

Curriculum Vitae

1. Gary Felder

2. Contact Information

- **Work:** Clark Science Center/Physics Department/Smith College/Northampton, MA 01063, 413-585-4489
- **Home:** 128 Black Birch Trail/Florence, MA 01062, 413-537-1904
- **Email:** gfelder@email.smith.edu

3. Degrees

- **Doctorate:** June, 2001, Stanford University, “Mechanisms of Reheating After Inflation.”
- **Bachelor’s:** June, 1993, Oberlin College, Physics.

4. Awards and Honors

- The William Elgin Wickenden Award for the best paper published in the *Journal of Engineering Education* in 2002 (see publication list).
- Paper selected as one of “highlights of the year” by the editors of *Classical and Quantum Gravity*, 2002 (see publication list).
- 1992/93 Carl E. Howe award for outstanding senior in physics (Oberlin College).
- 1991/92 R. Weinstock award for outstanding junior in physics (Oberlin College).

5. Employment History

- Professor, Smith College Physics Department: 7/03-present. Currently associate professor.
- Postdoctoral fellow, Canadian Institute for Theoretical Astrophysics: 8/01-7/03. Research on cosmology and high energy theoretical physics.
- Research assistant, Stanford University: 4/97-6/01. Doctoral research on inflationary cosmology.
- Research intern, N.C. State University. 6/91–9/91; 6/92–9/92; 6/93–2/94; 5/95–5/96. Research on engineering education, including statistical data analysis (SAS).
- Private contractor, On Technology, Raleigh, North Carolina. 1/95–2/95. Troubleshooting and installation of new hardware.
- Technical assistant, One Tree Software, Raleigh, North Carolina. 10/93-2/94. Technical support and office management.
- Mathematics and physics tutor. NC State University, 1/87-5/88 and 9/93-12/93, and Oberlin College, 9/88-12/92. Duties at Oberlin included teaching recitation sections.
- Research intern, Oberlin College, 9/89-9/90. Measured total nuclear reaction cross sections, made theoretical predictions using various models, and compared the data to the predictions.

6. Grants Received

- NSF “Transforming Undergraduate Education in Science” (TUES) grant, \$138,659, 2011-2016.

- NSF theoretical physics research grant, \$105,000; 2008-2011.
- NSF theoretical physics research grant, \$104,775; 2005-2008.
- Mellon Summer Stipend Grant, \$8,000; 2005.
- CFCF grant for early universe research, \$1,255; 2004.
- The Mellam Family Foundation Fellowship for graduate study, 2000-2001.
- NATO Linkage Grant 975389: “The Origin of Matter in the Universe,” 1999-2002.
- Canadian Institute for Theoretical Astrophysics pre-doctoral fellowship, 1999-2000.
- National Science Foundation fellowship for graduate study, 1996-1999.
- B.P. America Academic Year Assistantship for undergraduate research, 1989-1990.

7. Publications

(All journal articles were refereed.)

• Books

1. Gary N. Felder and Kenny M. Felder, Mathematica Methods in Engineering and Physics, John Wiley & Sons, 2015.

• Physics Publications

1. J.F. Dufaux, G.N. Felder, L. Kofman, and O. Navros, "Gravity Waves from Tachyonic Preheating after Hybrid Inflation," JCAP 0903:001 (2009), arXiv:0812.2917.
2. G.N. Felder, “CLUSTEREASY: A Program for Lattice Simulations of Scalar Fields in an Expanding Universe on Parallel Computing Clusters,” Comput. Phys. Commun. 179 (2008), arXiv:0712.0813.
3. G.N. Felder and I. Tkachev, “LATTICEEASY: A Program for lattice simulations of scalar fields in an expanding universe,” Comput. Phys. Commun. 178(2008)929, hep-ph/0011159.
4. J. F. Dufaux, A. Bergman, G. N. Felder, L. Kofman, and J. Uzan “Theory and Numerics of Gravitational Waves from Preheating After Inflation,” Phys. Rev. D, **76**:123517 (2007), arXiv:0707.0875.
5. G. N. Felder, H. Kim, W. Park, and E. Stewart, “Preheating and Affleck-Dine Leptogenesis after Thermal Inflation,” J. Cosmol. Astropart. Phys., JCAP0706:005 (2007), hep-ph/0703275.
6. G. N. Felder and O. Navros, “Inflation Fragmentation after Lambda Φ^4 Inflation,” J. Cosmol. Astropart. Phys., JCAP0702:014 (2007), hep-ph/0701128.
7. G. N. Felder and L. Kofman, “Nonlinear Inflation Fragmentation after Preheating,” Phys. Rev. D, **75**:043518 (2007), hep-ph/0606256.
8. J.F. Dufaux, G. N. Felder, L. Kofman, M. Peloso, and D. Podolsky, “Preheating with trilinear interactions: Tachyonic resonance,” J. Cosmol. Astropart. Phys., JCAP0607:006 (2006), hep-ph/0602144.
9. D. I. Podolsky, G. N. Felder, L. Kofman and M. Peloso, “Equation of State and Beginning of Thermalization After Preheating,” Phys. Rev. D, **73**:023501 (2006), hep-ph/0507096.
10. M. Desroche, G. Felder, J. Kratochvil, and A. Linde, “Preheating in New Inflation,” Phys Rev. D, **71**:103516 (2005), hep-th/0501080.

11. A. Birch and G. Felder, "Accuracy of the Born and Ray Approximations for Time-Distance Helioseismology of Flows," *Ap. J.*, 616:1261-1264 (2004).
 12. J. Martin, G. Felder, A. Frolov, L. Kofman, and M. Peloso, "Branecode: A Program for Simulations of Braneworld Dynamics," *Comput. Phys. Commun.* 171(2005)69, hep-ph/0404141.
 13. G. Felder and L. Kofman, "Inhomogeneous Fragmentation of the Rolling Tachyon," *Phys. Rev. D*, **70**:046004 (2004), hep-th/0403073.
 14. J. Martin, G. Felder, A. Frolov, M. Peloso, and L. Kofman, "Braneworld Dynamics with the Branecode," *Phys. Rev. D* **69**:084017 (2004), hep-th/0309001.
 15. G. Felder, L. Kofman, and A. Starobinsky, "Caustics in Tachyon Matter and Other Born-Infeld Scalars," *JHEP* 0209:026 (2002), hep-th/0202017.
 16. G. Felder, A. Frolov, L. Kofman, and A. Linde, "Cosmology With Negative Potentials," *Phys. Rev. D* **66**:023507 (2002), hep-th/0202017.
 17. G. Felder, A. Frolov, and L. Kofman, "Warped Geometry of Brane Worlds," *Class. Quant. Grav.* **19**:2983-3002 (2002), hep-th/0112165. This paper was selected as one of the highlights of the year by the editors of *Classical and Quantum Gravity*.
 18. G. Felder, L. Kofman, and A. Linde, "Tachyonic Instability and Dynamics of Spontaneous Symmetry Breaking," *Phys. Rev. D* **64**:123517 (2001), hep-th/0106179.
 19. G. Felder, J. Garcia-Bellido, P. Greene, L. Kofman, A. Linde, and I. Tkachev, "Dynamics of Symmetry Breaking and Tachyonic Preheating," *Phys. Rev. Lett.* **87**:011601 (2001), hep-ph/0012142.
 20. G. Felder and L. Kofman, "The Development of Equilibrium After Preheating," *Phys. Rev. D* **63**:103503 (2001), hep-ph/0011160.
 21. G. Felder, L. Kofman, A. Linde, and I. Tkachev, "Inflation After Preheating," *JHEP* 0008:010 (2000), hep-ph/0004024.
 22. G. Felder, L. Kofman, and A. Linde, "Gravitational Particle Production and the Moduli Problem," *JHEP* 0002:027 (2000), hep-ph/9909508.
 23. G. Felder, L. Kofman, and A. Linde, "Inflation and Preheating in NO Models," *Phys. Rev. D* **60**:103505 (1999), hep-ph/9903350.
 24. G. Felder, L. Kofman, and A. Linde, "Instant Preheating," *Phys. Rev. D* **59**:123523 (1999), hep-ph/9812289.
 25. R. E. Warner, H. W. Wilschut, W. F. Rulla, and G. N. Felder, "Average Reaction Cross Sections for 74- to 112-MeV Alpha Particles on ^{127}I and ^{133}Cs ," *Phys. Rev. C* **43** (3), 1313 (1991).
 26. R. E. Warner and G. N. Felder, "Microscopic Calculations of Low-Energy Reaction Cross Sections," *Phys. Rev. C* **42** (5), 2252 (1990).
- **Physics Conference Proceedings**
 1. G. Felder, A. Frolov, and L. Kofman, "Warped Geometry of Brane Worlds with Scalar Fields," *Proceedings of the workshop - Brane World: New Perspective in Cosmology, Progress of Theoretical Physics Supplement* **148**, 165 (2002).

2. G. Felder, "Warped Geometry of Brane Worlds," Proceedings for the Fifth Alexander Friedmann International Seminar on Gravitation and Cosmology, International Journal of Modern Physics A, **17** (29), 4297 (2002).
3. G. Felder, "Nonlinear Dynamics of Interacting Fields," Proceedings for CAPP 2000: Conference on Cosmology and Particle Physics, AIP Conf. Proc. **555**, 285 (2001).
4. G. Felder, "Inflation After Preheating," Proceedings for Cosmo 98: International Workshop on Particle Physics and the Early Universe, AIP Conf. Proc. **478**, 58 (1999).

- **Education Publications**

1. R. M. Felder, G. N. Felder, and E. J. Dietz, "The Effects of Personality Type on Engineering Student Performance and Attitudes," J. Engr. Education **91** (1), 3 (2002). This paper was selected by the American Society for Engineering Education as the best paper of 2002 in this journal.
2. R. M. Felder, G. N. Felder, and E. J. Dietz, "A Longitudinal Study of Engineering Student Performance and Retention. V. Comparisons with Traditionally-Taught Students," J. Engr. Education **87** (4), 469 (1998).
3. R. M. Felder, G. N. Felder, M. Mauney, C. E. Hamrin Jr., and E. J. Dietz, "A Longitudinal Study of Engineering Student Performance and Retention. III. Gender Differences in Student Performances and Attitudes," J. Engr. Education **84** (2), 151 (1995).
4. R. M. Felder and G. N. Felder, "Is the Quality of American Students Really Declining? " Chem. Engr. Progr., 79, (1992). Translated into Spanish and reprinted as "Realmente Esta Dismuyendo la Calidad de los Estudiantes Norteamericanos? " Educacion Quimica **5** (1), 32 (1994).

- **Education Conference Proceedings**

1. G. Ellis, G. Felder, and M. Moriarty, "A Learner-Centered Approach for Preparing At-Risk Students for Success in Engineering," Proceedings for the annual meeting of the American Society for Engineering Education (2008).
2. R. M. Felder, G. N. Felder, M. Mauney, C. E. Hamrin Jr., and E. J. Dietz, "Women in Engineering: Falling into the Gender Gap," Proceedings for the annual meeting of the American Society for Engineering Education (1994).

8. **Performances** *not applicable*

9. **Lectures and Presentations**

- **Conference Presentations**

- "Teaching Math Methods with Active Learning Exercises," American Association of Physics Teachers New England regional section annual meeting, Salem, MA, March 2015.
- "Teaching Math Methods with Active Learning Exercises," American Association of Physics Teachers annual winter meeting, San Diego, CA, January 2015.
- "CurvedLand: It's like Mapquest with Non-Euclidean Geometry," CITA@25: The Theory of the Universe and Everything in It (19th Kingston meeting), Toronto, ON, Canada, May 2010.
- "Gravitational Waves from Preheating," Nonequilibrium Phenomena in Cosmology and Particle Physics, Santa Barbara, CA, Feb. 2008.

- “Breaking Up is Hard to Do: The Dynamics of Inflaton Fragmentation,” Non-Perturbative Dynamics in the Early Universe, Madrid, Spain, Sep. 2006.
- “Waves and Bubbles: The Detailed Structure of Preheating,” COSMO 05: International Workshop on Particle Physics and the Early Universe, Bonn, Germany, Sep. 2005.
- “The Equation of State After Preheating,” COSMO 05: International Workshop on Particle Physics and the Early Universe, Bonn, Germany, Sep. 2005.
- “Inhomogeneous Fragmentation of the Rolling Tachyon,” COSMO 04: International Workshop on Particle Physics and the Early Universe, Toronto, ON, Canada, Aug. 2004.
- “Radiating Tachyon Matter,” the Eighth Claude Itzykson Meeting: Which Model(s) for the Early Universe? , Saclay, France, June, 2003.
- “Warped Geometry of Brane Worlds,” the Fifth Alexander Friedmann International Seminar on Gravitation and Cosmology, João Pessoa, Brazil, April, 2002.
- “From Preheating to Equilibrium,” CAPP 2000: Conference on Cosmology and Particle Physics, Verbier, Switzerland, July, 2000. Also presented at Kingston 2000: The CITA Reunion Meeting, Toronto, ON, Canada, Aug. 2000.
- “Gravitational Particle Production and the Moduli Problem,” PASCOS 99: 7th International Symposium on Particles, Strings, and Cosmology, Granlibakken, Lake Tahoe, California, Dec. 1999.
- “Inflation After Preheating,” Cosmo 98: International Workshop on Particle Physics and the Early Universe, Institute for Nuclear and Particle Astrophysics and Cosmology, University of California, 1998. Also presented at the Pritzker Symposium on the Status of Inflationary Cosmology, University of Chicago, Feb. 1999.
- “Reaction Cross Sections of Alpha Particles on Cesium Iodide,” 1990 National Conference on Undergraduate Research, Schenectady, NY, April 1990.
- **Invited Seminars**
 - “The Big Bang and Beyond,” Project Eureka, UMass, Amherst, July 2014.
 - “The Early Universe,” Smith College Summer Science and Engineering Program, Northampton, MA, July 2013.
 - “The Higgs Boson Has Been Found ... So What is it and Who Cares,” Smith College Summer Science and Engineering Program, Northampton, MA, July 2012.
 - “Gravity Waves from Preheating,” University of Minnesota, Minneapolis, MN, May 2012.
 - “The Very Early Universe,” Hamilton College, Clinton, NY, January 2012.
 - “Spacetime Ripples from the Dawn of Time: Gravity Waves from the Early Universe,” Dartmouth College, Hanover, NH, April 2010.
 - “Inflation and the Very Early Universe,” Mt. Holyoke College, South Hadley, MA, September 2009.
 - “The Very Early Universe,” Trinity College, Hartford, CT, March, 2009.
 - “Breaking Up is Hard to Do: The Dynamics of Inflation Fragmentation,” University of Massachusetts, Amherst, MA, October, 2006.
 - “Einstein’s Legacy: A New Vision of Space and Time,” Applewood Retirement Community, Amherst, MA, October, 2005.

- “Waves and Bubbles: The Detailed Structure of Preheating,” University of North Carolina, Chapel Hill, NC, September, 2005.
- “Waves and Bubbles: The Detailed Structure of Preheating,” Stanford Linear Accelerator, Stanford, CA, May, 2005.
- “The Detailed Structure of Preheating,” Canadian Institute for Theoretical Astrophysics, Toronto, ON, Canada, March, 2005.
- “The Very Early Universe,” Amherst College, Amherst, MA, March, 2004.
- “The Very Early Universe,” Dickinson College, Carlisle, PA, February, 2004.
- “The Big Bang in a Box: Simulating the Early Universe,” University of Massachusetts, Amherst, MA, October, 2003.
- “The Very Early Universe,” Our Lady of Mt. Carmel High School, Mississauga, ON, November, 2002.
- “Fixing the Big Bang With Inflation,” Millikin University, Decatur, IL, November, 2002. Also presented at the University of Toronto, Toronto, ON, November, 2002, Creighton University, Omaha, NE, December, 2002, Williams College, Williamstown, MA, January, 2003, Kennesaw State University, Kennesaw, GA, January, 2003, Santa Clara University, Santa Clara, CA, January, 2003, Harvey Mudd College, Claremont, CA, January, 2003, and Smith College, Northampton, MA, February, 2003.
- “Scalar Field Cosmology,” St. Mary’s College, Halifax, NS, October, 2002.
- “The Big Bang Model, or Where Did All This Stuff Come From?” York University Astronomy Club, Toronto, ON, February, 2002.
- “Warped Geometry of Brane Worlds,” Institute for Theoretical Physics, Stanford University, Stanford, CA, November, 2001.
- “Tachyonic preheating,” Institute for Theoretical Physics, Stanford University, Stanford, CA, March, 2001.
- “A Primer on Inflation,” University of Toronto Astronomy Department, Toronto, ON, December, 1999.
- “Reheating: Theory and Simulations,” Canadian Institute for Theoretical Astrophysics, Toronto, ON, February, 1999.

10. Other Professional Activities

• Research Supervision

- Suroor Gandhi, summer research, “Studying Oscillons in Fields through Simulations of the Early Universe,” Summer 2015.
- Jack Zhao, Hampshire College, special studies, “Phase portraits of non-minimally coupled scalar fields,” Spring 2015.
- Claudia Yun, summer research, “Quantum Chaos,” Summer 2014.
- Neelma Qureshi, special studies, “Study of differential equations and nonminimally coupled scalar fields,” Fall 2011.
- May Benson-Martin, Hampshire College, summer research, “Monopole production,” Summer 2011.
- Lydia Shannon, summer research, “Extending a Curved Space Applet to Include Negative Curvature,” Summer 2011.
- Carolyn Earnest, Hampshire College, special studies, “Independent study of mathematical methods in physics,” Fall 2010.

- Caitlin Crowl, summer research and special studies, “Monopole formation,” Summer-Fall 2010.
- Adam Krellenstein, Hampshire College, special studies, “Phase Portraits of Non-Minimally Coupled Inflation,” Fall 2009-Spring 2010.
- Julia Burns, Smith College, summer research and special studies, “Gravity Waves from Preheating After New Inflation,” Summer 2009-Summer 2010.
- Stephanie Erickson, Smith College, summer research and honors project, “An Applet to Illustrate Curved Geometry,” Summer 2009-Spring 2010.
- Rachel Schmierer-Davis, Smith College, STRIDE, Fall 2008.
- Amanda Bergman, Smith College, summer research and honors project, “Phase Portraits of Inflationary Dynamics,” Summer 2008-Spring 2009.
- Xiao Ting Zhao, Smith College, summer research and special studies, “Computer Simulations of the Early Universe,” Summer-Fall 2008.
- Hannah Steele, High school student, “Non-Gaussianity in Preheating after Chaotic Inflation,” Summer 2008.
- Olga Navros, University of North Carolina, grant supported research, “Gravity Wave Production from Preheating after Hybrid Inflation,” Summer 2007.
- Natalie Krumdieck, Smith College, STRIDE, “Simulations of the Early Universe,” Fall 2006-Spring 2007.
- Amanda Bergman, Smith College, grant supported research and special studies courses, “Simulations of Gravity Wave Production in the Early Universe,” Summer 2006, Fall 2006, and Spring 2007.
- Olga Navros, University of North Carolina, grant supported research, “The Spatial Distribution of Matter Production,” Summer 2006.
- Nicole Brynes, Smith College, grant supported research, “The Geometry of Curved Spaces,” Spring-Summer 2006.
- Amanda Bergman, Smith College, special studies course and grant supported research, “Quantum Cosmology in the String Theory Landscape,” Spring-Summer 2006.
- Sirein Awadalla, Smith College, grant supported research, “Simulating the String Theory Landscape,” Fall 2005 – Spring 2006.
- Katherine Peterson, Smith College, STRIDE, Fall 2005-Spring 2006.
- Deepikaa Menon, Mt. Holyoke College, Special studies course, “Matter Production in the Early Universe,” Fall, 2005.
- Poornima Muralidhar, Smith College, grant supported research, “Parallel Fourier Transforms,” Summer, 2005.
- Dooshaye Moonshiram, Smith College, Special studies course and grant supported research, “Geometry of Curved Spaces,” Spring-Fall 2005.
- Sirein Awadalla, Smith College, grant supported research, “Parallel Lattice Simulations of the Early Universe,” Summer 2005.
- Chiare Hwang, Sarah Wodin-Schwartz, Jessica Schwaber, Jessica McCartney, and Krystal Locke, Smith College, Design and Implementation of an experiment for the NASA Reduced-Gravity Student Flight Opportunity Program, “Tribology: Investigating the Effects of Variations in Gravity Upon Grit-Contaminated Lubricated Joints,” Fall 2004-Spring 2006.
- Mariel Desroche, Smith College, Grant supported research and special studies course, “The Origin of Matter in the Universe,” January-August, 2004.

- Design and Implementation of an experiment for the NASA Reduced-Gravity Student Flight Opportunity Program, “Solid and Oil Lubricants in Microgravity,” Fall 2003-Spring 2004.
- Jing Li and Dessislava Michaylova, Smith College, Course project for Dominique Thiebault’s course on parallel computing, “Developing a Parallel Computing Implementation of Early-Universe Simulations,” Fall, 2003.
- Lauren Barth-Cohen, Smith College, Special studies course, “Mapping the Curved Spaces of General Relativity,” Fall, 2003.
- Nima Taheri-Lotfi, University of Toronto, Senior astronomy research project, “The Self-Reproducing Inflationary Universe,” 2002-2003.
- **Computational Physics**
 - I have developed five freely available programs for computational physics, which have been used by a wide variety of research groups:
 1. **LATTICEASY** A C++ program for simulating interacting fields in the early universe.
 2. **CLUSTEREASY** A parallel programming version of LATTICEASY for use on large clusters.
 3. **FFTEASY** A portable, easy to use set of C functions for performing Fast Fourier Transforms.
 4. **BRANECODE** A C++ program for simulating the dynamics of “braneworld” scenarios in which our universe is a 3D surface in a higher-dimensional space.
 5. **CURVEDLAND** A Java applet that allows users to observe and manipulate objects in a non-Euclidean space.
 - I have set up a computational physics laboratory at Smith College with a 16 node Beowulf cluster plus several individual workstations for use in early universe research as well as occasional classroom use. The cluster has also been used by other Smith professors for biological and other research.
- **Other**
 - In addition to the invited seminars listed above I’ve also spoken about astronomy and physics to elementary school groups, retirement communities, astronomy open-houses, book clubs, and student clubs.

11. Professional Memberships

- American Association of Physics Teachers, 2014.
- Anacapa Society (for theoretical physicists at primarily undergraduate institutions), 2007.
- American Physical Society, 2002.
- Sigma Xi, 1993.
- Phi Beta Kappa, 1992.

12. College Service

• College-Wide Committees and Official Positions

- Science Planning Committee – 2014-*present*.
- Provost’s Advisory Committee on Educational Technology, 2009-2010.
- Workgroup on Teaching and Learning, 2009-2010.
- Science Planning Committee, 2009-2011.
- Teagle Foundation Working Group on Quantitative Rubrics, 2009-2010.

- Liaison Committee for Science Center Renovations, 2009.
- Committee on Educational Technology, 2008-2011.
- Search committee for Quantitative Skills Counselor, 2008.
- Quantitative Skills Committee, 2005-2006 and 2008-2009.
- Sigma Xi luncheon talk coordinator, 2005-2006.
- Vice-President, Phi Beta Kappa, 2004-2007.
- Chair, Junior Faculty in Science and Engineering, 2004-2005.
- **Departmental Committees and Official Positions**
 - Physics department chair, 2013-*present*.
 - Physics department study abroad advisor, 2011-*present*.
 - Physics department honors liaison, 2011-*present*.
 - Physics department webmaster, 2003-2009.
 - Physics department library liason, 2003-*present*.
- **Other**
 - **Math Preparation for Engineering Students:** I have worked with the engineering department on strategies for helping students with insufficient math preparation. I co-developed (with Nat Fortune) a new introductory physics course, PHY117, which incorporated a higher level of mathematical problem solving than the older PHY115 course and I taught PHY117 for the first five years that it was offered. I developed a math assessment for placing students in the appropriate physics class. I started administering the math assessment to engineering students in the fall to warn students who needed to work on math skills before starting physics in the spring, and I worked with Tom Schicker (then of the Jacobson Center) on developing a J-Term course for students who did poorly on that assessment. I co-developed (with Glenn Ellis) a summer math course for engineering students who take PHY115 or who take PHY117 but still have trouble with math skills.
 - **GRE Preparation for Physics Students:** I organized a series of weekly GRE preparation sessions for juniors and seniors in physics. These sessions are held every year in the fall and are led in rotating fashion by all physics faculty.