A. Curriculum Vitae

RICARDO A. FLORES

Department of Physics and Astronomy
University of Missouri – St. Louis
St. Louis, Missouri 63121
(314) 516–6727 (office)
email: Ricardo.Flores@umsl.edu
WWW: http://www.umsl.edu/~floresr

EDUCATION

B.S., Physics, University of Chile, Santiago, Chile 8/79
Ph.D., Physics, University of California, Santa Cruz 8/84
Languages: Bilingual Spanish-English. Fluent in French.

EMPLOYMENT

Regular positions

2001–present	Professor, University of Missouri-Saint Louis
1994–2001	Associate Professor, University of Missouri-Saint Louis
1990–1994	Assistant Professor, University of Missouri-Saint Louis
1988–1990	Postdoctoral Research Associate, Theoretical Physics Institute, University of Minnesota
1986–1988	Scientific Associate, Theory Division, CERN, Switzerland
1984–1986	Postdoctoral Research Associate, Physics Department, Brandeis University

Concurrent Positions

1992–1993	Associate Professor, Department of Physics, University of Chile

GRANT AWARDS

National Science Foundation — 1992–1998 — $75,000
Fundación Andes (Chile) — 1992–1993 — $10,000
University of Missouri — 1991, 1994–1996, 1998–2000 — $35,000

B. Scholarly Activity

I have worked in two separate fields of research over the years. Until 1996, most of my work was in the field of Elementary Particle Theory. However, starting in 1996 my research became entirely focused on Astrophysical Cosmology.

My research has had a good impact in each of the two fields I have worked in. The citations listed below were compiled from the SLAC/DESY High-Energy Physics Database (http://www.slac.stanford.edu/spires) and the NASA Astrophysics Data System (http://adsabs.harvard.edu/abstract_service.html) in May 2008. The citation rate for the works listed below is **58 citations per paper**. To put this record in perspective, note that the most–cited institutions in Physics average 14.7 citation per paper (highest is 21; see http://www.in-cites.com/institutions/phy_1995-2005.html). Also, note the SLAC/DESY database criteria for a paper to be considered famous (very well–known, well–known): more than 250 (100–249, 50–99) citations; by these criteria, 2 (4, 6) of these works qualify (with 1 (1, 3) of them written while at UM–St. Louis).

1. Publications in Print

a) Articles in Journals (all refereed; work from dissertation research marked by D)

My research has been published only in the major journals in the two fields I work on, Astrophysics and the Physics of Elementary Particles. I have not had a minor role in any of the publications listed below. **Ph. D. advisor: Marc Sher**.

Article	**citations**
1. R. Flores and M. Sher, "Effects of Additional Doublets in the Coleman-Weinberg SU(2) × U(1) → U(1) Phase Transition", *Physics Letters* Vol. B103 (1981) 445–449.	**4**
2. R. Flores and M. Sher, "Higgs Masses in the Standard, Multi-Higgs and Supersymmetric Models", *Annals of Physics* Vol. 148 (1983) 95–134.	**211**
3. R. Flores and M. Sher, "Upper Limits to Fermion Masses in the Weinberg-Salam Model", *Physical Review* Vol. D27 (1983) 1679–1682.	**79**
4. R. Flores and M. Sher, "Independence of Mass Scales in Inverse Hierarchy Models", *Physics Letters* Vol. B129 (1983) 411–413.	**2**
5. R. Flores and M. Sher, "Is Coleman-Weinberg Symmetry Breaking in the Standard Model Ruled Out?", *Nuclear Physics* Vol. B238 (1984) 702–715.	**11**
6. G. Blumenthal, S. Faber, R. Flores and J. Primack, "Contraction of Dark Matter Galactic Halos due to Baryonic Infall", *Astrophysical Journal* Vol. 301 (1986) 27–34.	**354**

7. R. Flores, G. Blumenthal, A. Dekel and J. Primack, "Is the Universe Dominated by Relativistic Particles?", *Nature* Vol. 323 (1986) 781–784. **14**

8. J. Ellis, R. Flores, S. Rudaz and D. Seckel, "Comments on the Possibility of Electroweak Baryon Number Violation at High Temperatures", *Physics Letters* Vol. B194 (1987) 241–246. **30**

9. R. Flores, "Dynamical Estimates of the Local Density of Dark Matter", *Physics Letters* Vol. B215 (1988) 73–80. **51**

10. J. Ellis, R. Flores and S. Ritz, "Implications for Dark Matter Particles of Searches for Energetic Solar Neutrinos", *Physics Letters* Vol. B198 (1987) 393–402. **120**

11. J Ellis and R. Flores, "Realistic Predictions for the Detection of Supersymmetric Dark Matter", *Nuclear Physics* Vol. B307 (1988) 883–908. **100**

12. J. Ellis, R. Flores and J. D. Lewin, "Rates for Inelastic Nuclear Excitation by Dark Matter Particles", *Physics Letters* Vol. B212 (1988) 375–380. **22**

13. J. Ellis, R. Flores, K. Freese, S. Ritz, D. Seckel, and J. Silk, "Cosmic Ray Constraints on the Annihilations of Relic Particles in the Galactic Halo", *Physics Letters* Vol. B214 (1988) 403–412. **66**

14. H. Dreiner, J. Ellis and R. Flores, "The Spin of the Proton in a Hybrid Chiral Bag Model", *Physics Letters* Vol. B221 (1989) 167–172. **28**

15. B. Campbell, J. Ellis and R. Flores, "Parity Violation in Light Atoms and the Strange Spin Content of the Proton", *Physics Letters* Vol. B225 (1989) 419–424. **18**

16. R. Flores, K. Olive and S. Rudaz, "Radiative Processes in LSP Annihilation", *Physics Letters* Vol. B232 (1989) 377–382. **9**

17. R. Flores, K. Olive and M. Srednicki, "Elastic Neutralino-Matter Scattering", *Physics Letters* Vol. B237 (1990) 72–76. **42**

18. R. Flores, K. Olive and D. Thomas, "A New Dark Matter Candidate in the Minimal Extension of the Supersymmetric Standard Model", *Physics Letters* Vol. B245 (1990) 509–515. **29**

19. R. Flores, K. Olive and D. Thomas, "Light-Neutralino Interactions in Matter in an Extended Supersymmetric Standard Model", *Physics Letters* Vol. B263 (1991) 425–431. **20**

20. J. Ellis and R. Flores, "Elastic Supersymmetric Relic-Nucleus Scattering Revisited", *Physics Letters* Vol. B263 (1991) 259–266. **136**

21. J. Ellis, R. Flores and S. Masood, "MSW Effects on High Energy Solar Neutrinos from Relic Annihilation", *Physics Letters* Vol. B294 (1992) 229–234. **16**

22. J. Ellis and R. Flores, "Prospects for Neutralino Detection with a ^{73} Ge + ^{76} Ge Detector", *Physics Letters* Vol. B300 (1993) 175–182. **73**

23. R. Flores, J. Primack, G. Blumenthal and S. Faber, "Rotation Curves from Baryonic Infall: Dependence on Disk–to–Halo Ratio, Initial Angular Momentum, and Core Radius, and Comparison with Data", *Astrophysical Journal* Vol. 412 (1993) 443–454. **90**

24. J. Ellis and R. Flores, "Implications of LEP on Laboratory Searches for Dark Matter Neutralinos", *Nuclear Physics* Vol. B400 (1993) 25–36. **48**

25. R. Flores and J. Primack, "Observational and Theoretical Constraints on Singular Dark Matter Halos", *Astrophysical Journal Letters* Vol. 427 (1994) 1–4. **244**

26. R. Flores, "Systematics of Spiral Rotation from Tidal Torquing", *International Journal of Modern Physics* Vol. D3 (1994) 81–86. N/A

27. R. Flores and J. Primack, "Cluster Cores, Gravitational Lensing, and Cosmology", *Astrophysical Journal Letters* Vol. 457 (1996) 5–9. **25**

28. J. Ellis and R. Flores, "Implications of the Strange Spin of the Nucleon for the Neutron Electric Dipole Moment in Supersymmetric Theories", *Physics Letters* Vol. B377 (1996) 83–88. **42**

29. A. Maller, R. Flores and J. Primack, "Inclination Effects in Spiral Galaxy Gravitational Lensing", *Astrophysical Journal* Vol. 486 (1997) 681–686. **29**

30. M. Way, R. Flores and H. Quintana, "Statistics of AGN in Rich Clusters Revisited", *Astrophysical Journal* Vol. 502 (1998) 134–140. **5**

31. R. Flores, H. Quintana and M. Way, "Deconstructing A3266: A Major Merger in a Quiet Cluster", *Astrophysical Journal* Vol 532 (2000) 206–213. **12**

32. A. Maller, L. Simard, P. Guhathakurta, J. Hjorth, A. Jaunsen, R. Flores, and J. Primack, "Breaking the Disk/Halo Degeneracy with Gravitational Lensing", *Astrophysical Journal* Vol 533 (2000) 194–202. **32**

33. R. Flores, A. Maller, and J. Primack, "Arc Statistics in Clusters: Galaxy Contribution", *Astrophysical Journal* Vol. 535 (2000) 555-560. **25**

34. K. Roettiger and R. Flores, "A Prediction for Observable Rotation in the ICM of Abell 3266", *Astrophysical Journal* Vol. 538 (2000) 92–97. **18**

35. B. Allgood, R. Flores, J. Primack, A. Kravtsov, R. Wechsler, A. Faltenbacher, and J. Bullock, "The Shape of Dark Matter Haloes: Dependence on Mass, Redshift, Radius and Formation", *Mon. Not. R. Astron. Soc.* Vol. 367 (2006) 1781–1796. **74**

36. R. Flores, B. Allgood, A. Kravtsov, J. Primack, D. Buote, and J. Bullock, *"The Shape of Galaxy Cluster Dark Matter Halos: Systematics of Its Imprint on Cluster Gas, and Comparison to Observations", Mon. Not. R. Astron. Soc.* Vol. 377 (2007) 883-896. **10**

Total citations for journal publications: 2089.

b) Articles in Conference Proceedings (all invited)

1. R. Flores, "Higgs Masses and Supersymmetry" in "Inner Space/Outer Space", eds. E. Kolb, et al. (University of Chicago Press, Chicago, 1986), p. 561–562.

2. R. Flores, "Constraints on Unstable Dark Matter", in "XXIII International High Energy Physics Conference", ed. S.C. Loken (World Scientific, Singapore, 1987), p. 470–474.

3. R. Flores, "Unstable Dark matter and Galaxy Formation", in "Nearly Normal Galaxies", ed. S.M. Faber (Springer-Verlag, New York, 1987), p. 413–420.

4. R. Flores, "Galaxy Formation with Baryonic Infall", in "Cosmology and Particle Physics", ed. I. Hinchliffe (World Scientific, Singapore, 1987), p. 48–62.

5. R. Flores, "Dark Matter", in "Proceedings of the International Europhysics Conference on High Energy Physics", ed. O. Botner (EPS, Petit Lancy, 1987), p. 403–407.

6. R. Flores, "The Rotation of Spiral Galaxies: Infall Model vs. Observations", in "Large Scale Structures of the Universe", eds. J. Audouze et al. (Kluwer Academic Publishers, Dordrecht, 1988) p. 584.

7. R. Flores, "Laboratory Detection of Supersymmetric Dark Matter", in "Proceedings of the II European Workshop on Low Temperature Devices for the Detection of Low Energy Neutrinos and Dark Matter", eds. L. Gonzalez-Mestres and D. Perret-Gallix (editions Frontieres, Gif-sur-Yvette, 1988) p. 103–115.

8. R. Flores, "The Local Density of Halo Dark Matter", Annales de Physique, **13** (1988) 13–15.

9. J. Ellis, R. Flores, K. Freese, S. Ritz, D. Seckel, and J. Silk, "Halo Antiprotons and Gamma Rays from Cold Dark Matter Annihilation", in "Proceedings of the Workshop on Particle Physics: Forefront Experimental Issues", ed. E.B. Norman, (World Scientific, Singapore, 1988) p. 253–254.

10. R. Flores, "Neutralino Interaction in the Laboratory", in "Proceedings of the XXIV International Conference on High Energy Physics", eds. R. Kotthaus and J. H. Kuhn (Springer-Verlag, Berlin, 1989) p. 1511–1518.

11. R. Flores, "Particle Dark Matter and Its Laboratory Detection", in "Particle Astrophysics, Atomic Physics and Gravitation", *eds*. J. Trân Thanh Vân, G. Fontaine and E. Hinds, Editions Frontieres, 1995, pp. 141–146.

12. A. Maller, R. Flores and J. Primack, "Modeling Spiral Galaxy Lenses", in Proceedings of the *Golden Lenses* workshop held at Jodrell Bank, University of Manchester, June 23–25 1997, pp 1–4.

13. M. Way, R. Flores, and H. Quintana, "Reevaluating Active Galactic Nuclei in Rich Clusters", in "Observational Cosmology: Development of Galaxy Systems", eds. G. Giuricin, M. Mezzetti, and P. Salucci, Astronomical Society of the Pacific Conference Series, Vol.176 (1999) 93–96.

14. A. Maller, R. Flores, and J. Primack, "Determining Halo and Disk Properties from Gravitational Lensing of Spiral Galaxies", in "Galactic Halos: A UC Santa Cruz Workshop", ed. D. Zaritsky, Astronomical Society of the Pacific Conference Series, Vol.136 (1998) 311–313.

2. Presentations to Scholarly Groups and Conferences

Over the years I have been invited to present my work at national and international Conferences, as well as to Scholarly Groups throughout the country and in Europe. All have been oral presentations about work that was subsequently published (see section **B1**).

a) Invited presentations at Conferences

1. University of Washington Summer Institute, Seattle, WA (August 1983); (Talk: "Higgs and Fermion Masses in the GWS Model").

2. "Inner Space/Outer Space", Fermilab, Batavia, IL (May 1984); (Talk: "Higgs Masses and Supersymmetry").

3. "Inflationary Cosmology Confronts Observations", University of California, Berkeley (March 1985); (Talk: "Dissipational Infall of Baryons in Dark Matter Halos").

4. XXIII International Conference on High Energy Physics, University of California, Berkeley (July 1986); (Talk: "Constraints on Unstable Dark Matter").

5. "Nearly Normal Galaxies: From the Planck Time to the Present", University of California, Santa Cruz (July 1986); (Talk: "Unstable Dark Matter and Galaxy Formation").

6. Theoretical Workshop on Cosmology and Particle Physics, Lawrence Berkeley Laboratory, Berkeley (August 1986); (Talk: "Galaxy Formation with Baryonic Infall").

7. "Dark Matter and Formation of Large Scale Structure", Hebrew University, Jerusalem, Israel (December 1986); (Talk: "Cosmology with Unstable Dark Matter").

8. "International Europhysics Conference on High Energy Physics", Uppsala, Sweden (June 1987); (Talk: "Dark Matter Review").

9. "La Masse Cachée Dans L'Univers et La Matière Noire", Laboratoire d'Annecy de Physique des Particules, Annecy, France (July 1987); (Talk: "The Local Density of Halo Dark Matter").

10. "The Post Recombination Universe", NATO Workshop at Cambridge University, Cambridge, UK (July 1987); (Talk: "The Rotation of Spiral Galaxies").

11. "II European Workshop on Low Temperature Devices for the Detection of Low Energy Neutrinos and Dark Matter", LAPP, Annecy (May 1988); (Talk: "Laboratory Detection of Supersymmetric Dark Matter").

12. "Conference on High Energy Physics and Cosmology", ICTP, Trieste (July 1988); (Talk: "Dark Matter Detection").

13. "XXIV International High Energy Physics Conference", Munich (August 1988); (Talk: "Neutralino Interaction in the Laboratory").

14. "Dark Matter", Institute for Fundamental Theory, University of Florida, Gainsville, FL (February 1992); (Talk: "Systematics of Spiral Rotation from Tidal Torquing").

15. "VII Latin-american Regional Meeting of the International Astronomical Union", Chile (November 1992); (Talk:"Systematics of Spiral Rotation: A Comparison of Theory and Observation").

16. "XXIXth Rencontre de Moriond", Villars sur Ollon, Switzerland (January 1994); (Talk:"Particle Dark Matter and Its Laboratory Detection").

17. "Workshop on Galaxy Formation and Evolution", University of California, Santa Cruz (August 1998); (Talk: "Cluster Lensing").

18. "Princeton University–PUC Workshops on Astrophysics: Ω", Chile (January 1999); (Talk:"Gravitational Lensing by Galaxy Clusters").

19. "Workshop on Galaxy Formation and Evolution", University of California, Santa Cruz (August 2000); (Talk: "Rotation Curves: CDM vs. Data").

b) Invited presentations to Scholarly Groups

1. Department of Physics, Brandeis University, September 1984.

2. Center for Astrophysics, Harvard University, April 1985.

3. Department of Physics, Tufts University, October 1985.

4. Department of Physics, Northeastern University, January 1986.

5. Department of Physics, University of Minnesota, January 1986.

6. Department of Physics, University of Pennsylvania, February 1986.

7. Theory Division, European Center for Nuclear Research (CERN), October 1986.

8. International School for Advanced Studies (SISSA), Trieste, February of 1987.

9. Department of Physics, University of Paris VII, March 1987.

10. Department of Physics, University of Napoli, May 1987.

11. Bartol Research Institute, University of Delaware, January 1988.

12. Department of Physics, Ohio State University, January 1988.

13. Department of Physics, University of Florida, February 1988.

14. Department of Physics, University of Massachussetts–Amherst, February 1988.

15. Fermi National Accelerator Laboratory, February 1988.

16. Department of Physics, University of Michigan, February 1988.

17. Department of Physics, University of Pisa, April 1988.

18. Theoretical Physics Center, CNRS Marseille, May 1988.

19. Department of Physics, University of California–Los Angeles, January 1989.

20. Department of Physics, University of California–Riverside, December 1989.

21. Department of Physics, University of California–Santa Cruz, December 1989.

22. Department of Physics, University of California–Davis, January 1990.

23. Department of Physics, Ohio State University, February 1990.

24. Center for Particle Astrophysics, University of California-Berkeley, January 1990

25. Theoretical Physics Institute, University of Minnesota, February 1990.

26. Department of Physics, Washington University, September 1990.

27. Department of Physics, Washington University, October 1990.

28. Department of Physics, Washington University, October 1991.

29. Department of Astronomy, University of Chile, November 1992.

30. Department of Physics, University of Chile, November 1992.

31. Department of Physics, College of William and Mary, May 1996.

32. Department of Astronomy, Catholic University of Chile, March 1997.

33. Department of Physics, Saint Louis University, November 1998.

34. Department of Physics, University of Missouri – Columbia, April 1999.

35. Bartol Research Institute, University of Delaware, March 2000.

C. Teaching Activity

1. Courses Taught at UM–St. Louis

Fundamental Particles and Forces (Physics 5357)
Electrodynamics I (Physics 6411)
Electrodynamics II (Physics 6423)
Astrophysics (Astronomy 4301)
Electromagnetism & Optics (Physics 2112)
Quantum Mechanics I (Physics 6461)
Quantum Mechanics II (Physics 6463)

2. Doctoral Students

Michael J. Way, Ph. D. in Physics, 1998
Zhongyu Zhang, Ph. D. in Physics, 2003
David R. Coss, Ph. D. in Physics, 2010

In addition, I co–advised Ariyeh Maller, Ph. D. in Physics, 1999 (UC–Santa Cruz).

3. Teaching at Other Institutions

University of California–Santa Cruz: Introduction to Particle Physics (1984)

University of Chile: Introduction to Astrophysics (1992)
Introduction to Symmetries and Particles (1993)