

Curriculum Vitae
Brian D. Fields

Department of Astronomy
The University of Illinois at Urbana-Champaign
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Current Position

Assistant Professor Aug. 2000 – present
Departments of Astronomy and of Physics, and Center for Theoretical Astrophysics
University of Illinois at Urbana-Champaign

Research Interests

Cosmology, nuclear and particle astrophysics. Primordial nucleosynthesis, cosmic rays, gamma-ray astrophysics, neutrino astrophysics, dark matter, galactic evolution. Supernovae: near-earth events and their signatures in live radioisotopes; supernova remnants. Terrestrial neutrinos from geophysical radioactive decays.

Experience

Visiting Assistant Professor Aug. 1998 – Aug. 2000
Department of Astronomy
University of Illinois at Urbana-Champaign

Research Associate Aug. 1997 – Aug. 1998
School of Physics and Astronomy, University of Minnesota

Research Associate Aug. 1995 – Aug. 1997
Dept. of Physics, University of Notre Dame

Postdoctoral Fellow Nov. 1994 – July 1995
Institut d'Astrophysique, Paris, France.

Doctoral Candidate Sept. 1990–Oct. 1994
Dept. of Physics, Univ. of Chicago.
Supervisor: Professor David Schramm

Education

University of Chicago, Chicago, IL
Ph.D. in Physics, December 1994
M.S. in Physics, June 1992

Williams College, Williamstown, MA
A.B. *magna cum laude*, June, 1989
In Physics with highest honors, and in English

Awards

NSF CAREER Award, August 2001.
Invited to UIUC Campus Honors Program faculty, August 2001
UIUC Incomplete List of Teachers Ranked as Excellent, Spring 2000, Fall 2000,
Fall 2001 (Outstanding), Fall 2002 (Outstanding), Fall 2003 (Outstanding),
Spring 2004
NSF/NATO Postdoctoral Fellow 1994-1995
Nathan Sugarman Prize for Graduate Research. The Enrico Fermi Institute,
University of Chicago, 1993
NASA Graduate Student Researchers Program Fellow 1992-1993; renewed 1993-1994
US Dept. of Education Fellowship 1990-1991, 1991-1992
Gregor Wentzel Prize for Teaching Assistants, honorable mention.
University of Chicago, June 1990.
GE Foundation Graduate Fellowship. Williams College, June, 1989.
Howard Stabler Prize in Physics. Williams College, June, 1989
Sigma Xi. Williams College, June 1989
Phi Beta Kappa. Williams College, Sept. 1988

Invited Talks

Joint High Energy Physics and Nuclear Physics Seminar, Univ. of Rochester, March 2005
Colloquium, Department of Astronomy, Univ. of Wisconsin, Oct. 2004.
Seminar, TRIUMF Laboratory, Vancouver, Jan. 2004
Colloquium, Department of Physics and Astronomy, Univ. of Victoria, Jan. 2004
High Energy Theoretical/Experimental Physics Seminar, Univ. of Illinois.
Oct. 2003
Astrophysics Seminar, Department of Physics, Notre Dame Univ., Oct. 2003
Colloquium, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, Sept. 2003

Astronomy with Radioactivities IV Workshop, Seeon, Germany, May 2003
American Physical Society Meeting, Philadelphia, PA, April 2003
Stellar Abundances & Nucleosynthesis Conference, Seattle, WA, March 2002.
Workshop on Low Z at Low z and High z: Early Chemical Evolution,
Minneapolis, MN, March 2002.
Theoretical Astrophysics Seminar, Fermilab, March 2002.
Colloquium, Dept. of Physics, Indiana University/Purdue University of Indianapolis,
Jan. 2002.
Conference on Deuterium in the Universe, Observatoire de Meudon, France, June 2001.
Workshop on Frontiers of Nuclear Astrophysics, Argonne National Laboratory,
February 2001.
Astronomy Seminar, Dept. of Physics & Astronomy, Michigan State Univ., Oct. 2000
Colloquium, Dept. of Physics & Astronomy, Ohio Univ., Sept. 2000
Colloquium, Dept. of Physics & Astronomy, Univ. of Oklahoma, Sept. 2000
Colloquium, Dept. of Physics, Hamilton College, Feb. 2000
Colloquium, Dept. of Astronomy, Indiana Univ., Sept. 1999
AAS Special Session on Cosmic Rays, Supernovae, and Light Element Production,
Chicago, May 1999
Colloquium, Dept. of Astronomy, Univ. of Illinois Urbana-Champaign, April 1999
Astronomy Seminar, Department of Physics and Astronomy, Michigan State Univ.,
Feb. 1999
Workshop on LiBeB, Cosmic Rays and Gamma-Ray Line Astronomy,
Institut d'Astrophysique de Paris, Dec. 1998
Astrophysics Seminar, Department of Physics, Notre Dame Univ., Oct. 1998
Astrophysics Colloquium, Department of Astronomy, Univ. of Minnesota, Oct. 1997
Workshop on Gravitational Microlensing, Aspen Center for Physics, June 1997
Workshop on Nucleosynthesis in the Big Bang, Stars, and Supernovae.
Univ. of Washington, July 1996.
Autumn Meeting of APS Division of Nuclear Physics. Williamsburg, VA, Oct. 1994.

External Funding

“Supernova Remnant–Heliosphere Collisions and Transport of Live Radioisotopes: Three Dimensional Simulations”

PI: Brian Fields

NASA June 1, 2004 – May 31, 2007

Award: \$181,468

“CAREER: Nucleosynthesis in the Early Universe and the Early Galaxy”

PI: Brian Fields

NSF Aug. 15, 2001 – July 31, 2006

Award: \$335,000

Teaching

Assistant Professor, University of Illinois

Astronomy 596/496 NPA: Nuclear and Particle Astrophysics. Spring 2004, 2005.
Fall 2001.

Astronomy 396 AFT: Astronomy for Teachers. Summer 2002.

Astronomy 306: Galaxies and the Universe. Fall 2003.

Astronomy 301: Scientific Writing for Astronomers. Fall 2003.

Astronomy 210: General Astronomy. Spring 2000. Fall 2000, 2002, 2004.

Astronomy 100: Perspectives in Astronomy. Spring 1999, 2002, 2003. Fall 1999.

Physics 101: General Physics. Fall 1998.

Visiting Assistant Professor, University of Minnesota

Astronomy 1031/1032. Spring 1998.

Instructor, University of Notre Dame

Physics 127 Lab. Autumn 1995, Autumn 1996.

Teaching Assistant, University of Chicago

Autumn 1989–Spring 1991.

Graduate Student Advising

Richard Cyburt, UIUC Physics. PhD 2003

Thesis: “Analyzing Cosmological Concordance Between Big Bang Nucleosynthesis
and the Cosmic Microwave Background”

Postdoctoral Fellowship: TRIUMF National Laboratory for Particle and
Nuclear Physics, Canada. 2003–

Vasiliki Pavlidou, Astronomy

Prelim Passed: Spring 2003

Tijana Prodanović, Astronomy

Prelim Passed: Fall 2004

Currently on Thesis Committee for 3 Astronomy, 3 Physics students

Service

Service to Department: Astronomy, University of Illinois

Associate Director, Center for Theoretical Astrophysics, 2003–

General Graduate Advisor, 2001-2002, 2002-2003, 2003-2004, Consultant 2004-2005

Colloquium Chair, Spring 1999

Qualifying Exam Committee 2000-2001, 2003-2004, Chair 2002-2003

Undergraduate Advisor, 1999-2000, 2002-2003, 2003-2004, 2004-2005

Undergraduate Recruitment Committee Chair 2001-2002

Departmental Study Abroad Advisor 1999-2000, 2001-2002, 2002-2003, 2003-2004,
2004-2005

Service to Discipline

Referee: *Astrophys. J.*, *Phys. Rev. D*, *Phys. Rev. Lett.*, *Astropart. Phys.*, *Phys. Lett. B*,
J. Cosmology & Astropart. Phys.

Service to Community

Instructor, SummerMath program for 8th Grade students, July 2004

Speaker, Saturday Astrophysics Honors Program 2004, 2005

Speaker, Saturday Physics Honors Program 2000, 2002

Conference Organizing

Member, Local Organizing Committee, 3rd International Workshop on Gravitational Mi-
cro-lensing Surveys, Notre Dame, March 6–8, 1997

Publications

Refereed Journals

1. “Optimal State Determination By Mutually Unbiased Measurements”
William K. Wootters and Brian D. Fields
Annals of Physics (1989) **191**, 363.
2. “The Boron-to-Beryllium Ratio in Halo Stars: A Signature of Cosmic Ray Nucleosynthesis in the Early Galaxy”
T. P. Walker, G. Steigman, D. N. Schramm, K. A. Olive, and B. Fields
The Astrophysical Journal (1993) **413**, 562.
3. “Beryllium and Boron Constraints on an Early Galactic Bright Phase”
Brian D. Fields, David N. Schramm, and James W. Truran
The Astrophysical Journal (1993) **405**, 559.
4. “Primordial Nucleosynthesis and the Abundance of Beryllium and Boron”
David Thomas, David N. Schramm, Keith A. Olive, and Brian D. Fields
The Astrophysical Journal (1993) **406**, 569.
5. “Effect of Neutrino Heating on Primordial Nucleosynthesis”
Brian D. Fields, Scott Dodelson, and Michael S. Turner
Physical Review D (1993) **47**, 4309.
6. “Pop II ${}^6\text{Li}$ as a Probe of Nucleosynthesis and Stellar Structure and Evolution”
Gary Steigman, Brian D. Fields, Keith A. Olive, David N. Schramm, and Terry P. Walker
The Astrophysical Journal Letters (1993) **415**, L35.
7. “Constraints on Neutrino Oscillations from Big Bang Nucleosynthesis”
X. Shi, D. N. Schramm, and B. D. Fields
Physical Review D (1993) **48**, 2563.
8. “Production of Li, Be & B from Baryon Inhomogeneous Primordial Nucleosynthesis”
David Thomas, David N. Schramm, Keith A. Olive, Grant J. Mathews, Bradley S. Meyer, and Brian D. Fields
The Astrophysical Journal (1994) **430**, 291.
9. “Cosmic Ray Models for Early Galactic Lithium, Beryllium, and Boron Production”
Brian D. Fields, Keith A. Olive, and David N. Schramm
The Astrophysical Journal (1994) **435**, 185.
10. “Implications of a High Population II B/Be Ratio”
Brian D. Fields, Keith A. Olive, and David N. Schramm
The Astrophysical Journal (1995) **439**, 854.

11. “On the Evolution of the Light Elements I. D, ^3He , and ^4He ”
Brian D. Fields
The Astrophysical Journal (1996) **456**, 478.
12. “Nuclear and Gamma-ray Production by Supernova Ejecta”
Brian D. Fields, Michel Cassé, Elisabeth Vangioni-Flam, and Ken’ichi Nomoto
The Astrophysical Journal (1996) **462**, 276.
13. “Model-Independent Predictions of Big Bang Nucleosynthesis”
Brian D. Fields and Keith A. Olive
Physics Letters B (1996), **368**, 103.
14. “LiBeB Production by Nuclei and Neutrinos”
Elisabeth Vangioni-Flam, Michel Cassé, Brian D. Fields, and Keith A. Olive
The Astrophysical Journal, (1996) **468**, 199.
15. “Model Independent Predictions of Big Bang Nucleosynthesis from ^4He and ^7Li : Consistency and Implications”
Brian D. Fields, Kimmo Kainulainen, Keith A. Olive, and David Thomas
New Astronomy (1996) **1**, 77.
16. “Geological Isotopic Anomalies as Signatures of Nearby Supernovae”
John Ellis, Brian D. Fields, and David N. Schramm
The Astrophysical Journal (1996) **470**, 1227.
17. “Nucleosynthesis Limits on the Mass of Long Lived Tau and Muon Neutrinos”
Brian D. Fields, Kimmo Kainulainen, and Keith A. Olive
Astroparticle Physics (1997) **6**, 169.
18. “Halo White Dwarfs and the Hot Intergalactic Medium”
Brian D. Fields, Grant J. Mathews, and David N. Schramm
The Astrophysical Journal (1997) **483**, 625.
19. “Massive Compact Halo Objects Viewed from a Cosmological Perspective: Contribution to the Baryonic Mass Density of the Universe”
Brian D. Fields, Katherine Freese, and David S. Graff,
New Astronomy (1998) **3**, 347
20. “On the Evolution of Helium in Blue Compact Galaxies”
Brian D. Fields and Keith A. Olive
The Astrophysical Journal (1998), **506**, 177
21. “The Boron Isotopic Ratio in HD 76932”
Luisa Rebull, Douglas Duncan, Sveneric Johansson, Julie Thorburn, and Brian Fields
The Astrophysical Journal (1998), **507**, 387

22. “Testing the Relation Between Local and Cosmic Star Formation Histories”
Brian D. Fields
The Astrophysical Journal (1999), **515**, 603
23. “The Revival of Galactic Cosmic Ray Nucleosynthesis?”
Brian D. Fields and Keith A. Olive
The Astrophysical Journal (1999), **516**, 797
24. “The Evolution of ${}^6\text{Li}$ in Standard Cosmic-Ray Nucleosynthesis”
Brian D. Fields and Keith A. Olive
New Astronomy (1999), **4**, 255
25. “On Deep-Ocean ${}^{60}\text{Fe}$ as a Fossil of a Near-Earth Supernova”
Brian D. Fields and John Ellis
New Astronomy (1999), **4**, 419
26. “Chemical Abundance Constraints on White Dwarfs as Halo Dark Matter”
Brian D. Fields, Katherine Freese, & David S. Graff
The Astrophysical Journal (2000), **534**, 265
27. “Primordial Lithium and Big Bang Nucleosynthesis”
Sean G. Ryan, Timothy C. Beers, Keith A. Olive, Brian D. Fields, & John E. Norris
The Astrophysical Journal Letters (2000), **530**, L57
28. “Testing Spallation Processes With Beryllium and Boron”
Brian D. Fields, Keith A. Olive, Elisabeth Vangioni-Flam, & Michel Cassé
The Astrophysical Journal (2000), **540**, 930–945
29. “Standard Cosmic Ray Energetics and Light Element Production”
Brian D. Fields, Keith A. Olive, Michel Cassé, & Elisabeth Vangioni-Flam
Astronomy & Astrophysics (2001), **370**, 623–634
30. “The NACRE Thermonuclear Reaction Compilation and Big Bang Nucleosynthesis”
Brian D. Fields, Richard H. Cyburt, & Keith A. Olive
New Astronomy (2001), **6**, 215–238
31. “Diffuse Gamma-Rays From Local Group Galaxies”
Vasiliki Pavlidou & Brian D. Fields
The Astrophysical Journal (2001), **558**, 63–71
32. “On the Possible Sources of D/H Dispersion at High Redshift”
Brian D. Fields, Keith A. Olive, Joseph Silk, Michel Cassé, and Elisabeth Vangioni-Flam
The Astrophysical Journal (2001), **563**, 653–659
33. “Primordial Nucleosynthesis with CMB Inputs: Probing the Early Universe and Light Element Astrophysics”
Richard H. Cyburt, Brian D. Fields, & Keith A. Olive *Astroparticle Physics* (2002), **17**, 87–100

34. “A Simple Model for r -Process Scatter and Halo Evolution”
Brian D. Fields, James W. Truran, & John J. Cowan
The Astrophysical Journal (2002), **575**, 845–854
35. “Constraining Strong Baryon–Dark Matter Interactions with Primordial Nucleosynthesis and Cosmic Rays”
Richard H. Cyburt, Brian D. Fields, Vasiliki Pavlidou, and Benjamin Wandelt
Physical Review D (2002), **65** 123503
36. “The Guaranteed Gamma-Ray Background”
Vasiliki Pavlidou and Brian D. Fields
The Astrophysical Journal Letters (2002), **557** 5–8.
37. “A Peculiar Linear Radio Feature In The Supernova Remnant N206”
Robert J. Klinger, John R. Dickel, Brian D. Fields, and Douglas K. Milne
The Astronomical Journal (2002), **124**, 2135–2144.
38. “Discovery of an old, nearby, and overlooked supernova remnant centered on the southern constellation Antlia Pneumatica”
Peter R. McCullough, Brian D. Fields, and Vasiliki Pavlidou
The Astrophysical Journal Letters (2002), **576**, L41–L44.
39. “Production of Lithium, Beryllium, and Boron by Hypernovae”
Brian D. Fields, Frederic Daigne, Michel Cassé, and Elisabeth Vangioni-Flam
The Astrophysical Journal (2002), **581**, 389–395.
40. “On the Baryometric Status of ^3He ”
Elisabeth Vangioni-Flam, Keith A. Olive, Brian D. Fields, & Michel Cassé
The Astrophysical Journal (2003), **585**, 611–616.
41. “Updated Nucleosynthesis Constraints on Unstable Relic Particles”
Richard H. Cyburt, John Ellis, Brian D. Fields, and Keith A. Olive
Physical Review D (2003), **67**, 103521
42. “Primordial Nucleosynthesis in Light of WMAP”
Richard H. Cyburt, Brian D. Fields, and Keith A. Olive
Physics Letters B (2003), **567**, 227–234.
43. “On Non-primordial Deuterium Production by Accelerated Particles”
Tijana Prodanović and Brian D. Fields
The Astrophysical Journal (2003), **597**, 48–56.
44. “Live radioisotopes as signatures of nearby supernovae”
Brian D. Fields
New Astronomy Reviews (2004), **48**, 119–123.
45. “The Pionic Contribution to Diffuse Gamma Rays: Upper Limits”
Tijana Prodanović and Brian D. Fields
Astroparticle Physics (2004) **21**, 627–635

46. “Solar Neutrino Constraints on the BBN Production of Li”
Richard H. Cyburt, Brian D. Fields, and Keith A. Olive
Physical Review D (2004) **69**, 123519
47. “Probing Primordial and Pre-Galactic Lithium with High Velocity Clouds”
Tijana Prodanović and Brian D. Fields
The Astrophysical Journal Letters (2004) **616**, L115–118
48. “Deep-Ocean Crusts as Telescopes: Using Live Radioisotopes to Probe Supernova Nucleosynthesis”
Brian D. Fields, Kathrin A. Hochmuth, and John Ellis
The Astrophysical Journal (2005) in press
49. “Double Distribution of Dark Matter Halos with respect to Mass and Local Over-density”
Vasiliki Pavlidou and Brian D. Fields
Physical Review D (2005) in press
50. “Lithium-6 and Gamma Rays: Complementary Constraints on Cosmic-Ray History”
Brian D. Fields and Tijana Prodanović
The Astrophysical Journal (2005) in press
51. “New BBN limits on Physics Beyond the Standard Model from ${}^4\text{He}$ ”
Richard H. Cyburt, Brian D. Fields, Keith A. Olive, and Evan Skillman
Astroparticle Physics (2005) in press

Refereed Journals: Pending

1. “Imaging the Earth’s Interior: the Angular Distribution of Terrestrial Neutrinos”
Brian D. Fields and Kathrin A. Hochmuth
Physical Review D submitted (2004)

Invited Reviews

1. “Big Bang Nucleosynthesis”
Brian D. Fields and Keith A. Olive
Nuclear Physics A (2005) in press
2. “Big Bang Nucleosynthesis”
Brian D. Fields and Subir Sarkar
Mini-Review in “Review of Particle Properties”
(2004) in press, also available on the PDG WWW pages pdg.lbl.gov.
3. “A Census of Cosmic Matter”
Brian D. Fields
Science (2001) **294**, 529

4. “Big Bang Nucleosynthesis” Brian D. Fields and Subir Sarkar
Mini-Review in “Review of Particle Properties”
D.E. Groom et al. (Particle Data Group), **The European Physical Journal**
(2000) C15 1, and 2001 off-year partial update for the 2002 edition available on the
PDG WWW pages pdg.lbl.gov.

Popular Journals

1. “Cosmic Birth Rite”
Brian Fields
New Scientist (2004), Feb. 14-20, 36.
2. “The Big Bang Strikes Back”
David Schramm (with Brian Fields and Craig Copi)
New Scientist (1993) **138**, 1878, 31.
3. “Kernfusie na de oerknal” (“Big Bang Nucleosynthesis”)
David N. Schramm and Brian D. Fields
Zenit [the Netherlands] (1996), **23**, 9, 360.

Conference Proceedings

1. “Searching for Mutually Unbiased Observables”
William K. Wootters and Brian D. Fields
Bell's Theorem, Quantum Theory and Conceptions of the Universe, (1989) M.
Kafatos, ed. (Kluwer:Boston).
2. “Quark Matter and Cosmology”
David N. Schramm, Brian D. Fields, and David Thomas
Nuclear Physics A (1992) **544**, 267c.
3. “Cosmic Rays and Galactic Chemical Evolution”
Brian D. Fields, David N. Schramm, and James W. Truran
Proceedings of the XXIIIth International Cosmic Ray Conference (1993), **2**, 300.
4. “Lithium, Beryllium, and Boron in Cosmology and Cosmic Rays”
Brian D. Fields
Particle Physics and Cosmology (1994), eds. A. Astbury et al (World Scientific: New
Jersey) 452.
5. “Nuclear and Gamma-ray Production by Supernova Ejecta”
Brian D. Fields
in the Proceedings of Nuclei in the Cosmos IV
Nuclear Physics A, (1997) **621**, 481.

6. "Halo White Dwarfs and the Hot Intergalactic Medium"
Brian D. Fields, Grant Mathews, and David Schramm
in the Proceedings of Nuclei in the Cosmos IV
Nuclear Physics A, (1997) **621**, 580.
7. "Halo White Dwarfs and the Hot Intergalactic Medium"
Brian D. Fields, Grant Mathews, and David Schramm
in the Proceedings of the Eighteenth Texas Symposium on Relativistic Astrophysics
and Cosmology, (1998), eds. A. Olinto, J. Friedman, & D. Schramm (World Scien-
tific: New Jersey), 333.
8. "Halo White Dwarfs and Baryonic Dark Matter"
Brian D. Fields, Grant J. Mathews, and David N. Schramm
in *Primordial Nuclei and Their Galactic Evolution* (1998), eds. N. Prantzos et al.
(Kluwer: Dordrecht), 219.
9. "The Galactic Evolution of Beryllium and Boron"
Brian D. Fields and Keith A. Olive
in *LiBeB, Cosmic Rays, and Related X- and Gamma-Rays*, eds. R. Ramaty, E.
Vangioni-Flam, M. Cassé, and K. Olive, *Proceeding of the Astronomical Society of
the Pacific*, (1999) **171**, 118
10. "LiBeB and Big Bang Nucleosynthesis"
Keith A. Olive and Brian D. Fields
in *LiBeB, Cosmic Rays, and Related X- and Gamma-Rays*, eds. R. Ramaty, E.
Vangioni-Flam, M. Cassé, and K. Olive, *Proceeding of the Astronomical Society of
the Pacific*, (1999) **171**, 36
11. "Probing Cosmic Ray Origin with Beryllium and Boron"
Brian D. Fields and Keith A. Olive
in *Proceedings of the 26th International Cosmic Ray Conference*, eds. D. Kieda, M.
Salamon, & B. Dingus, (1999) **4**, 203

References

Available upon request.