

CURRICULUM VITAE
María de las Mercedes Calbi

Contact Information:

Department of Physics and Astronomy
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Professional Experience:

09/2010 to present Associate Professor, Dept. of Physics and Astronomy, University of Denver
09/2009 to 08/2010 Associate Professor, Department of Physics, Southern Illinois University
09/2003 to 08/2009 Assistant Professor, Department of Physics, Southern Illinois University
08/2000 to 08/2003 PostDoctoral Fellow, The Pennsylvania State University
03/1994 to 03/2000 Teaching Assistant, University of Buenos Aires, Argentina

Education and Training:

The Pennsylvania State University - PostDoctoral fellow - 08/2000-08/2003
Advisor: Prof. Milton W. Cole
University of Buenos Aires, Argentina - Ph. D. in Physics - March 2000
Advisor: Prof. Susana E. Hernández
University of Buenos Aires, Argentina - B.S. in Physics - March 1995

Research Awards:

- Southern Illinois University Outstanding Scholar Award, 2010.
- NSF Presidential Early Career Award for Scientists and Engineers (PECASE), July 2009.
- PostDoctoral fellowship, CONICET, Argentina, 2000.
- PostDoctoral fellowship, Fundación Antorchas, Argentina, 2000.
- Doctoral fellowship, CONICET, Argentina, 1995.

Research Grants:

- National Science Foundation, Division of Materials Research (DMR), “Collaborative Research: Carbon Nanohorns: Adsorption Kinetics and Equilibrium, Experiments and Simulations”, 09/01/10 – 08/31/13, \$ 315,000
- National Science Foundation, Chemical and Biological Separations (CBET, ENG), “CAREER: Kinetics of Adsorption in Nanoporous Structures” (PECASE award), 07/01/08 – 06/30/13, \$ 400,000
- National Science Foundation, Division of Materials Research (DMR), “Polyatomic Adsorbates on Carbon Nanotube Bundles”, 07/01/07 – 06/30/10, \$ 330,000
- Petroleum Research Fund, Type G Starter Grant, “Dynamics and Kinetics of Gases on Nanotube Bundles”, 09/01/2005 – 08/31/2007, \$ 35,000
- Office of Research Development & Administration, SIUC, Faculty Seed Grant, 05/15/05-05/15/06.

Research Interests:

- Gas adsorption and transport in nanostructures: Thermodynamics of adsorption and phase transitions; kinetics of adsorption; transport and diffusive behavior; porous materials for separation, sensor and environmental applications.
- Forces between nanosized particles, aggregation phenomena in fluids.

Scientific Publications – Journal Articles:

Jared T. Burde and M. Mercedes Calbi, “*Adsorption kinetics of diatomic molecules on the exterior of nanotube bundles*”, in preparation.

1. Nayeli Zuniga-Hansen and M. Mercedes Calbi, “*Thermal Desorption from Heterogeneous Surfaces*”, J. Phys. Chem C 116, 5025–5032 (2012).
2. S.M. Gatica, M.M. Calbi, R.A. Trasca, G. Stan, M.W. Cole, “*Quasi-one dimensional fluids that exhibit higher dimensional behavior*”, Int. J. Mod. Phys. 24, 5051 (2010).
3. Jared T. Burde and M. Mercedes Calbi, “*Fast removal of weak binding adsorbates by kinetic separation*”, J. Phys. Chem. Letters 1, 808 (2010).
4. Jared T. Burde, Chong L. Park, Nayeli Zuniga, and M. Mercedes Calbi, “*Kinetics of External Adsorption on Nanotube Bundles: Surface Heterogeneity Effects*”, J. Phys. Chem. C 113, 16945–16950 (2009).
5. S.M. Gatica, M.M. Calbi, R.D. Diehl, M.W. Cole, “*Physics of Gases Near Carbon Nanotubes and Buckyballs*”, J. Low Temp. Phys. 152, 89-107 (2008).
6. Dinesh S. Rawat, V. Krungleviciute, L. Heroux, M. Bulut, M. Mercedes Calbi, and Aldo D. Migone, “*Dependence of Single-Walled Carbon Nanotube Adsorption Kinetics on Temperature and Binding Energy*”, Langmuir 24, 13465-13469 (2008).
7. Vaiva Krungleviciute, M. Mercedes Calbi, Jeff Wagner, Aldo D. Migone, Masako Yudasaka and Sumio Iijima, “*Probing the structure of carbon nanohorn aggregates by adsorbing gases of different size*”, J. Phys. Chem. C 112, 5742-5746 (2008).
8. Jared T. Burde and M. Mercedes Calbi, “*Physisorption Kinetics in Carbon Nanotube Bundles*”, J. Phys. Chem. C 111, 5057-5063 (2007).
9. Dinesh S. Rawat, M. Mercedes Calbi, Aldo D. Migone, “*Equilibration Time: Kinetics of Gas Adsorption on Closed and Open-ended Single Walled Carbon Nanotubes*”, J. Phys. Chem. C. 111, 12980-12986 (2007).

10. Luke Heroux, Vaiva Krungleviciute, M. Mercedes Calbi, and Aldo D. Migone, “*CF₄ on carbon nanotubes: Physisorption on grooves and external surfaces*”, J. Phys. Chem B 110, 12597-12602 (2006).
11. M. Mercedes Calbi and J. L. Riccardo, “*Energy barriers at the ends of carbon nanotube bundles: Effects on interstitial adsorption kinetics*”, Phys. Rev. Lett. 94, 246103 1-4 (2005).
12. Y.H. Kahng, R.B. Hallock, M.M. Calbi, “*Competitive adsorption of He-3 and He-4 to carbon nanotube bundles*”, J. Low Temp. Phys. 138, 217-222 (2005).
13. M. Mercedes Calbi, Ari Mizel and Milton W. Cole, “*Lattice dilation near a single hydrogen molecule in an interstitial channel within a nanotube bundle*”, Phys. Rev. B 69, 195408 (2004).
14. R.A. Trasca, M.M. Calbi, M.W. Cole, J.L. Riccardo, “*Lattice-gas Monte Carlo study of adsorption in pores*”, Phys. Rev. E 69, 011605 (2004).
15. Francesco Ancilotto, M. Mercedes Calbi, Silvina M. Gatica and Milton W. Cole, “*Bose-Einstein Condensation of Molecular Hydrogen in Nanotube Bundles*”, Phys. Rev. B 70, 165422 (2004).
16. Francesco Ancilotto, M. Mercedes Calbi, Milton W. Cole, Silvina M. Gatica and E. S. Hernandez, “*Intriguing examples of inhomogeneous broadening*”, Israel J. Chem. 44, 229 (2004).
17. Silvina M. Gatica, M. Mercedes Calbi and Milton W. Cole, “*Universal anisotropic condensation transition of gases in nanotube bundles*”, Journal of Low Temperature Physics 133, 399-406 (2003).
18. S.M. Gatica, M.M. Calbi, D. Velegol and M.W. Cole, “*Three-body interactions involving clusters and films*”, Phys. Rev. B 68, 205409 (2003).
19. M.K. Kostov, M.M. Calbi and M.W. Cole, “*Phonons and specific heat of phases adsorbed on the surface of nanotube bundles*”, Phys. Rev. B 68, 245403 (2003).
20. M.M. Calbi, S.M. Gatica and M.W. Cole, “*Statistical mechanics of interacting peapods*”, Phys. Rev. B 67, 205417 (2003).
21. M.M. Calbi, S.M. Gatica, D. Velegol, M.W. Cole, “*Retarded and non retarded van der Waals interactions between a cluster and a second cluster or a conducting surface*”, Phys. Rev. A 67, 033201 (2003).
22. M. Mercedes Calbi and Milton W. Cole, “*Dimensional crossover and quantum effects of gases adsorbed on nanotube bundles*”, Phys. Rev. B 66, 115413-1-11 (2002).
23. M. Mercedes Calbi, Silvina M. Gatica, Mary J. Bojan, Milton W. Cole, “*Ground state and thermal properties of a lattice gas on a cylindrical surface*”, Phys. Rev. E 66, 061107 (2002).
24. S. M. Gatica, M.M. Calbi and M.W. Cole, “*Simple model of capillary condensation in porous media*”, Phys. Rev. E 65, 061605 (2002).
25. Raluca A. Trasca, M. Mercedes Calbi and Milton W. Cole, “*Lattice model of gas condensation within nanopores*”, Phys. Rev. E 65, 061607 (2002).
26. M.M. Calbi, F. Toigo, and M.W. Cole, “*Dilation and intercalation of gases within carbon nanostructures*”, J. Low Temp. Phys. 126, 179 (2002).
27. M.M. Calbi, F. Toigo, M.W. Cole, “*Dilation-induced phases of gases absorbed within a bundle of carbon nanotubes*”, Phys. Rev. Lett. 86, 5062-5065 (2001).
28. M.M. Calbi, M.W. Cole, S.M. Gatica, M.J. Bojan, and G. Stan, “*Colloquium: Condensed phases of gases inside nanotube bundles*”, Rev. Mod. Phys. 73, 857-865 (2001).
29. M.M. Calbi, S.M. Gatica, M.J. Bojan, and M.W. Cole, “*Phases of neon, xenon, and methane adsorbed on nanotube bundles*”, J. Chem. Phys. 115, 9975-9981 (2001).
30. S.M. Gatica, G. Stan, M.M. Calbi, J.K. Johnson, and M.W. Cole, “*Axial phase of quantum fluids in nanotubes*”, J. Low Temp. Phys. 120, 337-359 (2000).

31. M.M. Calbi and E.S. Hernandez, “*Dynamical response of liquid ^3He films adsorbed on solid substrates*”, J. Low Temp. Phys. 120, 1-43 (2000).
32. M.M. Calbi, F. Toigo, S.M. Gatica, and M.W. Cole, “*Capillary condensation for quantum fluids*”, Phys. Rev. B 60, 14935-14942 (1999).
33. S.M. Gatica, M.M. Calbi, M.W. Cole, “*Capillary condensation transitions in a slab geometry*”, Phys. Rev. E 59, 4484-4489 (1999).
34. M.M. Calbi and E.S. Hernandez, “*Fermi disks model for ^3He films adsorbed on graphite within a density-functional approach*”, Phys. Rev. B, 13258-13264 (1998).
35. M.M. Calbi, S.M. Gatica, E.S. Hernandez, “*Dynamical susceptibility of a thermally excited neutral Fermi-liquid film*”, Phys. Rev. B 54, 13097-13104 (1996).
36. M.M. Calbi, E.S. Hernandez, “*Exchange effects in a two-dimensional Fermi liquid*”, J. Phys. A-Math. Gen. 29, 5257-5272 (1996).

Scientific Publications – Book Chapter:

M. Mercedes Calbi, M.W. Cole, S.M. Gatica, M.J. Bojan, J.K. Johnson, “*Adsorbed gases in bundles of carbon nanotubes: Theory and Simulation*”, Chapter 9, in Adsorption by Carbons, ed. by Eduardo J. Bottani, Juan M.D. Tascon, Elsevier Science Publishing, Amsterdam (2008).

Student Advisement:

Jared Burde, M.S., Physics Department, June 2011 – Thesis title: “*Physisoprtion Kinetics in Carbon Nanotube Bundles*”. Currently, graduate student at Univ. of Denver

Seyoum Tsigie, M.S., Physics Department, May 2010 – Thesis title: “*Kinetic selectivity effects of Binary Mixtures on Nanotube Bundles: Internal and External Adsorption*”.

Jeffrey Wagner, M.S., Physics Department, June 2008 – Thesis title: “*Gas adsorption on carbon nanohorn aggregates*”.

Nayeli Zuniga, graduate student.

Chris Pueblo, REU undergraduate student.

Chong Park, REU undergraduate student.

Synergistic Activities:

▶ Physics Workshop Leader as part of the DU supported program CARE (College Aspirations, Readiness and Empowerment) for Black Adolescent Girls, an initiative oriented to bring STEM career possibilities to life for these minority students as well as encouraging pursuing higher education, May 2012.

▶ Summer Link to College, VIP program at Univ. of Denver for rising high school junior students, offered a week long workshop titled “*Physics of Renewable Energy*”, since August 2011.

▶ Physics Workshop Leader, *Expanding Your Horizons in Science & Mathematics*, a conference for 7th, 8th, & 9th grade girls to motivate and encourage young women to pursue science careers; Southern Illinois University, Carbondale, IL.

▶ Member of Executive Committee in the 28th Illinois Junior Science & Humanities Symposium, a conference and competition aiming at promoting research and experimentation in sciences, mathematics and engineering at the high school level; Southern Illinois University, Carbondale, IL.

- ▶ Undergraduate student advisor, *NSF Research Experience for Undergraduates* in Materials Science, summer 2006.
- ▶ Reviewer of scientific articles (Physical Review Letters, Physical Review B, Journal of Chemical Physics, Surface Science, Journal of Physical Chemistry, Langmuir, Journal of Low Temperature Physics)
- ▶ Grant Proposal Reviewer: Petroleum Research Foundation, Environmental Protection Agency, National Science Foundation, Awwa Research Foundation, British Research Council.

Invited Talks:

- ▶ “*Adsorption Kinetics of Polyatomic Molecules*”, September 21-24, 2011, Adsorption at the Nanoscale, Columbia, MO.
- ▶ “*Adsorption of Gases on Nanoporous Materials: Equilibrium and Kinetics*”, University of Denver, February 2010; University of Notre Dame, March 2010.
- ▶ “*Kinetics of Gas Adsorption on Carbon Nanotube Bundles*”, August 17th, 2009, Graphitic Materials Symposium, American Chemical Society meeting, Washington, DC.
- ▶ “*Gas adsorption and kinetics in carbon nanotube bundles*”, March 18 th, 2005, Department of Physics, University of Missouri – Kansas City.
- ▶ “*Adsorption kinetics in carbon nanotube bundles*”, June 6th, 2005, Department of Physics, Pennsylvania State University.
- ▶ “*Novel phases of matter adsorbed on nanotube bundles*”, Southern Illinois University (Carbondale), March 2003; Wesleyan University (Middletown,CT), May 2003.
- ▶ “*Gases adsorbed on nanotube bundles: Dimensional crossover and quantum effects*”, Midwest Thermodynamic & Statistical Mechanics Meeting, Pittsburgh, PA, May 2002.
- ▶ “*Dilation and Intercalation of gases within carbon nanostructures*”, Symposium on Quantum Fluids and Solids, Konstanz, Germany, July 2001.