

# JEFFREY P. FILIPPINI – CURRICULUM VITAE

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## EDUCATION

### University of California - Berkeley, CA

Ph.D., Physics 2008

Dissertation: “A Search for WIMP Dark Matter Using the First Five-Tower Run of the Cryogenic Dark Matter Search”

Advisor: Bernard Sadoulet

M.A., Physics 2004

### Harvard University - Cambridge, MA

A.B. *summa cum laude*, Chemistry and Physics 2002

## RESEARCH INTERESTS

- Particle cosmology: direct and indirect searches for dark matter, observations of the cosmic microwave background, connections between theory and experiment.
- Detection of particles and radiation with sub-Kelvin detectors.
- Statistical techniques for data analysis.

## RESEARCH CAREER

### Moore Postdoctoral Scholar in Experimental Physics - Caltech 2008-Date

*Observational Cosmology Group - Prof. Andrew Lange, Prof. Sunil Golwala*

Development of SPIDER and BICEP2, two large-scale bolometric instruments for observations of the polarization of the cosmic microwave background. Focus on optimization of bolometers and SQUID readout system for low-background operation. Ongoing work on dark matter detection with the CDMS collaboration.

### Graduate Student Researcher – Univ. of California, Berkeley 2003-2008

*Cryogenic Dark Matter Search (CDMS) - Prof. Bernard Sadoulet*

Detector characterization, experimental operations, and data analysis for a world-leading experiment to detect the scattering of dark matter particles in terrestrial detectors.

### Undergraduate Research Assistant - Harvard University 2001-2002

*Super-Kamiokande - Dr. Mark Messier, Prof. Ed Kearns (Boston Univ.)*

Conducted a blind analysis to search for proton decay into  $K^*(892) \nu$ .

*MINOS - Prof. Gary Feldman, Dr. Roy Lee, Dr. Mark Messier*

Developed cosmic muon generation software for a subterranean neutrino detector.

### Chemical Research Intern - Akzo Nobel Chemicals. Summer 2000

*Surfactants America - Dr. Doug Lucas*

Investigated reagents to reduce caking and dust production in potash mining.

## AWARDS AND HONORS

- Moore Fellowship in Experimental Physics, California Institute of Technology 2008-Date

- Leon M. Lederman Fellowship, Fermi National Accelerator Laboratory (*declined*) 2008
- Princeton Fellowship in Experimental Physics, Princeton University (*declined*) 2008
- National Defense Science and Engineering Graduate (NDSEG) Fellowship 2002-2005
- Offered graduate fellowships at Princeton (Centennial), MIT (Presidential), Harvard (Purcell), UCSB (Broida) (*all declined*) 2002
- Certificate of Distinction in Teaching, Harvard Committee on Undergraduate Education 2002
- Phi Beta Kappa 2002
- John Harvard Scholarship 2000-2002
- U.S. National Chemistry Olympiad - National Finalist (20 in nation) for IChO team 1997

## TEACHING AND PUBLIC OUTREACH

### CDMS Education and Outreach 2003-2008

Led and organized several lab tours at UC Berkeley and Soudan Underground Laboratory.  
 Redesigned and maintained CDMS's education and outreach web site, including new essays on the science of dark matter and answers to questions from the public.  
 Several outreach activities at the Level Playing Field Institute's Summer Math and Science Honors (SMASH) Academy and at Emeryville High School.  
 Supervised self-study of two high school students (Summer 2008).

### Graduate Student Instructor - UC Berkeley Fall 2002

Physics 10: "Physics for Future Presidents" - Prof. Richard Muller. Fall 2002.

### Laboratory Teaching Fellow - Harvard University Spring 2002

Physics 15b: "Electricity & Magnetism" laboratory- Prof. Howard Georgi, Tom Hayes

## SCIENTIFIC SERVICE

- Organizer of Caltech Observational Cosmology seminar series, 2009-Date
- Maintainer of the Dark Matter Limit Plotter (<http://dmtools.berkeley.edu/>, <http://dmtools.brown.edu:8080/>), a prominent community resource, 2003-2009
- Scientific secretary and webmaster  
2007 Meeting of the University of California's Institute for Nuclear and Particle Astrophysics and Cosmology (INPAC) (May 4-6, 2007: Berkeley, CA)
- Organizing committee member and webmaster  
Pre-SUSY06 Workshop on the Complementarity Between Dark Matter Searches and Collider Experiments - June 10, 2006
- Scientific secretary  
DUSEL Science Workshop (Aug. 11-14, 2004: Berkeley, CA)
- Graduate Student / Faculty Mentor Liaison Committee, Berkeley Physics Dept., 2003-2004

## PROFESSIONAL MEMBERSHIPS

American Physical Society

## OTHER INFORMATION

- United States citizen
- Experienced in sub-Kelvin cryogenics, high-vacuum technology, radioisotope handling.
- Software: Matlab, Mathematica; C, Python, Java, Fortran, Perl; LaTeX, HTML, JavaScript
- Avid puzzle solver / writer, esp. MIT Mystery Hunt (2000-2010; writing team 2006, 2011)

# JEFFREY P. FILIPPINI – PUBLICATION LIST

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## SELECTED PUBLICATIONS

1. J.P. Filippini et al. “SPIDER: a balloon-borne CMB polarimeter for large angular scales,” *Proc. SPIE* **7741**, 77411N (2010).
2. Z. Ahmed et al. “Dark matter search results from the CDMS II experiment,” *Science* **327**, p. 1619, [arXiv:0912.3592](https://arxiv.org/abs/0912.3592) (**Contributing writer**).
3. Z. Ahmed et al. “Search for Weakly Interacting Massive Particles with the First Five-Tower Data from the Cryogenic Dark Matter Search at the Soudan Underground Laboratory,” *Phys. Rev. Lett.* **102**, 011301 (2009), [arXiv:0802.3530](https://arxiv.org/abs/0802.3530) (**Led data analysis**).
4. D.S. Akerib et al., “Limits on spin-dependent WIMP-nucleon interactions from the Cryogenic Dark Matter Search,” *Physical Review D* **73**, 011102 (2006), [astro-ph/0509269](https://arxiv.org/abs/astro-ph/0509269) (**Primary author**).

## ALL PUBLICATIONS

(\* = peer-reviewed journal article, † = high-impact, peer-reviewed journal article)

1. Z. Ahmed et al. “Combined Limits on WIMPs from the CDMS and EDELWEISS Experiments,” submitted to *Phys. Rev. D.*, [arXiv:1105.3377](https://arxiv.org/abs/1105.3377).
2. D.T. O’Dea et al. “SPIDER optimization II: Optical, magnetic and foreground effects,” submitted to *Astrophys. J.*, [arXiv:1102.0559](https://arxiv.org/abs/1102.0559).
3. \* Z. Ahmed et al. “Search for inelastic dark matter with the CDMS II experiment,” to appear in *Phys. Rev. D.*, [arXiv:1012.5078](https://arxiv.org/abs/1012.5078).
4. † Z. Ahmed et al. “Results from a Low-Energy Analysis of CDMS II Germanium Data,” *Phys. Rev. Lett.* **106**, 131302 (2011), [arXiv:1011.2482](https://arxiv.org/abs/1011.2482).
5. \* D.S. Akerib et al. “A low-threshold analysis of CDMS shallow-site data,” *Phys. Rev. D* **82**, 122004 (2010), [arXiv:1010.4290](https://arxiv.org/abs/1010.4290).
6. J.P. Filippini et al. “SPIDER: a balloon-borne CMB polarimeter for large angular scales,” *Proc. SPIE* **7741**, 77411N (2010).
7. S.A. Bryan et al. “Modeling and characterization of the SPIDER half-wave plate,” *Proc. SPIE* **7741**, 77412B (2010).
8. J.E. Gudmundsson et al. “Thermal architecture for the SPIDER flight cryostat,” *Proc. SPIE* **7741**, 77411M (2010).
9. M.C. Runyan et al. “Design and performance of the SPIDER instrument,” *Proc. SPIE* **7741**, 77411O (2010).
10. R.W. Ogburn et al. “The BICEP2 CMB polarization experiment,” *Proc. SPIE* **7741**, 77411G (2010).
11. R.W. Aikin et al. “Optical performance of the BICEP2 telescope at the South Pole,” *Proc. SPIE* **7741**, 77410V (2010).
12. J.A. Brevik et al. “Initial performance of the BICEP2 antenna-coupled superconducting bolometers at the South Pole,” *Proc. SPIE* **7741**, 77411H (2010).
13. A. Orlando et al. “Antenna-coupled TES bolometer arrays for BICEP2/Keck and SPIDER”, *Proc. SPIE* **7741**, 77410H (2010).
14. C.D. Sheehy et al. “The Keck array: a pulse-tube-cooled CMB polarimeter,” *Proc. SPIE* **7741**, 77411R (2010).

15. † Z. Ahmed et al. “Dark matter search results from the CDMS II experiment,” *Science* **327**, p. 1619, [arXiv:0912.3592](https://arxiv.org/abs/0912.3592) (*Contributing writer*).
16. \* Z. Ahmed et al. “Analysis of the low-energy electron-recoil spectrum of the CDMS Experiment,” *Phys. Rev. D* **81**, 042002 (2010), [arXiv:0907.1438](https://arxiv.org/abs/0907.1438).
17. † Z. Ahmed et al. “Search for Axions with the CDMS Experiment,” *Phys. Rev. Lett.* **103**, 141802 (2009), [arXiv:0902.4693](https://arxiv.org/abs/0902.4693).
18. J. Filippini, “WIMP hunting with the Cryogenic Dark Matter Search,” Les Rencontres de Physique de la Vallée D'Aoste, *Nuovo Cimento C* **32** 05-06 (2009), p. 45.
19. D.N. Seitz et al., “SuperCDMS Detector Readout Cryogenic Hardware,” 13th International Workshop on Low Temperature Detectors (LTD-13), AIP Conf. Proc. **1185** (2009), p. 282.
20. A. Orlando et al., “Antenna-Coupled TES Arrays for the BICEP2/Keck and SPIDER Polarimeters,” LTD-13, AIP Conf. Proc. **1185** (2009), p. 471.
21. N. Mirabolfathi et al., “The Cryogenic Dark Matter Search (CDMS) Experiment: Results, Status, and Perspective,” LTD-13, AIP Conf. Proc. **1185** (2009), p. 623.
22. C.N. Bailey et al., “Bulk and Surface Charge Collection: CDMS Detector Performance and Design Implications,” LTD-13, AIP Conf. Proc. **1185** (2009), p. 643.
23. P.L. Brink et al., “SuperCDMS Detector Fabrication Advances,” LTD-13, AIP Conf. Proc. **1185** (2009), p. 655.
24. Z. Ahmed et al., “Characterization of SuperCDMS 1-inch Ge Detectors,” LTD-13, AIP Conf. Proc. **1185** (2009), p. 659.
25. † Z. Ahmed et al. “Search for Weakly Interacting Massive Particles with the First Five-Tower Data from the Cryogenic Dark Matter Search at the Soudan Underground Laboratory,” *Phys. Rev. Lett.* **102**, 011301 (2009), [arXiv:0802.3530](https://arxiv.org/abs/0802.3530) (*Led data analysis*).
26. \* C. N. Bailey et al. “Detector Development for the Next Phases of the Cryogenic Dark Matter Search: Results from 1 inch Ge and Si Detectors,” *J. Low Temp. Phys.* **151** (2008), p. 211.
27. \* D. S. Akerib et al., “Present status of the SuperCDMS program,” *J. Low Temp. Phys.* **151** (2008), p. 818.
28. \* Z. Ahmed et al., “Present status of the Cryogenic Dark Matter Search experiment,” *J. Low Temp. Phys.* **151** (2008), p. 800.
29. \* D.S. Akerib et al., “Limits on spin-dependent WIMP-nucleon interactions from the Cryogenic Dark Matter Search,” *Physical Review D* **73**, 011102 (2006), [astro-ph/0509269](https://arxiv.org/abs/astro-ph/0509269) (*Primary author*).
30. \* J. Filippini et al., “Limits on WIMP-nucleon interactions from the Cryogenic Dark Matter Search at the Soudan Underground Laboratory,” *Nucl. Instr. Meth. A* **559** (2006), p. 390.
31. \* R. W. Ogburn et al., “Characterization, performance, and future advanced analysis of detectors in the Cryogenic Dark Matter Search (CDMS-II),” *Nucl. Instr. Meth. A* **559** (2006), p. 387.
32. \* N. Mirabolfathi et al., “Detector commissioning for the CDMS-II final run at the Soudan Underground Laboratory,” *Nucl. Instr. Meth. A* **559** (2006), p. 417.
33. \* P. L. Brink et al., “First test runs of a dark-matter detector with interleaved ionization electrodes and phonon sensors for surface-event rejection,” *Nucl. Instr. Meth. A* **559** (2006), p. 414.
34. \* P. L. Brink et al., “The SuperCDMS proposal for dark matter detection,” *Nucl. Instr. Meth. A* **559** (2006), p. 411.
35. † D.S. Akerib et al., “Limits on spin-independent WIMP-nucleon interactions from the two-tower run of the Cryogenic Dark Matter Search,” *Physical Review Letters* **96**, 011302 (2006), [astro-ph/0509259](https://arxiv.org/abs/astro-ph/0509259).
36. D.S. Akerib et al., “CDMS, supersymmetry and extra dimensions,” 7th UCLA Dark Matter Symposium (DM06), *Nucl Phys. B (Proc. Suppl.)* **173** (2007), p. 95; [astro-ph/0609189](https://arxiv.org/abs/astro-ph/0609189).
37. P. L. Brink et al., “Latest results from the CDMS II cold dark matter search,” 24th International Conference on Low Temperature Physics (LT-24), AIP Conf. Proc. **850** (2006), p. 1617.
38. \* D.S. Akerib et al., “Exclusion Limits on the WIMP-Nucleon Cross-Section from the First Run of the Cryogenic Dark Matter Search in the Soudan Underground Lab,” *Physical Review D* **72**, 052009 (2005), [astro-ph/0507190](https://arxiv.org/abs/astro-ph/0507190).

39. J. Filippini et al., "Limits on Spin-Dependent WIMP-Nucleon Interactions from the Cryogenic Dark Matter Search," 22nd Texas Symposium on Relativistic Astrophysics (2005).
40. R. W. Ogburn et al., "Progress of CDMS-II at the Soudan Mine," 22nd Texas Symposium on Relativistic Astrophysics (2005).
41. P. L. Brink et al., "Beyond the CDMS-II Dark Matter Search: SuperCDMS," 22nd Texas Symposium on Relativistic Astrophysics (2005), [astro-ph/0503583](http://astro-ph/0503583).
42. R. W. Schnee et al., "The SuperCDMS experiment," 5th International Heidelberg Conference on Dark Matter in Astro and Particle Physics (DARK04), [astro-ph/0502435](http://astro-ph/0502435).
43. † D.S. Akerib et al., "First Results from the Cryogenic Dark Matter Search in the Soudan Underground Lab," *Phys. Rev. Lett.* **93**, 211301 (2004), [astro-ph/0405033](http://astro-ph/0405033).
44. \* V. Mandic et al., "Study of the dead layer in germanium for the CDMS detectors," *Nucl. Instr. Meth. A* **520** (2003), p. 171.

## SEMINARS, TALKS, AND POSTER PRESENTATIONS

- "Probing the Echoes of Inflation: SPIDER, BICEP2, and beyond"  
*Seminar at UC Berkeley* February 23, 2011
- "SPIDER: a balloon-borne CMB polarimeter for large angular scales"  
*SPIE Astronomical Telescopes and Instrumentation 2010* July 2, 2010
- "New Results from the Cryogenic Dark Matter Search"  
*Special seminar at Caltech* December 18, 2009
- "Background Rejection Techniques for Direct Detection of Dark Matter"  
*Talk for the Caltech dark matter discussion group* December 8, 2009
- "Hunting Dark Matter on Earth"  
*Caltech Observational Cosmology seminar* June 25, 2009
- "Recent Results from the Cryogenic Dark Matter Search"  
*Invited talk at Les Rencontres de Physique De La Vallee D'Aoste* March 2, 2009
- "WIMP Hunting with the Cryogenic Dark Matter Search"  
*Seminar for Aspera Virtual Institute of Astroparticle Physics* April 18, 2008
- "Background Rejection for the Cryogenic Dark Matter Search"  
*Talk at 2008 April Meeting of the American Physical Society* April 12, 2008
- "New Results from the Cryogenic Dark Matter Search"  
*Princeton Fellowship in Experimental Physics Seminar* February 25, 2008
- "Searching for Dark Matter Underground: The Cryogenic Dark Matter Search"  
*Princeton Particle and Nuclear Astrophysics Seminar* December 18, 2007
- "The Cryogenic Dark Matter Search: Status and Prospects"  
*Talk at TeV Particle Astrophysics* August 30, 2007
- "Background Rejection for the Cryogenic Dark Matter Search"  
*Talk at 2007 April Meeting of the American Physical Society* April 16, 2007
- "Complementarity at a Zeptobarn"  
*Talk at pre-SUSY06 Workshop on the Complementarity Between Dark Matter Searches and Collider Experiments* June 10, 2006
- "Dark Matter at the Zeptobarn Scale"  
*Poster at KICP Inaugural Symposium* December 11, 2005
- "New Results from the Cryogenic Dark Matter Search at the Soudan Underground Lab"  
*Seminar at the LBNL Institute for Nuclear and Particle Astrophysics* September 23, 2005
- "Limits on WIMP-nucleon interactions from the Cryogenic Dark Matter Search at the Soudan Underground Laboratory"  
*Talk at Low Temperature Detectors 11* August 1, 2005
- "Spin-dependent WIMP interactions with the Cryogenic Dark Matter Search"  
*Poster at 22nd Texas Symposium on Relativistic Astrophysics* December 13 2004

## **OTHER CONFERENCES AND WORKSHOPS**

- The Path to CMBPol: Upcoming Measurements of CMB Polarization (Jul. 1-3, 2009: Chicago, IL)
- 6th - 9th UCLA Dark Matter Symposia (Feb. 2004, 2006, 2008, 2010: Marina Del Rey, CA)
- Deep Underground Science and Engineering Lab Town Meeting (Nov. 2-4, 2007: Washington, DC)
- 2007 Meeting of the University of California's Institute for Nuclear and Particle Astrophysics and Cosmology (INPAC) (May 4-6, 2007: Berkeley, CA).
- SUSY06 (June 12-17, 2006: Irvine, CA)
- DUSEL Science Workshop (Aug. 11-14, 2004: Berkeley, CA).
- 2003 SLAC Summer Institute: Cosmic Connections (Jul. 28 – Aug. 8, 2003: SLAC)