SILVINA MARIA GATICA

SUMMARY

My scientific work is mainly focused on Condensed Matter Theory and Computer Simulations, with emphasis on problems related to matter in the nanometer-scale. My work has been published in top journals (Phys. Rev, Rev. Mod. Phys., etc.), with more than 1,000 citations. I have directed three PhD and one M.S. thesis and taught physics at the University of Buenos Aires, the Pennsylvania State University and currently at Howard University.

CONTACT INFORMATION:

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EDUCATION

University of Buenos Aires, Argentina:

1996	Ph.D. in Physical Sciences. Advisor: Dr. S. Hernández. Thesis: Quantum dissipative maps subjected to periodic perturbations.
1988	B.A. in Physical Sciences.

ACADEMIC APPOINTMENTS

From August 2017	Howard University, Department of Physics and Astronomy. **Associate Chair**
From August 2017	Howard University, Department of Physics and Astronomy. **Professor (Tenured)**
From August 2016	Howard University, Department of Physics and Astronomy. **Director of the Graduate Studies in Physics**
2013 to 2017	Howard University, Department of Physics and Astronomy. **Associate Professor (Tenured)**
2008 to 2013	Howard University, Department of Physics and Astronomy. **Assistant Professor**
2005 to 2008	Howard University, Department of Physics and Astronomy. Lecturer
2005 to 2007	George Mason University, Computational Science Center. Affiliate Faculty.

2002 to 2004	Pennsylvania State University, Department of Physics, Visiting Professor.
2000 to 2002	National Research Council (CONICET), Argentina. Scientific researcher.
1996 to 2002	University of Buenos Aires, Department of Physics. Postdoctoral researcher on condensed matter theory

RESEARCH GRANTS

1. "REU Site in Physics at Howard University" (Co-PI), Funding Agency: NSF; Amount: **$343,957.00** for three years starting March 2018.
2. Title: "Equilibrium properties of gases adsorbed on materials based on layered graphene: theory and simulations"; Funding agency: Harvard U. Center of Integrated Quantum Materials (CIQM); Amount: **$237,763.00** for three years starting Oct. 2013.
3. Title: "HU ADVANCE IT: Women in color faculty in STEM as change agents", Amount: **$14,800**. Period: 6/15/2013 to 12/31/2013
4. Title: "Theoretical Study of the Adsorption of CO2 in nanopores", Summer Faculty Research Fellowship. Howard University, Summer 2012. Amount: **$15,000**
5. Title: "Collaborative research. Carbon Nanohorns: Adsorption Kinetics and Equilibrium Experiments and Simulations". Agency: National Science Foundation. Amount: **$249,000** for 3 years starting July 2010
6. Title: "Theoretical Study of the Adsorption and Separation of Gases in Metal-Organic-Frameworks" Agency: American Chemical Society, Petroleum Research Fund. Amount: **$100,000** for 2 years starting July 2010
7. Title: "Theoretical and Simulational Study of Adsorption of Gases on Nanopatterned Surfaces", New Faculty Start Up Research Fund, Howard University. Amount: $**50,000** for two years, 2008-2010.
8. Title: "Nanotechnology", HUPERN. Amount: $**26,303.50**, 1 year (FY2010)

TALKS, LECTURES AND CONTRIBUTIONS TO CONFERENCES

2018	Computational study of Physical Adsorption, Computational Research @ HU Symposium
2017	Matter confined in nanoscale spaces, Department of Physics and Astronomy, Howard University
2017	APS March Meeting, New Orleans LA (two contributions)
2016	Adsorption and gas separation of molecules on graphene, MOFs and nanohorns, Department of Physics, Universidad de Buenos Aires; Argentina
2016	Adsorption and Gas Separation of Molecules on graphene, CAMP Seminar, Department of Physics, Penn State University; State College PA

2016 APS March Meeting, Baltimore (MD)
2016 Equilibrium and Kinetics of Adsorption in Graphene, Quantum Materials and Devices Seminar Series CIQM at U. Harvard; Cambridge MA
2015 Adsorption of Molecules on Nano-porous Materials. Lecture in the course "Engineering Sciences 114r: Quantum Materials: From Research Lab to Classroom", at U. Harvard; Cambridge MA
2015 Properties of molecules adsorbed on graphene, carbon nanotubes and carbon nanohorns: theory and simulations, Nagano, Japan (**invited**)
2014 Physics at the Falls: Phase transitions in reduced dimensions, Buffalo, NY (**invited**)
2014 APS March Meeting, Denver, CO (two contributions)
2013 APS March Meeting, Baltimore, MD (two contributions)
2013 Lectures: I) Adsorption on surfaces; II) Theoretical techniques and examples and III) Computational technique at the School on Experimental Determination of the Structure of Surfaces; Universidad de Minas Gerais, Belo Horizonte, Brazil
2012 Department of Physics, Pennsylvania State University (Seminar)
2012 APS March Meeting, Boston MA (two contributions)
2012 Department of Physics and Astronomy, Howard University. (**Colloquium**)
2011 Conference on Adsorption at the Nanoscale, Columbia MI. (**Invited**)
2011 Department of Physics and Astronomy, Howard University. (**Colloquium**)
2011 APS March Meeting, Dallas TX (contribution)
2010 77th Annual Meeting of the Southeastern Section, American Physical Society, Baton Rouge, LA. (I**nvited**)
2010 Department of Physics and Astronomy, Howard University. (**Colloquium**)
2010 APS March Meeting, Portland OR (two contributions)
2009 Department of Physics and Astronomy, John Hopkins University (Seminar)
2009 APS March Meeting, Pittsburgh PA (contribution)
2008 Physics Department, University of Texas at El Paso (**Colloquium**)
2008 Department of Physics and Astronomy, Howard University (**Colloquium**)
2008 Department of Physics, University of Maryland (Seminar)
2008 APS March Meeting, New Orleans LA (four contributions)
2007 U.S. Naval Research Laboratory (Seminar)
2007 Computational and Data Science Department, George Mason University. (**Colloquium**)
2007 APS March Meeting, Denver CO (two contributions)
2006 Department of Physics and Astronomy, Howard University. (**Colloquium**)
2006 APS March Meeting, Baltimore MD (contribution)
2005 Department of Physics and Astronomy, Howard University. (**Colloquium**)
2005 School of Computational Sciences, George Mason University (**Colloquium**)
2004 March Meeting, American Physical Society, Montreal, Canada. (**Invited**)
2004 Particles 2004, Orlando Fl. (**Invited**)

TEACHING EXPERIENCE

From 2005 Department of Physics and Astronomy, Howard University. Courses taught: Introductory physics courses, algebra based and calculus

based. Classical Mechanics (graduate level), Molecular Simulations (NEW COURSE, graduate level), Electrodynamics (graduate level)

2002 to 2004 Department of Physics, Pennsylvania State University. Introductory physics courses, algebra based.

1995 to 2002 Department of Physics, University of Buenos Aires. Instructor of general physics, statistical mechanics, modern physics.

1990 to 1995 Department of Physics, University of Buenos Aires. Teaching Assistant of general physics, statistical mechanics, modern physics.

1986 to 1990 University of Buenos Aires. Teaching Assistant for pre-college physics.

STUDENTS ADVISED

Disertations:

- Mamadou Mbaye (PhD); Title: "Adsorption of Gases on Carbon Nanotubes", April 2014
- D: Sidi Maiga (PhD); Title: "Adsorption of Gases on Graphene and Metal Organic Frameworks", April 2016
- M: Hawazin Alhamdi (M.S.); Title: "Separation of Mixtures on Graphene-based substrates", April 2017
- D: Hind Aljaddani (PhD); Title: "Design of substrates for molecular capture and sensing", in progress.

I also have advised 18 undergraduate students.

AWARDS

- Recipient of a post-doctoral fellowship awarded by the National Research Council (CONICET), Argentina, to perform research in condensed matter physics. (1995-1997)
- Recipient of a Doctoral fellowship awarded by the National Research Council (CONICET), Argentina, to perform research in statistical mechanics. (1991-1995)

PROFESSIONAL MEMBERSHIPS

- American Physical Society
- National Society of Hispanic Physicists
- Sigma Xi

PUBLICATIONS

1. *Monolayer adsorption of noble gases on graphene*, Sidi M.Maiga and Silvina M.Gatica, J. Chem. Phys. (2018) https://doi.org/10.1016/j.chemphys. 2017.11 .020
2. *Adsorption and gas separation of molecules by carbon nanohorns,* Silvina M. Gatica, Anton Nekhai and Adam Scrivener, Molecules 21, no. 5: 662. (2016)
3. *Commensurate Phases of Kr Adsorbed on Single-Walled Carbon Nanotubes,* Mamadou T. Mbaye, Sidi M. Maiga, Silvina M. Gatica, J. Low Temp Phys 185, 129; doi:10.1007/s10909-016-1544-6 (2016)
4. *Adsorption of Gases in Nanomaterials: Theory and Simulations*. M. T. Mbaye, S. M. Maiga and S. M. Gatica, (2013). Chapter in the book "Applied Spectroscopy and Nanomaterials", editor: P. Misra, Springer. (2014)
5. *Contribution of Chirality to the Adsorption of a Kr Atom on a Single Wall Carbon Nanotubes,* H. Kim, E. Booth, M. Mbaye and S. Gatica, J. Low Temp. Phys 175, 590-603 (2014)
6. *Simulations of Adsorption of CO2 and CH4 in MOFs: Effect of the Size and Charge Distribution on the Selectivity,* Sidi M. Maiga, Mayra A. Medina, Oluwaseyitan J. Durodola and Silvina M. Gatica, J. Low Temperature Physics, DOI 10.1007/s10909-013-0864-z (2013)
7. *Gas Adsorption in Novel Environments, Including Effects of Pore Relaxation*, Milton W. Cole, Silvina M. Gatica, Hye-Young Kim, Angela D. Lueking and Sarmishtha Sircar, J. Low Temperature Physics, Volume 166, Numbers 5-6, Pages 231-241. (2012)
8. *Quasi-one dimensional fluids that exhibit higher dimensional behavior*, Silvina M. Gatica, M. Mercedes Calbi, George Stan, R. Andreea Trasca and Milton W. Cole, Intl. Journal of Modern Physics B24, 5051-5059 (2010) and Proceedings of the 33rd Intl. Workshop on Condensed Matter Theories (World Scientific, 2011)
9. *Phase Behavior of Ar and Kr Films on Carbon Nanotubes*, Hye-Young Kim, Milton W. Cole, Mamadou Mbaye and Silvina M. Gatica, J. Phys. Chem. A, 115, p 7249 (2011)
10. *Simulation and Modeling of Nanostructures, Defects and Adsorption Processes in Materials*, D. Casimir, S. Gatica and P. Misra, Chapter in "Fundamentals and Current Topics in Molecular Structure Research, " P. Misra and C. Haridas, Editors, Research SignPost, Kerala, India, pp. 95-113. (2011)
11. *Solid Phase of Krypton on the Exterior of Individual Single-Walled Carbon Nanotubes,* Oludotun Ode and Silvina Gatica, J Low Temp Phys 161: 367 (2010)
12. *Anomalous effective dimensionality of quantum gas adsorption near nanopores,* Steven J Full, Jessica P McNutt, Milton W Cole, Mamadou T Mbaye and Silvina M Gatica, J. Phys.: Condens. Matter 22 334206, (2010)
13. *Nanobubbles at Water-Solid Interfaces: Calculation of the Contact Angle Based on a Simple Model,* H. Elnaiem, D. Casimir, P. Misra and S.M. Gatica, Computers, Materials & Continua, Vol.14, No.1, (2009)
14. *Adsorbed gases in bundles of carbon nanotubes: theory and simulation*, M. Mercedes Calbi, Milton W. Cole, Silvina M. Gatica, Mary J. Bojan and J. Karl Johnson, Chapter 9 of Adsorption by Carbons, edited by E. J. Bottani and Juan M. D. Tascón, Elsevier Science Publishing, pp. 187-210. (2009)
15. *Condensation of fluids confined in non-rigid nanopores: with a little help of the substrate,* Silvina M. Gatica and Hye-Young Kim, J. Low Temp. Phys. 157: 382-394 (2009).
16. *To wet or not to wet, that is the question*, Silvina Gatica and Milton Cole, J. Low Temp. Phys. 157: 111-136 (2009)

17. *Effects of substrate relaxation on adsorption in pores,* Hye-Young Kim, Silvina M. Gatica, George Stan, Milton W. Cole, J. Low Temp. Phys. 156: 1-8 (2009)
18. *Ordering transition of gases adsorbed on a C_60 surface: Monte Carlo simulations and lattice-gas models,* Silvina M. Gatica, Milen K. Kostov, and Milton W. Cole, Phys. Rev. B 78, 205417 (2008)
19. *A Corresponding States Principle for Physisorption and Deviations for Quantum Fluids,* Hye-Young Kim, Angela D. Lueking, Silvina M. Gatica, J. Karl Johnson and Milton W. Cole, Molecular Physics 106, 1579 (2008)
20. *Review: Novel physics of gases near carbon nanotubes and buckyballs*, Gatica, SM; Calbi, MM; Diehl, RD; Cole, MW, J. Low Temp. Phys. 152 (3-4):89-107 (2008)
21. *Xe Adsorption on a C_{60} Monolayer on Ag(111),* S. M. Gatica, H. I. Li, R. A. Trasca, M. W. Cole and R. D. Diehl, Phys. Rev. B 77, 045414 (2008)
22. *Vibrational modes of 4He and H2 gases adsorbed on carbon nanotubes*, Silvina M. Gatica, Angela D. Lueking, Milton W. Cole and Gerald D. Mahan, Phys. Rev. B 76, 085406 (2007). Selected for the August 20, 2007 issue of Virtual Journal of Nanoscale Science & Technology.
23. *Study of solid-liquid phase changes of Lennard-Jones nanoclusters by NPT Monte Carlo Simulations,* S. M Gatica, X. Dong and E. Blaisten-Barojas, J. of Computational and Theoretical Nanoscience 4, 529 (2007)
24. *Tight-Binding Calcium Clusters from Adaptive Tempering Monte Carlo Simulation*, X. Dong, S. Gatica and E. Blaisten-Barojas, Computing Letters 4, (2005)
25. *Capillary Condensation in cylindrical Nanopores*, S. M. Gatica and M. W. Cole, Phys. Rev. E 72, 041602 (2005)
26. *Thermodynamic properties and correlation functions of Ar films on the surface of a bundle of nanotubes,* N. M. Urban, S. M. Gatica, M. W. Cole and J. L. Riccardo, Phys. Rev. B 71, 245410 (2005).
27. *Designing van der Waals forces between nanocolloids,* S.M. Gatica, M.W. Cole and D. Velegol, Nano Lett., 5, 169-173 (2005).
28. *Possible One-Dimensional ^{3}He Quantum Fluid Formed in Nanopores,* J.Taniguchi, A.Yamaguchi, H. Ishimoto, H. Ikegami, T. Matsushita, N. Wada, S.M. Gatica, M.W. Cole, F. Ancilotto, S. I. and Y. Fukushima, Phys. Rev. Lett. 94, 065301 (2005).
29. *Bose Einstein Condensation of Helium and Hydrogen inside bundles of carbon nanotubes*, F. Ancilotto, M. Calbi, S. M. Gatica and M. W. Cole, Phys. Rev. B 70, 165422 (2004). Selected for the 15 Nov. 2004 issue of the Virtual Journal of Nanoscale Science and Technology.
30. *Wetting Transition of Water on Graphite and Other Surfaces,* S.M. Gatica, J.K. Johnson, X.C. Zhao and M.W. Cole, J. Phys. Chem. B 108, 11704 (2004)
31. *Anomalous low temperature specific heat of ^{3}He inside nanotubes bundles,* S.M. Gatica, F. Ancilotto and M. W. Cole, J. Low Temp. Phys. 136, 179 (2004)
32. *Intriguing examples of inhomogeneus broadening,* F. Ancilotto, M. Calbi, M. Cole, S. Gatica and E. Hernández, Israel Journal of Chemistry 44, 229 (2004)
33. *Heat capacity of helium in cylindrical environments,* S. Gatica, E. Hernández and L. Szybisz, Phys Rev. B 68, 144501 (2003)
34. *Universal anisotropic condensation transition of gases in nanotubes bundles*, S.M. Gatica, M.M. Calbi and M. W. Cole, J. Low Temp. Phys. 133, 399 (2003)
35. *Three-body interactions involving clusters and films*, S.M. Gatica, M.M. Calbi, M.W. Cole and D. Velegol, Phys. Rev. B 68, 205409 (2003)
36. *Retarded and non-retarded van der Waals interactions between a cluster and a second cluster or a conducting surface,* M.M. Calbi, S.M. Gatica, D. Velegol and M.W. Cole, Phys. Rev. A

67, 033201 (2003); selected for the March 15, 2003 issue of the Virtual Journal of Biological Physics Research.

37. *Statistical mechanics of interacting peapods,* M.M. Calbi, S.M. Gatica, and M.W. Cole, Phys. Rev. B 67, 205417 (2003)
38. *Ground state and thermal properties of a lattice gas on a cylindrical surface*, M. Mercedes Calbi, Silvina M. Gatica, Mary J. Bojan, Milton W. Cole, Phys. Rev. E 66, 061107 (2002)
39. *Simple Model of Capillary Condensation in porous media*, S. M. Gatica, M. M. Calbi and M. W. Cole., Phys. Rev. E 65, 061605 (2002)
40. *Colloquium: Condensed phases of gases inside nanotube bundles*, M. M. Calbi, M. W. Cole, S. M. Gatica, M. J. Bojan and G. Stan, Rev. on Modern Phys., 73, 857 (2001)
41. *Structure and stability of superfluid 4He systems with cylindrical symmetry*, L. Szybisz and S. M. Gatica, Phys. Rev. B. 64, 224523 (2001)
42. *Phases of Neon, Xenon and Methane adsorbed on nanotube bundles*, M. M. Calbi, S. M. Gatica, M. J. Bojan and M. W. Cole, J. Chem. Phys. 115, 9975 (2001)
43. *Quasi-one and two-dimensional transitions of gases adsorbed on nanotube bundles*, S. M. Gatica, M. J. Bojan, G. Stan and M. W. Cole, J. Chem. Phys. 114, 3765 (2001)
44. *Momentum distribution of helium and hydrogen in nanotubes*, S. M. Gatica, M. W. Cole, G. Stan J. M. Hartman and V.H. Crespi, Phys. Rev. B. 62, 9989 (2000)
45. *Uptake of gases in bundles of carbon nanotubes*, G. Stan, M. J. Bojan, S. Curtarolo, S. M. Gatica and M. W. Cole, Phys. Rev. B 62, 2173 (2000)
46. *Axial phase of quantum fluids in nanotubes*, S. M. Gatica, G. Stan, M. M. Calbi, J. K. Johnson and M. W. Cole, J. Low Temp. Phys. 120, 337 (2000)
47. *Helium mixtures in nanotube bundles*, G. Stan, J. M. Hartman, V. H. Crespi, S. M. Gatica and M. W. Cole, Phys. Rev. B 61, 7288 (2000)
48. *Atoms in nanotubes: small dimensions and variable dimensionality*, G. Stan, S. M. Gatica, M. Boninsegni, S. Curtarolo and M. W. Cole, Am. J. Phys.67, 110 (1999)
49. *Capillary condensation for quantum fluids*, M. M. Calbi, F. Toigo, S. M. Gatica and M. W. Cole, Phys. Rev. B 60, 14935 (1999)
50. *Capillary condensation transitions in a slab geometry*, S. M. Gatica, M. Calbi and M. W. Cole, Phys. Rev. E 59, 4484 (1999)
51. *Dynamical response of spin-polarized ^{3}He*, S. M. Gatica, E. S. Hernández and J. Navarro, Phys. Rev. B 60, 15302 (1999)
52. *Spin-polarized ^{3}He in a density functional frame*, S. M. Gatica, E. S. Hernández and J. Navarro, Phys. Rev. B 58, 12300 (1998)
53. *Structure and energetics of mixed ^{4}He-^{3}He drops*, M. Barranco, M. Pi, S. M. Gatica, E. S. Hernández and J. Navarro, Phys. Rev. B 56, 8997 (1997)
54. *Structure and energetics of mixed ^{4}He-^{3}He drops*, M. Barranco, M. Pi, S. M. Gatica, E. S. Hernández and J. Navarro, Phys. Rev. B 56, 8997 (1997)
55. *Instability scenarios for doped ^{4}He clusters*, S. M. Gatica, E. S. Hernández and M. Barranco, J. Chem. Phys. 107, 927 (1997)
56. *Dynamic susceptibility of a thermally excited Fermi liquid film*, M.M.Calbi, S.M. Gatica and E. S. Hernández, Phys. Rev. B 54, 13097 (1996)
57. *A quantum map for a kicked spin 1 in an oscillator reservoir*, S.M. Gatica and E. S. Hernández, Physica A 222,173 (1995)
58. *Quasiscalar map for a kicked spin 1/2*, E. S. Hernández and S.M. Gatica, Physica A 212, 110 (1994)

59. *Asymptotic regime of quantal stochastic and dissipative motion*, M. A. Despósito, S.M. Gatica and E. S. Hernández, Physical Review A 46, 3234 (1992)
60. *Phase space description of quantum rotations*, S.M. Gatica and E. S. Hernández, Physical Review A 43, 4594 (1991)