenient fiction’,” J. Gea-Banacloche, Phys. Rev. A **58**, 4244 (1998).
57. “Emergence of classical radiation fields through decoherence in the Scully-Lamb laser model,” J. Gea-Banacloche, Foundations of Physics, **28**, 531 (1998).
58. “Qubit-qubit interaction in quantum computers,” J. Gea-Banacloche, Phys. Rev. A **57**, R1-R4 (1998).
59. “Reply to “Comment on ‘Quantum suppresion of chaos in the spin boson model’”,” G. A. Finney and J. Gea-Banacloche, Phys. Rev. E **56**, 2329-2330 (1997).
60. "Quantum suppresion of chaos in the spin-boson model," G. A. Finney and J. Gea-Banacloche, Phys. Rev. E **54**, 1449-1456 (1996).
61. "Analytic quantum-trajectory results for fluorescent atom in lossless cavity," T. C. Burt and J. Gea-Banacloche, Quantum Semiclass. Opt. **8**, 105-119 (1996).
62. "Schrödinger modal structure of cubical, pyramidal and conical evanescent light-wave gravitational atom traps," J. P. Dowling and J. Gea-Banacloche, Phys. Rev. A **52**, 3997 (1995).
63. "Electromagnetically-induced transparency in ladder-type, inhomogeneously-broadened media: theory and experiment," Julio Gea-Banacloche, Yong-qing Li, Shao-zheng Jin, and Min Xiao, Phys. Rev. A **51**, 576—584 (1995).
64. "Measurement of dispersive properties of electromagnetically induced transparency in rubidium atoms," Min Xiao, Yong-qing Li, Shao-zheng Jin and Julio Gea-Banacloche, Phys. Rev. Lett. **74**, 666—669 (1995).
65. "Laser with injected squeezed vacuum: Phase diffusion and intensity fluctuations," P. R. Rice, X. Yin, J. Walden, J. Gea-Banacloche, L. M. Pedrotti and J. E. Mullen, Phys. Rev. A **50**, 4176—4187 (1994).
66. "Quasiclassical approximation for the spin-boson Hamiltonian with counterrotating terms," G. A. Finney and J. Gea-Banacloche, Phys. Rev. A **50**, 2040—2052 (1994).
67. "Squeezing in the Jaynes-Cummings model for large coherent fields," C. W. Woods and J. Gea-Banacloche, J. Mod. Opt. **40**, 2361—2379 (1993)
68. "Jaynes-Cummings model with quasiclassical fields: The effect of dissipation," J. Gea-Banacloche, Phys. Rev. A, **47**, 2221—2234 (1993).
69. "Loss of state purity and regularity in the Jaynes-Cummings model," J. Gea-Banacloche, Phys. Rev. A **46**, 7307—7310 (1992).
70. "A new look at the Jaynes-Cummings model for large fields: Bloch sphere evolution and detuning effects," J. Gea-Banacloche, Opt. Commun. **88**, 531—550 (1992).
71. "The specular reflection of light off light," J. P. Dowling and J. Gea-Banacloche, Am. J. Phys., **60**, 28—34 (1992).
72. "Atom- and field-state evolution in the Jaynes-Cummings model for large initial fields," J. Gea-Banacloche, Phys. Rev. A, **44**, 5913—5931 (1991).
73. "Collapse and revival of the state vector in the Jaynes-Cummings model: an example of state preparation by a quantum apparatus," J. Gea-Banacloche, Phys. Rev. Lett. **65**, 3385 (1990).
74. "Theory of the two-photon micromaser: Photon statistics," Imrana Ashraf, J. Gea-Banacloche and M. S. Zubairy, Phys. Rev. A **42**, 6704 (1990).
75. "Linewidth of a laser with a squeezed reservoir," Ch. Ginzel, J. Gea-Banacloche, and A. Schenzle, Phys. Rev. A. **42**, 4164 (1990).
76. "Influence of pump phase fluctuations on the squeezing in a degenerate parametric oscillator," J. Gea-Banacloche and M. S. Zubairy, Phys. Rev. A **42**, 1742 (1990).
77. "Phase-sensitive amplification in a three-level atomic system," N. A. Ansari, J. Gea-Banacloche and M. S. Zubairy, Phys. Rev. A **41**, 5179 (1990).
78. "Treatment of the spectrum of squeezing based on the modes of the universe. I. Theory and a physical picture," J. Gea-Banacloche, Ning Lu, L. M. Pedrotti, S. Prasad, M. O. Scully, and K. Wodkiewicz, Phys. Rev. A **41**, 369 (1990).
79. "Treatment of the spectrum of squeezing based on the modes of the universe. II. Applications" J. Gea-Banacloche, Ning Lu, L. M. Pedrotti, S. Prasad, M. O. Scully, and K. Wodkiewicz, Phys. Rev. A **41**, 381 (1990).
80. "Squeezed states in nonideal interferometers: the effect of aberrations," J. Gea-Banacloche and G. Leuchs, J. Mod. Opt. **36**, 1277 (1989).
81. "Two-photon absorption of nonclassical light," J. Gea-Banacloche, Phys. Rev. Lett. **62**, 1603 (1989).
82. "Emission spectra of an atom in a cavity in the presence of a squeezed vacuum," J. Gea-Banacloche, R. R. Schlicher and M. S. Zubairy, Phys. Rev. A **38**, 3514 (1988).
83. "Soft X-ray free-electron laser with a laser undulator," J. Gea-Banacloche, G. T. Moore, R. R. Schlicher, M. O. Scully and H. Walther, IEEE J. Quantum Elect. QE-**23**, 1558 (1987).
84. "Applying squeezed states to nonideal interferometers," J. Gea-Banacloche and G. Leuchs, J. Opt. Soc. Am. B **4**, 1667 (1987).
85. "Squeezing of spontaneous emission in a laser," J. Gea-Banacloche, Phys. Rev. Lett. **59**, 543 (1987).
86. "Squeezed states for interferometric gravitational wave detectors," J. Gea-Banacloche and G. Leuchs, J. Mod. Opt. **34**, 793 (1987).
87. "Passive versus active interferometers: why cavity losses make them equivalent," J. Gea-Banacloche, Phys. Rev. A **35**, 2518 (1987).
88. "Gravity wave detection via correlated spontaneous emission lasers," M. O. Scully and J. Gea-Banacloche, Phys. Rev. A **34**, 4043 (1986).
89. "Influence of phase fluctuations on the measurement of the frequency of a laser," J. Gea-Banacloche, M. O. Scully and D. Z. Anderson, Opt. Commun. **57**, 67 (1986).
90. "Intrinsic linewidth of a free-electron laser," W. Becker, J. Gea-Banacloche and M. O. Scully, Phys. Rev. A **33**, 2174 (1986).
91. "Steady state photon statistics of a free-electron laser," J. Gea-Banacloche, Phys. Rev. A **33**, 1448 (1986).
92. "Quantum theory of the free-electron laser: large gain, saturation, and photon statistics," J. Gea-Banacloche, Phys. Rev. A **31**, 1607 (1985).
93. "The ring laser gyro," W. W. Chow, J. Gea-Banacloche, L. M. Pedrotti, V. Sanders, W. Schleich and M. O. Scully, Rev. Mod. Phys., **57**, 61 (1985).
94. "Laser cavity dumping using optical bistability," J. Gea-Banacloche, W. W. Chow and M. O. Scully, Opt. Commun. **46**, 43 (1983).
95. "Energy loss by slow magnetic monopoles," J. Gea-Banacloche, K. Cahill, D. Rossbach and A. Comtet, Lett. Nuovo Cimento **37**, 145 (1983).
96. "Bistable limit cycles in a model for a laser with a saturable absorber," J. C. Antoranz, L. L. Bonilla, J. Gea and M. G. Velarde, Phys. Rev. Lett. **49**, 35 (1982).
97. "Oscillatory phenomena and Q-switching in a model for a laser with a saturable absorber," J. C. Antoranz, J. Gea and M. G. Velarde, Phys. Rev. Lett. **47**, 1895 (1981).
98. "A heuristic derivation of the time-dependent properties of a free-electron laser," F. T. Arecchi, J. Gea and F. Romanelli, Opt. Commun. **36**, 144 (1981).
99. "Multiplicity of steady states in heterogeneous catalysis: the case of Langmuir's n-th order kinetics," J. R. Gea and J. L. Ibáñez, J. Chem. Phys. **75**, 1538 (1981).

**(B) In conference proceedings volumes (partial list).**

1. “Entanglement and fluctuations in cavity quantum electrodynamics,” J. Gea-Banacloche, T. C. Burt, P. R. Rice and L. A. Orozco, in *Fluctuations and Noise in Photonics and Quantum Optics III*, edited by P. R. Hemmer, J. Gea-Banacloche, P. Heszler, Sr., and M. S. Zubairy, proceedings of SPIE vol. 5842 (SPIE, Bellingham, WA, 2005) p. 44-52.
2. “Quantum error correction for various forms of noise (Keynote Paper),” J. Gea-Banacloche and J. P. Clemens, in Proceedings of the SPIE, vol. 5468 (Proceedings of the Conference on Fluctuations and Noise in Photonics and Quantum Optics II), edited by P. Heszler, D. Abbott, J. Gea-Banacloche and P. R. Hemmer, p. 252-261 (2004).
3. “Energy requirements for quantum computation (Keynote Paper),” J. Gea-Banacloche, in Proceedings of the SPIE, vol. 5155 (Proceedings of the Conference on Noise and Information in Nano-electronics, Sensors, and Standards),, edited by L. B. Kish, F. Green, G. Iannaccone and J. R. Vig, p. 154-166 (2003).
4. “Quantum constraints on quantum error correction with laser pulses,” J. Gea-Banacloche, talk presented at the International Conference on Quantum Information (ICQI 2001), Rochester, NY, June 13–16, 2001. (to appear in the proceedings volume)
5. "Qubit-qubit interaction in quantum computers: errors and scaling laws," J. Gea Banacloche, in *Photonic Quantum Computing II*, Steven P. Hotaling, Andrew R. Pirich, Editors, Proceedings of SPIE Vol. 3385, 64-71 (1998).
6. "Conditioned density matrix treatment of fluorescent atom in quasiclassical field," T. C. Burt and J. Gea-Banacloche, in *Proceedings of 7th Rochester conference on Coherence and Quantum Optics*, (1995) Edited by L. Mandel and E. Wolf.
7. "The Schrödinger cat in the Jaynes-Cummings model," J. Gea-Banacloche, in *Foundations of Quantum Mechanics*, edited by T. D. Black et al (1991 Santa Fe Conference Proceedings, World Scientific, 1992).
8. "Statistical properties of a laser with a squeezed reservoir," Ch. Ginzel, J. Gea-Banacloche and A. Schenzle, Acta Phys. Pol. A78, 123 (1990).
9. "Collapse and recreation of the state vector in quantum mechanics," J. Gea-Banacloche, in *New Frontiers in Quantum Electrodynamics and Quantum Optics*, ed. by A. O. Barut, 531 (Plenum Press, New York, 1990).
10. "Squeezed states of light," M. H. Muendel, G. Wagner, J. Gea-Banacloche and G. Leuchs, in *Gravitational Wave Data Analysis*, ed. by B. F. Schutz, 135 (Kluwer Academic Publishers, 1989).
11. "Laser coupled to a squeezed-loss reservoir," J. Gea-Banacloche and L. M. Pedrotti, in *Proceedings of the International Conference on Lasers '88*.
12. "Proposal for a compact FEL with electromagnetic-wave undulator," J. Gea-Banacloche, G. T. Moore, R. R. Schlicher, M. O. Scully and H. Walther, J. Nucl. Inst. Meth. A 272, 199 (1988).
13. "Vacuum fluctuations and spontaneous emission in quantum optics," J. Gea-Banacloche, M. O. Scully and M. S. Zubairy, Physica Scripta T21, 81 (1988).
14. "Tests of general relativity and the correlated emission laser," J. Gea-Banacloche, W. Schleich and M. O. Scully, in *Laser Spectroscopy VIII*, ed. by W. Persson and S. Svanberg, 139 (Springer, Berlin, 1987).
15. "Quantum noise quenching in correlated spontaneous emission lasers, and their application to high-precision measurements," J. Gea-Banacloche and M. O. Scully, in *Quantum Optics*, ed. by J. D. Harvey and D. F. Walls (Springer, Berlin, 1986).
16. "Quantum theory of the free-electron laser," W. Becker, J. Gea-Banacloche, J. K. McIver and M. O. Scully, in *International Conference on Insertion devices for Synchrotron Sources*, ed. by R. Tatchyn and I. Lindau. Proceedings SPIE, 582, 318 (1986).
17. "Quantum theory of the free-electron laser in the laboratory frame," J. Gea-Banacloche and M. O. Scully, J. Nucl. Inst. Meth. A 237, 100 (1985).
18. "Phase transition analogies: magnets, lasers and fluid flows," J. Gea-Banacloche, M. O. Scully and M. G. Velarde, in *Nonequilibrium Cooperative Phenomena in Physics and Related Fields*, ed. by M. G. Velarde, 25 (Plenum, New York, 1984).
19. "Free-electron lasers in the x-ray region," J. Gea-Banacloche, G. T. Moore and M. O. Scully, in *Free-Electron Generation of Extreme Ultraviolet Coherent Radiation*, ed. by J. M. J. Madey and C. Pellegrini. AIP Conference Proceedings, 118, 161 (1984).
20. "Prospects for an x-ray free-electron laser," J. Gea-Banacloche, G. T. Moore and M. O. Scully, in *Free-Electron Generators of Coherent Radiation*, ed. by C. A. Brau, S. F. Jacobs and M. O. Scully. Proceedings SPIE, 453, 393 (1984).

**(C) Book chapters:**

• “Optical Realizations of Quantum Teleportation,” *Progress in Optics*, vol. 46, Ch. 4, edited by E. Wolf (Elsevier 2004).

• "Evanescent Light-Wave Atom Mirrors, Resonators, Waveguides, and Traps," with J. P. Dowling, in *Advances in Atomic, Molecular and Optical Physics*, volume 37.

• Sections 15-5 through 15-8 of the book *The Detection of Gravitational Waves* (Cambridge University Press, 1991), edited by D. G. Blair. Co-authored with G. Leuchs.

**(D) Internet:**

* Kinetic Theory Pages: <https://jgeabana.hosted.uark.edu/kinth/> These pages include a couple of Java applets to visualize irreversible dynamics of an ideal gas and the approach to thermal equilibrium.
* Scatter plots of hydrogen atom wavefunctions: <https://jgeabana.hosted.uark.edu/orbitals/> (also requires a Java-enabled browser).

**Grants and Fellowships:**

National Science Foundation “Study of passive, cavity-mediated gates for deterministic quantum logic with single photons,” 2011-2014, P.I. (year 1: $72,327; year 2: $74,711; year 3: $77,201; total: $224,239).

National Science Foundation, “Minimum energy requirements for quantum logic,” 2006-2009, P.I. $55,355 (1st year), $55,783 (2nd year), $74,224 (3rd year), $185,362 (total).

ARO (Army Research Office) DEPSCoR grant, “Low-Power, Ultrafast Optical Switches Based on Coherence Optical Effects in Arrayed Semiconductor Nanostructures” P.I.: Min Xiao, Co-P.I.s: Greg Salamo and Julio Gea-Banacloche, $339,797, July 2005-2008.

ARO (Army Research Office) EPSCoR grant. 2002-2005. Title: “Quantum error correctionin the presence of environmental noise.” P.I. Amounts awarded: first year, $70,649; 2nd year, $117,116; 3rd year, $120,461; total, $308,225.

ARO (Army Research Office) EPSCoR grant. 1999-2002. Title: “Impact of internal interactions on the performance of large-scale quantum computers.” P.I. Amounts awarded: first year, $49,670; 2nd year, $42,932; 3rd year, $54,503; total, $147,106.

NSF, 1998-2001 “Physics Of Quantum Computing,” P.I. Amounts awarded: 1st year, $51,650; 2nd year, $51,650; 3rd year, $51,650, total: $154,950.

NSA (National Security Agency), 1997-1998. Title: “Decoherence in Candidate Quantum-Computing Systems.” P.I. Amount awarded: $27,929.

NSF, grant PHY-9317528, 3 years (1994-1997). Title: "Cavity Quantum Electrodynamics and the Quantum-Classical Correspondence." P.I.: J. Gea-Banacloche. Amounts awarded: $54,463 (first year), $45,209 (second year), $47,107 (third year), $146,779 (cumulative).

Research Grant from the Arkansas Science and Technology Authority for academic year 1990—91. Title of project: "Coherence in Open Quantum Systems." Amount awarded, $33,972. Principal investigator, J. Gea-Banacloche.

Fellowship from the Spanish "Consejo Superior de Investigaciones Científicas" and the German Max-Planck Gesselschaft, Visiting Scientist Program, 1989

Graduate Research Fellowship of the Ministery of Universities and Research (Spain), 1980—1981

**Honors and Awards:**

Fellow of the American Physical Society Society (Division of Atomic, Molecular and Optical Physics), since November of 2004. The citation states: “For his contributions to the understanding of Quantum-mechanical effects in the interaction of light with matter, and for his valuable service to the physics community as an associate editor of Physical Review A.”

"LASERS '88" award for best contributed paper to the International Conference on Lasers 1988 (Lake Tahoe, Nevada).

Tom L. Popejoy Award to the best dissertation in Science at the University of New Mexico in the period 1983—1985.

UNM Chapter of Sigma Xi Outstanding Dissertation Award, 1985.

"Premio extraordinario de fin de carrera," Universidad Autónoma de Madrid, 1980; for the highest GPA among the science graduates in the class of 1979.

**Recent Invited Talks:**

J. Gea-Banacloche, “Quantum error correction for interaction-induced errors,” invited talk at the Special Session on Quantum Information Theory of the 952nd American Mathematical Society Meeting, University of Massachusetts, Lowell (April 12, 2000)

J. Gea-Banacloche, “Quantum logic with quantum controls,” invited talk at the Quantum Information Theory Workshop, organized by the Dublin Institute of Technology (Dublin, Ireland, March 21-23, 2002). This talk, in PowerPoint format, is available on the web at <http://www.cnri.dit.ie/presentations.html>; the full URL is

<http://www.cnri.dit.ie/Downloads/Geabanacloche_2002_CNRI.ppt>

J. Gea-Banacloche, “Some quantum-optical perspectives on decoherence in quantum computers,” invited talk at the 2002 QELS (Quantum Electronics and Laser Science Conference), Long Beach, California, May 19-24, 2002.

Invited to “Quantum Information in Group IV Semiconductors” workshop, to be held for two days, March 28-29, 2003, in Oxnard, California, “a very small workshop by invitation only, for the purpose of making decisions on where the field goes from here.” (Organizers: Bruce Kane, Henry Everitt, and Eli Yablonovitch)

Invited speaker at the 2003 SPIE Symposium on Fluctuations and Noise, 1–4 June 2003, Santa Fe, New Mexico (Noise and Information in Nano-electronics, Sensors, and Standards--NINS 2003): “Energy requirements for quantum computation (Keynote Paper),” J. Gea-Banacloche, in Proceedings of the SPIE, vol. 5155.

Invited speaker at the second SPIE International Symposium on “Fluctuations and Noise,” Gran Canaria, Spain, 26-28 May 2004: “Quantum error correction for various forms of noise,” J. Gea-Banacloche and J. P. Clemens, Proc. SPIE vol. **5468**, 252 (keynote paper).

Invited talk at the Princeton-TAMU Bose-Einstein Condensation Symposium (October 14-15, 2005, Princeton University): “Damping of matter-wave currents in lattices due to "localizing" processes,” J. Gea-Banacloche.

Invited talk presented at the Conference on Fluctuations and Noise in Photonics and Quantum Optics III, part of the 3rd SPIE Symposium on Fluctuations and Noise (May 24-26, 2005, Austin, Texas): “Entanglement and fluctuations in cavity quantum electrodynamics,” J. Gea-Banacloche, T. C. Burt, P. R. Rice and L. A. Orozco.

Invited talk at the Second Nagoya Winter Workshop on Quantum Information, Measurement, and Foundations,14-18 February 2011, Nagoya University, Japan: “Energy constraints for quantum logic.”

**Other:**

Editorial Board Member, American Journal of Physics (since January 2016).

Member of organizing committee for the 2006 QELS (Quantum Electronics and Laser Science) Conference (Subcommittee 02: Quantum Information).

Co-chair of the conference “Fluctuations and Noise in Photonics and Quantum Optics,” in the second SPIE International Symposium on “Fluctuations and Noise,” Gran Canaria, Spain, 26-28 May 2004.

Member of the Quantum Optics organizing committee for the 1994 IQEC (International Quantum Electronics Conference).

**Professional Organizations:**

American Physical Society

Sigma Xi

**Referee:**

Physical Review A, Physical Review Letters, Journal of the Optical Society of America B, Physics Letters A, Optics Communications, Journal of Modern Optics, American Journal of Physics, Quantum and Semiclassical Optics.