

## Dr. Andrew Samuel Friedman - Curriculum Vitae

University of California, San Diego,  
Center for Astrophysics & Space Sciences,  
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### EDUCATION

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May 2012 Ph.D. **Harvard University**, Astronomy & Astrophysics

*Thesis: Infrared Light Curves of Type Ia Supernovae*

June 2006 A.M. **Harvard University**, Astronomy

*Thesis: Toward a More Standardized Candle Using GRB Energetics & Spectra*

Dec 2001 B.A. **University of California, Berkeley**, Physics & Astrophysics

*Summa Cum Laude*, Phi Beta Kappa, Highest Honors in Physics, Highest Distinction in General Scholarship, *Thesis: The Lick Observatory Supernova Search: Type Ia Supernovae, Cosmology, and the Accelerating Universe*

### PROFESSIONAL APPOINTMENTS

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2017 – Assistant Research Scientist, **UC San Diego** Center for Astrophysics & Space Sciences

2017 – Research Affiliate, Program in STS, **Massachusetts Institute of Technology (MIT)**

2014-17 Research Associate, Program in Science, Technology, & Society (STS), **MIT**

2012-16 Visiting Research Scientist, **MIT Center for Theoretical Physics**

2012-14 National Science Foundation STS Postdoctoral Fellow, **MIT**

### FELLOWSHIPS, HONORS, & AWARDS

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2012-14 National Science Foundation STS Postdoctoral Fellowship, **MIT**

2006-09 National Aeronautics & Space Administration Graduate Student Research Program Fellowship, **Harvard University / NASA Goddard Spaceflight Center**

2002-06 National Science Foundation Graduate Research Fellowship, **Harvard University**

2005 Certificate of Distinction in Teaching, **Harvard University** (Fall 2005)

2004 Certificate of Distinction in Teaching, **Harvard University** (Spring 2004)

2003-07 James Mills Peirce Fellowship, Department of Astronomy, **Harvard University**

### GRANTS

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2015-18 **National Science Foundation, NSF INSPIRE Award #1541160** (\$781,263) “Testing Bell’s Inequality with Astrophysical Observations”, Co-PI with David Kaiser, Alan Guth (MIT); Co-Is Jason Gallicchio (Chicago), Brian Keating (UCSD) [in collaboration with Anton Zeilinger (Vienna)]

2016-17 **NASA Jet Propulsion Laboratory R&TD Innovative Spontaneous Concept Proposal** (\$43,690), “Uncorrelated Random Number Generators from Astrophysical Processes”, Co-I with PI Hien Nguyen (JPL/Caltech), Jason Gallicchio (Harvey Mudd), David Kaiser (MIT)

2012-14 **National Science Foundation, NSF SES Award #1056580** (\$120,000) “Dark Energy, Fine-Tuning, and the Multiverse: Testing Theories in Modern Cosmology”, Co-PI with David Kaiser (MIT)

2006-09 **NASA Graduate Student Research Program Fellowship**, #NNX06AD85H, Prof. Robert Kirshner (Harvard Astronomy), Dr. Neil Gehrels (NASA/GSFC)

2002-06 **NSF Graduate Research Fellowship**, Harvard University Dept. of Astronomy

**TELESCOPE AWARDS**

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- 2015-17 **NASA Hubble Space Telescope**, Cycle 23, Phase II, Award GO-14216, “**RAISIN2: Tracers of cosmic expansion with SN IA in the IR**”, Co-I with PI, Robert Kirshner, Harvard University (\$320,686)
- 2012-14 **NASA Hubble Space Telescope**, Cycle 20, Phase II, Award GO-13046, “**RAISIN: Tracers of cosmic expansion with SN IA in the IR**”, Co-I with PI, Robert Kirshner, Harvard University (\$350,542)
- 2005-13 **Peters Automated InfraRed Imaging TELEscope**, 13 Semesters 2005a-2013a, Awarded 300 hours each, Fred Lawrence Whipple Observatory, “CfA Supernova Program: Photometry with the PAIRITEL 1.3-m”, Co-I with PI, Robert Kirshner, Harvard University
- 2010 **NASA Infrared Telescope Facility**, Sem 2010A, “Using NIR Spectra from Type Ia Supernovae to Constrain NIR Light Curves and Physics”, Co-I with PI, Howie Marion, Harvard University
- 2007-08 **NASA Swift Satellite**, Cycle 4, Award #NNH07ZDA001N-SWIFT407, “Investigation of the UV Properties of Supernovae With Swift”, Co-I with PI, Robert Kirshner, Harvard University

**SMALL GRANTS AND AWARDS**

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- 2015 **Foundational Questions Institute FQXi Mini-Grant** (\$1,500) “Testing the Foundations of Quantum Mechanics with Cosmological Observations”, PI Alan Guth (MIT); Co-I with David Kaiser (MIT), Jason Gallicchio (Chicago), Anton Zeilinger (Vienna), Brian Keating (UCSD), 1/1/15-9/1/15
- 2013 Rutgers Templeton Project in the Philosophy of Cosmology (\$3,000) to attend the “**Institute for the Philosophy of Cosmology**”, UC Santa Cruz, 6/23-7/14/13

**TEACHING**

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- 2012-15 Co-Leader, “Harvard/MIT Philosophy of Science Group”, **Harvard University**
- 2015 Teaching Fellow, “The Energetic Universe”, **Harvard University** (Spring 2015)
- 2005 Teaching Fellow, “Cosmic Connections”, **Harvard University** (Fall 2005)
- 2005 Teaching Fellow, “Matter In the Universe”, **Harvard University** (Spring 2005)
- 2004 Teaching Fellow, “Matter In the Universe”, **Harvard University** (Spring 2004)
- 2002 Teaching Assistant, **Summer Science Program**, Happy Valley School, Ojai, CA
- 2001 Teaching Assistant, “Introductory Astronomy”, **UC Berkeley** (Fall 2001)
- 1999 Student Instructor, “Science Fiction”, **UC Berkeley** (Spring 1999)

**50 SCIENTIFIC PUBLICATIONS**


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h-index: **18**, g-index: **38** ([NASA/ADS](#)), Citations: **1654**, Top 1<sup>st</sup> author: **187** ([Google Scholar](#))  
 Refereed: **23** (Accepted: **22**, Submitted: **1**), In prep: **3** 1<sup>st</sup>/2<sup>nd</sup> author Refereed: **8**, In prep: **3**  
 Non-Refereed: **27** (Conference: **1**, Popular: **11**, Circulars: **15**) 1<sup>st</sup> author non-refereed: **17**

**ALTERNATIVE METRICS**

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- 3 articles since 2014 ([1](#), [2](#), [3](#)) in top 5% of all research outputs scored by [Altmetric.com](#), each in **98-99<sup>th</sup>** percentile for High Attention Score compared to outputs of same age and source.
  - Article [1](#) among highest scoring outputs from *Physical Review Letters* (#38 out of 17,732).
  - **275** online mentions since 2013 on [Impactstory.org](#) (281 total). [Top publication](#) saved and shared **186** times (Only **6%** of researchers get this much attention). Research mentioned in 4 Wikipedia articles ([1](#), [2](#), [3](#), [4](#)) (Only **11%** of researchers are this highly Cited in Wikipedia).

**REFEREED PAPERS (22)**

- 2017 Leung, C., Brown, A., Nguyen, H., **Friedman, A.S.**, Kaiser, D.I., and Gallicchio, J., “Astronomical random numbers for quantum foundations experiments”, *Physical Review A*, *accepted* ([arXiv:1706.02276](https://arxiv.org/abs/1706.02276))
- 2017 Hicken, M., **Friedman, A.S.**+ 2017, “Type II Supernova Light Curves and Spectra From the CfA”, *The Astrophysical Journal Supplement Series*, Volume 233, Issue 1, id 6, 11pp, ([arXiv:1706.01030](https://arxiv.org/abs/1706.01030)) (DOI)
- 2017 Handsteiner, J., **Friedman, A.S.**+ 2017, “Cosmic Bell Test: Measurement Settings from Milky Way Stars”, *Physical Review Letters*, Vol. 118, Issue 6. id. 060401 ([arXiv:1611.06985](https://arxiv.org/abs/1611.06985)) (DOI) [Featured in Physics, Editor’s Suggestion]
- 2016 Marion, G.H. + 2016, “SN 2012cg: Evidence for Interaction Between a Normal Type Ia Supernova and a Non-Degenerate Binary Companion”, *The Astrophysical Journal*, Volume 820, Issue 2, id. 92, 16 pp ([arXiv:1507.07261](https://arxiv.org/abs/1507.07261)) (DOI)
- 2015 **Friedman, A.S.** + 2015c, “[CfAIR2: Near-Infrared Light Curves of 94 Type Ia Supernovae](https://arxiv.org/abs/1408.0465)”, *The Astrophysical Journal Supplement Series*, Volume 220, Issue 1, id. 9, 35 pp ([arXiv:1408.0465](https://arxiv.org/abs/1408.0465)) (DOI)
- 2014 Fransson, C. + 2014, “[High Density Circumstellar Interaction in the Luminous Type II<sub>n</sub> SN 2010jl: The first 1100 days](https://arxiv.org/abs/1312.6617)”, *The Astrophysical Journal*, Volume 197, Issue 2, id. 118, 40 pp ([arXiv:1312.6617](https://arxiv.org/abs/1312.6617)) (DOI)
- 2014 Bianco, F. + 2014, “[Multi-Color Optical and NIR Light Curves of 64 Stripped-Envelope Core-Collapse Supernovae](https://arxiv.org/abs/1405.1428)”, *The Astrophysical Journal Supplements*, Volume 213, Issue 2, Article id. 19, 21 pp. ([arXiv:1405.1428](https://arxiv.org/abs/1405.1428)) (DOI)
- 2014 Gallicchio, J., **Friedman, A.S.**, Kaiser, D.I., 2014, “[Testing Bell’s Inequality with Cosmic Photons: Closing the Setting-Independence Loophole](https://arxiv.org/abs/1310.3288)”, *Physical Review Letters*, Vol. 112, Issue 11, id. 110405, 5 pp. ([arXiv:1310.3288](https://arxiv.org/abs/1310.3288)) (DOI)
- 2014 Marion, G.H. + 2014, “[Type II<sub>b</sub> Supernova SN 2011dh: Spectra and Photometry from the Ultraviolet to the Near-Infrared](https://arxiv.org/abs/1303.5482)”, *The Astrophysical Journal*, Vol. 781, Issue 2, article id 69, 18 pp. ([arXiv:1303.5482](https://arxiv.org/abs/1303.5482)) (DOI)
- 2014 Margutti, R. + 2014, “[A Panchromatic View of the Restless SN 2009ip Reveals the Explosive Ejection of a Massive Star Envelope](https://arxiv.org/abs/1306.0038)”, *The Astrophysical Journal*, Vol. 780, Issue 1, article id. 21, 38 pp. ([arXiv:1306.0038](https://arxiv.org/abs/1306.0038)) (DOI)
- 2013 **Friedman, A.S.**, Kaiser, D.I., & Gallicchio, J. 2013, “[The Shared Causal Pasts and Futures of Cosmological Events](https://arxiv.org/abs/1305.3943)”, *Physical Review D*, Vol. 88, Issue 4, id. 044038, 18 pp. ([arXiv:1305.3943](https://arxiv.org/abs/1305.3943)) (DOI)
- 2013 Drout, M. + 2013, “[The Fast and Furious Decay of the Peculiar Type-I Supernova 2005ek](https://arxiv.org/abs/1306.2337)”, *The Astrophysical Journal*, Vol. 774, Issue 1, article id. 58, 18 pp. ([arXiv:1306.2337](https://arxiv.org/abs/1306.2337)) (DOI)
- 2013 Sanders, N.E. + 2013, “[PS1-12SK is a Peculiar Supernova From a He-Rich Progenitor System in a Brightest Cluster Galaxy Environment](https://arxiv.org/abs/1303.1818)”, *The Astrophysical Journal*, Vol. 769, Issue 1, 39, 15 pp. ([arXiv:1303.1818](https://arxiv.org/abs/1303.1818)), (DOI)
- 2012 **Friedman, A.S.** 2012, PhD Thesis, Harvard University, “[Infrared Light Curves of Type Ia Supernovae](https://arxiv.org/abs/1205.4493)”, *ProQuest Dissertations and Theses*, Pub. #: AAT 3513964; ISBN: 9781267446190; 272 pp. (NASA/ADS)
- 2012 Hicken, M. + 2012, “[CfA4: Light Curves for 93 Type Ia Supernovae](https://arxiv.org/abs/1205.4493)”, *The Astrophysical Journal Supplement*, Vol. 200, Issue 2, article id. 12, 15 pp. ([arXiv:1205.4493](https://arxiv.org/abs/1205.4493)), (DOI)
- 2009 Mandel, K., Wood-Vasey, W.M., **Friedman, A.S.**, & Kirshner, R.P. 2009, “[Type Ia](https://arxiv.org/abs/0908.3451)

- [Supernova Light Curve Inference: Hierarchical Bayesian Analysis in the Near Infrared](#)”, *The Astrophysical Journal*, Vol. 704, Issue 1, pp. 629-651 ([arXiv:0908.0536](#)), ([DOI](#))
- 2009 Modjaz, M. + 2009, “[From Shock Breakout to Peak and Beyond: Extensive Panchromatic Observations of the Type Ib Supernova 2008D Associated with Swift X-ray Transient 080109](#)”, *The Astrophysical J.*, Vol. 702, Issue 1, pp. 226-248 ([arXiv:0805.2201](#)), ([DOI](#))
- 2009 Foley, R. + 2009, “[SN 2008ha: An Extremely Low Luminosity and Exceptionally Low Energy Supernova](#)”, *The Astronomical Journal*, Vol. 138, Issue 2, pp. 376-391 ([arXiv:0902.2794](#)), ([DOI](#))
- 2009 Wang, X. + 2009, “[The Golden Standard Type Ia Supernova 2005cf: Observations from the Ultraviolet to the Near-Infrared Wavebands](#)”, *The Astrophysical Journal*, Vol. 697, Issue 1, pp. 380-408 ([arXiv:0811.1205](#)), ([DOI](#))
- 2008 Wood-Vasey, W.M., **Friedman, A.S.** + 2008, “[Type Ia Supernovae are Good Standard Candles in the Near Infrared: Evidence from PAIRITEL](#)”, *The Astrophysical Journal*, Vol. 689, Issue 1, pp. 377-390 ([arXiv:0711.2068](#)), ([DOI](#))
- 2005 **Friedman, A.S.** & Bloom, J.S. 2005b, “[Present and Future Prospects for GRB Standard Candles](#)”, *Il Nuovo Cimento C*, Vol. 028, Issue 04-05, pp. 669-672 ([astro-ph/0502559](#)), ([DOI](#))
- 2005 **Friedman, A.S.** & Bloom, J.S. 2005a, “[Toward a More Standardized Candle Using GRB Energetics and Spectra](#)”, *The Astrophysical Journal*, Vol. 627, Issue 1, pp. 1-25 ([astro-ph/0408413](#)), ([DOI](#))

#### CONFERENCE PROCEEDINGS AND ABSTRACTS (12)

- 2018 Avelino, A.; Kirshner, R.P.; Mandel, K.; Challis, P.; **Friedman, A. S.**; RAISIN Team, “[Near Infrared SN Ia Cosmology](#)”, *American Astronomical Society*, AAS Meeting #231, id.209.03
- 2017 Avelino, A.; **Friedman, A. S.**; Mandel, K.; Kirshner, R.P.; Challis, P. “[Near-infrared absolute magnitudes of Type Ia Supernovae](#)”, *American Astronomical Society*, AAS Meeting #229, id.410.02
- 2016 **Friedman, A. S.**; Kaiser, D. I.; Gallicchio, J.; Team 1: University of Vienna, Institute for Quantum Optics and Quantum Information; Team 2: UC San Diego Cosmology Group; Team 3: NASA/JPL/Caltech, “[Testing Quantum Mechanics and Bell's Inequality with Astronomical Observations](#)”, *American Astronomical Society*, AAS Meeting #228, id.403.05
- 2015 **Friedman, A. S.**; Gallicchio, J.; Kaiser, D. I.; Guth, A. H., “[Testing Quantum Mechanics and Bell's Inequality with Astronomical Observations](#)”, *American Astronomical Society*, AAS Meeting #225, id.255.13
- 2014 **Friedman, A. S.**; Gallicchio, J.; Kaiser, D. I.; Guth, A., “[Testing Quantum Mechanics and Bell's Inequality with Cosmological Observations of Quasars](#)”, *American Astronomical Society*, AAS Meeting #224, id.304.02
- 2014 **Friedman, A. S.**; Kaiser, D. I.; Gallicchio, J.; Guth, A. H., “[Testing Quantum Mechanics with Observations of Causally Disconnected Cosmological Events](#)”, *American Astronomical Society*, AAS Meeting #223, id.127.01
- 2010 Mandel, K.; Kirshner, R. P.; Narayan, G.; Wood-Vasey, W. M.; **Friedman, A. S.**; Hicken, M., “[Type Ia Supernova Light Curve Inference: Hierarchical Models for Nearby SN Ia in the Optical and Near Infrared](#)”, *American Astronomical Society*, AAS Meeting #215, id.343.05; *Bulletin of the American Astronomical Society*, Vol. 42, p.449

- 2010 **Friedman, A. S.**; Kirshner, R. P.; Wood-Vasey, M.; Bloom, J. S.; Mandel, K.; Challis, P.; Hicken, M.; Narayan, G.; Foley, R.; Rest, A.; Modjaz, M.; Starr, D.; Blondin, S.; Blake, C.; CfA Supernova Group; PAIRITEL collaboration, “[Infrared Light Curves of Type Ia Supernovae](#)”, American Astronomical Society, AAS Meeting #215, id.343.04; *Bulletin of the American Astronomical Society*, Vol. 42, p.449
- 2009 **Friedman, A. S.**; Wood-Vasey, M.; Mandel, K.; Hicken, M.; Challis, P.; Bloom, J.; Starr, D.; Kirshner, R. P.; Modjaz, M.; CfA Supernova Group; PAIRITEL, “[Disentangling Intrinsic Color Variation and Dust Extinction of Type Ia Supernovae With Near-Infrared, Optical, and Ultraviolet Photometry](#)”, American Astronomical Society, AAS Meeting #213, id.438.06; *Bulletin of the American Astronomical Society*, Vol. 41, p.311
- 2007 **Friedman, A. S.**; Wood-Vasey, W. M.; Bloom, J. S.; Modjaz, M.; Hicken, M.; Kirshner, R. P.; Starr, D.; Blake, C. H.; Falco, E.; Szentgyorgyi, A.; Challis, P.; Blondin, S.; Rest, A.; Skrutskie, M., “[The Absolute Brightness of Type Ia Supernovae in the Near-Infrared from PAIRITEL: Improved Reddening Estimates and Distances](#)”, American Astronomical Society, AAS Meeting #211, id.91.17; *Bulletin of the American Astronomical Society*, Vol. 39, p.886
- 2006 **Friedman, A. S.**; Wood-Vasey, W. M.; Modjaz, M.; Kirshner, R.; Bloom, J. S.; Blake, C. H.; Szentgyorgyi, A. H.; Falco, E. E.; Starr, D.; Skrutskie, M., “[First Two Years: Infrared Light Curves of Type Ia Supernovae with the Peters Automated Infrared Imaging Telescope \(PAIRITEL\)](#)”, 2007 AAS/AAPT Joint Meeting, American Astronomical Society Meeting 209, id.90.06; *Bulletin of the American Astronomical Society*, Vol. 38, p.1026
- 2005 **Friedman, A. S.**; Modjaz, M.; Wood-Vasey, W. M.; Blake, C. H.; Kirshner, R. P.; Challis, P.; Falco, E. E.; Bloom, J. S.; Skrutskie, M. F.; CfA Supernova Group Team; PAIRITEL Collaboration, “[Infrared Light Curves of Nearby Supernovae with the Peters Automated Infrared Imaging Telescope \(PAIRITEL\)](#)”, American Astronomical Society Meeting 207, id.171.05; *Bulletin of the American Astronomical Society*, Vol. 37, p.1432
- 2004 **Friedman, A. S.**, Bloom, J. S, and cosmicbooms.net Team, “[The Present and Future of GRB Cosmography](#)”, American Astronomical Society Meeting 205, id.159.07; *Bulletin of the American Astronomical Society*, Vol. 36, p.1611
- 2000 Li, W. Filippenko, A.V., Treffers, R., **Friedman, A.S.** + 2000, “[The Lick Observatory Supernova Search](#)”, *American Institute of Physics Conference Proceedings*, Vol. 522, pp. 103-106 ([astro-ph/9912336](#)), ([DOI](#))

#### **ASTRONOMICAL NOTICES (15)**

- 2012 Marion, G.H. + 2012b, “[Updated Physical Parameters of SN 2012cg](#)”, *The Astronomer's Telegram*, ATEL #4215, 6/2012 ([NASA/ADS](#))
- 2012 Marion, G.H. + 2012a, “[Early Optical and NIR Photometry and Optical Spectroscopy of SN 2012cg](#)”, *The Astronomer's Telegram*, ATEL #4159, 6/2012 ([NASA/ADS](#))
- 2011 Marion, G.H. + 2011, “[Helium Detection in IRTF Spectra of SN 2011dh](#)”, *The Astronomer's Telegram*, ATEL #3435, 6/2011 ([NASA/ADS](#))
- 2008 Challis, P. + 2008, “[Supernova 2008fj in UGC 10759](#)”, *Central Bureau Electronic Telegrams*, 1495, 1, 9/2008 ([NASA/ADS](#))
- 2008 Modjaz, M. + 2008, “[XRB 080109/SN 2008D:PAIRITEL NIR observations and t\\_0 from Swift.](#)”, *GRB Coordinates Network*, Circular Service, 7175, 1 (2008) ([NASA/ADS](#))

- 2007 Bloom, J.S. + 2007, “[PAIRITEL Monitoring of SN 2007sr](#)”, *The Astronomer's Telegram*, ATEL #1343, 12/2007 ([NASA/ADS](#))
- 2006 Blondin, S. + 2006, “[GRB 061201: magellan redshift of nearby Abell cluster.](#)”, *GRB Coordinates Network*, Circular Service, 5944, 1 (2006) ([NASA/ADS](#))
- 2001 **Friedman, A.S.**, Li, W.D., Schwartz, M. 2001, “[Supernova 2001ae in IC 4229](#)”, *International Astronomical Union (IAU) Circulars*, 7597, 1 (2001) ([NASA/ADS](#))
- 2001 **Friedman, A.S.**, Li, W.D., Chornock, R. 2001, “[Supernova 2001L in MCG -01-30-11](#)”, *International Astronomical Union (IAU) Circulars*, 7566, 1 (2001) ([NASA/ADS](#))
- 2000 **Friedman, A.S.**, Li, W.D., Schwartz, M. 2000, “[Supernova 2000fa in UGC 3770](#)”, *International Astronomical Union (IAU) Circulars*, 7533, 2 (2000) ([NASA/ADS](#))
- 1999 **Friedman, A.S.**, Li, W.D., Puckett, T. 1999, “[Supernova 1999gb in NGC 2532](#)”, *International Astronomical Union (IAU) Circulars*, 7316, 2 (1999) ([NASA/ADS](#))
- 1999 **Friedman, A.S.**, King, J.Y., Li, W.D., Lick Observatory Supernova Search 1999, “[Supernova 1999ej in NGC 495](#)”, *International Astronomical Union (IAU) Circulars*, 7286, 1 (1999) ([NASA/ADS](#))
- 1999 **Friedman, A.S.**, Li, W.D. 1999, “[Supernova 1999bx in UGC 11391](#)”, *International Astronomical Union (IAU) Circulars*, 7154, 1 (1999) ([NASA/ADS](#))
- 1999 Li, W.-D., Modjaz, M., King, J. Y., Papenkova, M., Johnson, R. A., **Friedman, A.S.**, Treffers, R. R., Filippenko, A. V. 1999, “[Comet 1999 E1](#)”, *International Astronomical Union (IAU) Circulars*, 7126, 1 (1999) ([NASA/ADS](#))
- 1999 Modjaz, M., King, J. Y., Papenkova, M., **Friedman, A.S.**, Johnson, R. A., Li, W. D., Treffers, R. R., Filippenko, A. V. 1999, “[Supernova 1999ac in NGC 6063](#)”, *International Astronomical Union (IAU) Circulars*, 7114, 1 (1999) ([NASA/ADS](#))

#### POPULAR SCIENCE ARTICLES (10)

- 2017 **Friedman, A.S.** 2017a, [Make the Cosmic Perspective Your Next Coping Mechanism](#), *Nautilus, Facts So Romantic: On Ideas*, Nov 7 2017
- 2015 **Friedman, A.S.** 2015b, [Are the Quantum World and the Real World the Same Thing?](#), *NOVA Physics Blog: The Nature of Reality*, May 7 2015
- 2015 **Friedman, A.S.** 2015a, [Ask Astro: Could quantum entanglement be a result of the big bang?](#), *Astronomy*, Vol. 43, Issue 5, May 2015, pg. 44-45
- 2014 **Friedman, A.S.** 2014d, [Can the Cosmos Test Quantum Entanglement?](#), *Astronomy*, Vol. 42, Issue 10, October 2014, pg. 28-33
- 2014 **Friedman, A.S.** 2014c, [Web Extra: Another cosmic thought experiment](#), *Astronomy*, Vol. 42, Issue 10, October 2014
- 2014 **Friedman, A.S.** 2014b, [Heart of a Star, Revealed](#), *Rune: The MIT Journal of Arts and Letters*, Issue 35, pg. 20-21
- 2014 **Friedman, A.S.** 2014a, [The Universe Made Me Do It? Testing "Free Will" With Distant Quasars](#), *NOVA Physics Blog: The Nature of Reality*, Mar 9 2014
- 2006 **Friedman, A.S.** 2006, [Using GRBs For Cosmology](#), p35 (with Naeye, R.S, *Dissecting the Bursts of Doom*, *Sky & Telescope*, Volume 112, No. 8, p30-37, 2006)
- 2002 **Friedman, A.S.** 2002, [The Fundamental Distinction Between Brains and Turing Machines](#), *Berkeley Scientific Journal*, Vol. 6, Issue 1, Spring 2002, p. 28-33
- 2001 **Friedman, A.S.** 2001b, [Fundamental Constants of Physics: The Genes of the Universe](#), *Berkeley Scientific Journal*, Vol. 5, Issue 2, Fall 2001, p. 100-104

- 2001 **Friedman, A.S.** 2001a, [The Fabric of Reality](#), *Berkeley Scientific Journal*, Vol. 5, Issue 1, Spring 2001, p. 28-30

### INVITED TALKS

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- 2017 Summer Science Program Guest Lecture, **New Mexico Tech**, 7/12/17
- 2017 Center for Astrophysics & Space Sciences, Astrophysics Seminar, **UC San Diego**, 3/8/17
- 2016 Arthur C. Clarke Center for Human Imagination, **UC San Diego**, 8/10/16
- 2016 Center for Astrophysics & Space Sciences, **UC San Diego**, 8/3/16
- 2016 **American Astronomical Society**, Meeting #228, San Diego, CA, 6/16/16
- 2016 Center for Astrophysics & Space Sciences, **UC San Diego**, 6/7/16
- 2015 Center for Astrophysics & Space Sciences, **UC San Diego**, 12/18/15
- 2015 Institute for Quantum Optics & Quantum Information, **University of Vienna**, 10/1-2/15
- 2015 Arthur C. Clarke Center for Human Imagination, **UC San Diego**, 8/6/15
- 2015 Center for Astrophysics & Space Sciences, **UC San Diego**, 8/5/15
- 2015 Center for Astrophysics & Space Sciences, **UC San Diego**, 7/1/15
- 2014 Arthur C. Clarke Center for Human Imagination, **UC San Diego**, 7/29/14
- 2014 Center for Astrophysics & Space Sciences, **UC San Diego**, 7/16/14
- 2014 **American Astronomical Society**, Meeting #224, Boston, MA, 6/4/14
- 2014 Brown Bag Lunch Talk, Kavli Institute for Astrophysics & Space Research, **MIT**, 3/10/14
- 2014 Philosophy of Physics Group, Department of Philosophy, **UC San Diego**, 2/20/14
- 2014 Institute for Theory and Computation, **Harvard-Smithsonian CfA**, 1/13/14
- 2013 Tufts/MIT Cosmology Seminar, **MIT Center for Theoretical Physics**, 11/19/13
- 2013 Center for Astrophysics & Space Sciences, **UC San Diego**, 6/19/13
- 2013 Center for Astrophysics & Space Sciences, **UC San Diego**, 1/2/13
- 2012 Special Astro. Seminar, Center for Astrophysics & Space Sciences, **UC San Diego**, 6/19/12
- 2012 A PITT PACC Workshop, Dept. of Physics & Astronomy, **U. of Pittsburgh**, 3/28/12
- 2012 Optical and Infrared Seminar, **Harvard-Smithsonian Center for Astrophysics**, 2/22/12
- 2011 Philosophy of Cosmology Workshop and Logic, Mathematics, & Physics Graduate Conference Panelist, Rotman Institute, **University of Western Ontario**, 5/7/11
- 2010 **American Astronomical Society**, Meeting #215, Washington, DC, 1/5/10
- 2007 Accretion and Explosion: The Astrophysics of Degenerate Stars, Kavli Institute for Theoretical Physics, **UC Santa Barbara**, 2/20/07
- 2006 2nd PAIRITEL Workshop, **Harvard-Smithsonian Center for Astrophysics**, 6/16/06
- 2006 Graduate Student Research Forum, Dept. of Astronomy, **Harvard University**, 3/14/06
- 2005 Supernova Acceleration Probe Science Meeting, **Lawrence Berkeley National Laboratory**, 7/15/05
- 2005 High Energy Astrophysics Division Lunch Talk, **Harvard-Smithsonian CfA**, 2/9/05
- 2005 **American Astronomical Society**, Meeting #205, San Diego, CA, 1/13/05

### POSTER PRESENTATIONS

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- 2014 “2<sup>nd</sup> Annual MIT Postdocs Share Their Science Poster Session”, **MIT**, 5/12/14
- 2009 “RogerFest: A Festival of Cosmic Explosions”, Cahill Center, **Caltech**, 8/21-23/09
- 2009 “Stellar Death & Supernovae, Kavli Institute for Theoretical Physics”, **UC Santa Barbara**, 8/17-21/09
- 2009 **American Astronomical Society**, Meeting #213, Long Beach, CA, 1/9-14/09
- 2008 **American Astronomical Society**, Meeting #211, Austin, TX, 1/7-11/08

- 2007 “NASA Graduate Student Research Program Symposium”, **NASA Goddard Space Flight Center**, Greenbelt, MD, 9/19-21/07
- 2006 **American Astronomical Society**, Meeting #207, Washington, DC, 1/8-12/06
- 2004 “4th Workshop on Gamma-Ray Bursts in the Afterglow Era”, **Rome, Italy**, 10/18-22/04

### **CONFERENCES AND WORKSHOPS**

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- 2016 **American Astronomical Society**, Meeting #228, San Diego, CA, 6/12-6/16
- 2015 “Cosmic Bell team workshop”, Institute for Quantum Optics & Quantum Information, **University of Vienna**, 9/30-10/4/15
- 2014 **American Astronomical Society**, Meeting #224, Boston, MA, 6/1-6/5
- 2013 “Institute for the Philosophy of Cosmology”, **UC Santa Cruz**, 6/23-7/14
- 2012 “Type Ia Supernovae in the Near-Infrared: A PITT PACC Workshop”, Department of Astronomy, **University of Pittsburgh**, 3/28-30/2012
- 2011 **American Astronomical Society**, Meeting #218, Boston, MA, 5/22-26/11
- 2011 “Logic, Mathematics & Physics Graduate Conference: Topics in the Philosophy of Cosmology panel”, Rotman Institute, **University of Western Ontario**, 5/7-9/11
- 2011 “Philosophy of Cosmology Workshop”, Rotman Institute, **University of Western Ontario**, 5/6-7/11
- 2010 **American Astronomical Society**, Meeting #215, Washington, DC, 1/3-7/10
- 2009 “RogerFest: A Festival of Cosmic Explosions”, Cahill Center, **Caltech**, 8/21-23/09
- 2009 “Stellar Death & Supernovae, Kavli Institute for Theoretical Physics”, **UC Santa Barbara**, 8/17-21/09
- 2009 **American Astronomical Society**, Meeting #213, Long Beach, CA, 1/9-14/09
- 2008 **American Astronomical Society**, Meeting #211, Austin, TX, 1/7-11/08
- 2007 “NASA Graduate Student Research Program Symposium”, **NASA Goddard Space Flight Center**, Greenbelt, MD, 9/19-21/07
- 2007 “Accretion and Explosion: The Astrophysics of Degenerate Stars”, Kavli Institute for Theoretical Physics, **UC Santa Barbara**, 2/20/07
- 2007 **American Astronomical Society**, Meeting #209, Seattle, WA, 1/5-10/07
- 2006 “NASA Graduate Student Research Program Symposium”, **NASA Goddard Space Flight Center**, Greenbelt, MD, 9/18-22/06
- 2006 “Penn State Summer School in Astrostatistics”, **Pennsylvania State University**, 6/6-10/06
- 2006 **American Astronomical Society**, Meeting #207, Seattle, WA, 1/8-12/06
- 2005 **American Astronomical Society**, Meeting #205, Seattle, WA, 1/9-13/05
- 2003 **American Astronomical Society**, Meeting #201, Seattle, WA, 1/5-9/2003

### **RESEARCH EXPERIENCE**

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- 2017- **UC San Diego**, Assistant Research Scientist, UCSD Center for Astrophysics & Space Sciences
- 2012-17 **MIT**, Postdoctoral Fellow, Program in Science, Technology, & Society (STS), Visiting Research Scientist, MIT Center for Theoretical Physics; Research Associate & Research Scientist, MIT STS Program
- Collaborated with MIT faculty Prof. David Kaiser (Physics, STS) and Prof. Alan Guth (Physics) on theoretical cosmology projects, including a proposed test of quantum mechanics using astronomical observations. 1 first author paper, 1 2<sup>nd</sup>



author paper. 3 popular articles. Co-PI on NSF INSPIRE Award #1541160, Co-I on NSF SES Award #1056580. Took lead writing both grant proposals.

- 2006-12 **Harvard University**, Graduate Research Assistant, Department of Astronomy Collaborated with Prof. Robert P. Kirshner (Harvard Astronomy) and Prof. Michael Wood-Vasey (now at University of Pittsburgh Astronomy & Astrophysics) on Infrared observations of Type Ia and other supernovae. 1 first author paper, 1 Ph.D. thesis paper, 2 2<sup>nd</sup>/3<sup>rd</sup> author papers, 4 other papers up to 2012. *8 other supernova papers since 2013 (1 first author)*.
- 2002-05 Collaborated with Prof. Joshua S. Bloom (now at UC Berkeley Astronomy) on the Energetics and Cosmological Applications of Gamma-Ray Burst explosions. 2 first author papers. Friedman & Bloom 2005a has 185 citations (Jun 2017)
- 1998-01 **UC, Berkeley**, Undergraduate Research Assistant, Dept. of Astronomy Collaborated with Prof. Alexei V. Filippenko and Dr. Weidong Li on observational astronomy project to discover supernova explosions. Discovered 8 supernovae from 1999-2001. Co-author on 2000 conference paper.

### **OTHER POSITIONS**

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- 2017 – Affiliate, Arthur C. Clarke Center for Human Imagination, **UC San Diego**
- 2014-16 Visiting Scholar, Center for Astrophysics & Space Sciences, **UC San Diego**
- 2013 Invited Scholar, Institute for the Philosophy of Cosmology, **UC Santa Cruz**

### **PROFESSIONAL SOCIETIES & SERVICES**

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- 2014 – Manuscript Referee: *The Astrophysical Journal*
- 2004 – Manuscript Referee: *The Astronomical Journal*
- 2004 – Manuscript Referee: *Journal of Cosmology & Astroparticle Physics*
- 2002 – Member, *American Astronomical Society*
- 2002 – Member, *American Association for the Advancement of Science*

### **SELECTED MEDIA COVERAGE**

---

- 2017 [Love, quantum physics and ‘entanglement’](#), Ari Daniel and Peter Thomson, PRI (Public Radio International), July 25 2017
- 2017 [Cosmic Bell Experiment](#), *MIT Museum*, July 18 2017
- 2017 [Local realism is dead, long live local realism?](#), Rebecca Holmes, *Physics World*, June 2017
- 2017 [A Cat, a Game Show, and a Ball of Yarn: A Play about Quantum Physics](#), Kate Repantis, *Slice of MIT*, Alumni Life, Campus Culture, Events, Modern Geekhood, Science, May 17 2017
- 2017 [Stars as random number generators could test foundations of physics](#), Lisa Zyga, *Phys.org*, May 16 2017
- 2017 [NEW RESULTS! Cosmic Quantum Bell Test](#), Dianna Cowern, *Physics Girl*, May 11 2017
- 2017 [Starlight Puts Quantum Mechanics to the Test](#), Rachel Gaal, *APS News*, Research News: Editor’s Choice, Mar 2017 (Volume 26, Number 3)
- 2017 [Starlight Closes Loophole](#), *Physics World*, Mar 2017
- 2017 [Starlight Puts Quantum Mechanics to the Test](#), *APS Physics*, Research News: Editor’s Choice, Feb 28 2017, Physics 10, 22

- 2017 [THUNK - 112. Quantum Entanglement & the Cosmic Bell Test](#), Josh Pelton, *THUNK*, Feb 21 2017
- 2017 [A 600-year-old quantum experiment in the stars](#), Cathal O’Connell, *Cosmos Magazine*, Feb 17 2017
- 2017 [Starlight-controlled entanglement experiment makes shared history unlikely](#), Chris Lee, *Ars Technica*, Feb 16 2017
- 2017 [How to Tame Quantum Weirdness](#), Pradeep Mutalik, *Quanta Magazine*, Feb 16 2017
- 2017 [600-Year-Old Starlight Bolsters Einstein's 'Spooky Action at a Distance'](#), Calla Cofield, *CBS News*, Feb 13 2017 [reprinted from [Space.com](#)]
- 2017 [600-Year-Old Starlight Bolsters Einstein's 'Spooky Action at a Distance'](#), Calla Cofield, *Space.com*, Feb 13 2017
- 2017 [Cosmic Bell Test: Measurement Settings from Milky Way Stars](#), *Physical Review Letters*, Highlighted Articles, Featured in Physics, Editor’s Suggestion, Feb 10 2017
- 2017 [The Universe Is as Spooky as Einstein Thought](#), Natalie Wolchover, *The Atlantic*, Feb 10 2017 (reprinted from [Quanta magazine](#))
- 2017 [Quantum Entanglement For the First Time Confirmed by Starlight](#), *Austrian Academy of Sciences*, Feb 8 2017 [[Original German](#)]
- 2017 [Quantum Loopholes And The Problem Of Free Will](#), Chad Orzel, *Forbes*, Feb 8 2017
- 2017 [Flash Physics: Starlight closes Bell test loophole...](#), Sarah Tesh, *physicsworld.com*, Feb 8 2017
- 2017 [Both/And in “Love and Other Entanglements” at the MIT Museum](#), Patrick Gabridge, Feb 7 2017
- 2017 [Sky is no Limit for Quantum Researchers](#), *Harvey Mudd College News*, Feb 7 2017
- 2017 [Quantum Theory by Starlight](#), David Kaiser, *The New Yorker*, Feb 7 2017
- 2017 [Experiment Reaffirms Quantum Weirdness](#), Natalie Wolchover, *Quanta Magazine*, Feb 7 2017
- 2017 [Quantum Physics Tells Us Our Fate Is Not Written in the Stars](#), Brian Koberlein, *Forbes*, Feb 7 2017
- 2017 [Starlight test shows quantum world has been weird for 600 years](#), Leah Crane, *New Scientist*, Feb 7 2017
- 2017 [Synopsis: Cosmic Test of Quantum Mechanics](#), Katherine Wright, *APS Physics*, Feb 7 2017
- 2017 [Physicists address loophole in tests of Bell's inequality using 600-year-old starlight](#), Jennifer Chu, *Phys.org*, Feb 7 2017 [reprinted from [MIT News Office](#)]
- 2017 [Stars align in test supporting “Spooky action at a distance”: Physicists address loophole in tests of Bell's inequality, using 600-year-old starlight](#), Jennifer Chu, *MIT News Office*, Feb 7 2017
- 2017 [Cosmic Test Bolsters Einstein's “Spooky Action at a Distance”](#), Elizabeth Gibney, *Scientific American*, Feb 3 2017 [reprinted from [Nature News](#)]
- 2017 [Cosmic test backs ‘quantum spookiness’](#), Elizabeth Gibney, *Nature News*, Feb 2 2017 [[Scientific American](#)]
- 2016 [Big Bell Test: Quantum Research Using Laymen](#), Oliver Morsch, *Neue Zurcher Zeitung: NZZ* (Switzerland), Dec 8 2016 [[Original German](#)]
- 2016 [Cosmic Test Confirms Quantum Weirdness](#), Emily Conover, *Science News*, Dec 5 2016
- 2016 [Cosmic experiment is closing another Bell test loophole](#), Andrew Grant, *Physics Today*, Points of View: Extra Dimensions, Dec 1 2016

- 2016 [First Discovery of a Binary Companion for a Type Ia Supernova](#), Christine Pulliam, *Harvard-Smithsonian Center for Astrophysics*, Release No. 2016-07, Mar 22 2016
- 2016 [First Discovery of a Binary Companion for a Type Ia Supernova](#), Rebecca Johnson, *University of Texas at Austin, McDonald Observatory*, 22 Mar 2016
- 2016 [Un Satellite Pour Tester La Physique Quantique](#), David Fosse, *Ciel & Espace* (France) 546, Mars-Avril 2016, pg. 44-49
- 2015 [I ♥ PHYSICS: A LOVE STORY: An Amateur Critique of String Theory](#), Benjamin Winterhalter, *JSTOR Daily*, 12/26/15
- 2015 [Viewpoint: Closing the Door on Einstein and Bohr's Quantum Debate](#), Alain Aspect, *APS Physics*, American Physical Society, 12/16/15
- 2015 [Is the Cosmos Random?](#), George Musser, *Scientific American*, 313, 88-93, September 2015
- 2015 [Sorry Einstein. Quantum Study Suggests 'Spooky Action' Is Real](#), John Markoff, *New York Times, Sunday Review*, 11/14/14
- 2014 [Is Quantum Entanglement Real?](#), David Kaiser, *New York Times, Sunday Review*, 11/14/14
- 2014 [Cosmic Test For Quantum Physics' Last Major Loophole](#), Bruce Dorminey, *Forbes*, 6/18/14
- 2014 [Bell's Theorem: Closing the Loopholes](#), Iulia Georgescu, *Nature Physics, News & Views*, 4/1/14
- 2014 [Cosmic Experiment Aims To Close Loophole In Quantum Theory: Distant quasars could help confirm 'spooky action' between particles](#), Charles Q. Choi, *Inside Science, NBC News*, 3/5/14 ([Physics Central: physics buzz blog](#))
- 2014 [Cosmic light could close quantum-weirdness loophole: Distant quasars would decide whether quantum entanglement is an illusion](#), Zeeya Merali, *Nature, News & Comment*, 2/25/14
- 2014 [Is entanglement real or is there a super-deterministic cosmic conspiracy? Researchers use quasars to kill off the last of the quantum hidden variables](#), Matthew Francis, *Ars Technica*, 2/21/14
- 2014 [Closing the 'free will' loophole: MIT researchers propose using distant quasars to test Bell's theorem](#), Jennifer Chu, *MIT News Office*, 2/20/14
- 2009 [Peculiar, Junior-sized Supernova Discovered By New York Teen](#), David Aguilar and Christine Pulliam, *Harvard-Smithsonian Center for Astrophysics*, 6/11/09
- 2006 [Astronomers Push and Pull Over Dark Energy's Role in Cosmos](#), Robert Irion, *Science*, 1/20/06
- 2004 [Gamma Ray Bursts: New Cosmic Rulers?](#), Robert Irion, *Science* (with below), 10/8/04
- 2004 [Astronomer's Eager for a Swift New Vision of the Universe](#), Robert Irion, *Science*, 10/8/04

#### **OTHER MEDIA COVERAGE**

- 2017 [How Odd Can It Be?](#), Joachin Schulz, *Spektrum.de* (Germany), May 11 2017 [[Original German](#)]
- 2017 [Crazy quantum effect confirmed again experimentally](#), Natalie Wolchover, Apr 11 2017 [[Original German](#)] (reprinted from [Quanta magazine](#))
- 2017 [Cosmic Bell test](#), John Swain, *CERN Courier*, Mar 17 2017
- 2017 [Saved by the Bell](#), Emily Conover, *Science News*, Comments, Feb 22 2017
- 2017 [Quantum Entanglement is Just as Einstein Predicted](#), Ryan Young, *Trend In Tech*, Feb 21 2017
- 2017 [Bell's Theorem – Is Everything Predetermined?](#), Bruce Fenton, *The Scientific & Medical Network*, Feb 18 2017

- 2017 [Quantum Entanglement: A Bell Test from the Stars](#), Sean Bailly, *Pour La Science*, Feb 17 2017 [Original French]
- 2017 [Physicists demonstrate that quantum entanglement exists](#), *ZAP*, Feb 16 2017 [Original Portuguese]
- 2017 [New results of testing quantum entanglement of spatially separated particles](#), RSF Research Staff, *Resonance Science Foundation*, Feb 16 2017
- 2017 [Quantum entanglement confirmed thanks to the light of a star](#), Trends 21, *SOTT (Sign of the Times)*, Feb 13 2017 [Original Spanish]
- 2017 [Quantum physics with stars](#), *Investigacion Yciencia*, Feb 13 2017 [Original Spanish]
- 2017 [Quantum physics with stars](#), *Noticiara Universal*, Feb 13 2017 [Original Spanish]
- 2017 [ATTACKING killing of quantum mechanics: something totally weird happened in the last 600 years in the universe](#), Danas, *Net.hr* (Croatia), Feb 12 2017 [Original Croatian]
- 2017 [Starry Fate](#), Brian Koberlein, *One Universe At A Time*, Feb 12 2017
- 2017 [Experiment Confirms Quantum “Spooky Action at a Distance”](#), Brett Tingley, *Mysterious Universe*, Feb 11 2017
- 2017 [QUANTUM PHYSICS SHOCKER: Scientists discover we have LESS free will than we thought](#), Sean Martin, *Express* (UK), Feb 11 2017
- 2017 [Interstellar Bell Test](#), Michael Gogins, *tumblr*, Feb 10 2017
- 2017 [Physicists Just Showed That Quantum Entanglement Is a Physical Reality](#), Dom Galeon, *Futurism*, Feb 10 2017
- 2017 [A MYSTERIOUS FORCE IN THE UNIVERSE INFLUENCES PARTICLES OVER HUNDREDS OF YEARS AND BILLIONS OF KILOMETERS](#), Daniel Higson, *Evo News*, Feb 10 2017
- 2017 [Quantum experiments, between rigor and virtuosity: Random Choices Generated From the Stars 600 Years Ago](#), Marco Malaspina, *Media INAF*, Feb 10 2017 [Original Italian]
- 2017 [Starlight confirms that "God plays dice." Stars align in test supporting "spooky action at a distance"](#), Constantine Vakouftsis, *Universe Art and Literature*, Feb 10 2017 [Original Greek]
- 2017 [Cosmic Bell experiment, once again proved ghostly as the role of distance](#), *Gigcasa* (China), Feb 10 2017 [Original Chinese]
- 2017 [600 YEARS OLD STARLIGHT HELPS TEST LOOPHOLE IN QUANTUM THEORY](#), Sumayah Aamir, *I4U News*, Feb 9 2017
- 2017 [Quantum Physics – Bell Inequalities: Light from the Milky Way stars provide strong demonstration of quantum entanglement of two particles](#), *Egno Editorial*, Feb 9 2017, [Original Greek]
- 2017 [Quantum spookiness with ancient starlight](#), *ORF.at* (Austria), Feb 9 2017 [Original German]
- 2017 [Quantum physics with stars: Vienna used photons from the Milky Way](#), *Die Presse*, Feb 9 2017 [Original German]
- 2017 [MIT used 600 year old starlight to remove loophole in test for quantum entanglement](#), tech2 News Staff, *Tech 2*, Feb 8 2017
- 2017 [Entanglement tests with star-powered pseudorandom generators are childish](#), Lubos Motl, *The Reference Frame*, Feb 8 2017
- 2017 [Among the stars in search of quantum physics tricks: Tests to rule out a cosmic 'Big Brother'](#), *ANSA* (Italy), Feb 6 2017 [Original Italian]

- 2017 [Physics first checked quantum physics for interstellar distances](#), *Russia News Today*, Feb 4 2017
- 2017 [Physicists investigate quantum entanglement using starlight](#), Stanislav Mihulka, *OSEL*, Feb 8 2017 [[Original Czech](#)]
- 2017 [Quantum Entanglement: 600-Year-Old Starlight Confirms ‘Spooky Action At A Distance’ Is Very Real](#), Avaneesh Pandey, *International Business Times*, Feb 8 2017
- 2017 [600-year-old starlight addressed a loophole in quantum theory](#), Andrew Dalton, *Engadget*, Feb 8 2017
- 2017 [600-Year-Old Starlight Helps Physicists Address Quantum Theory Loophole](#), Dianne Depra, *Tech Times*, Feb 8 2017
- 2017 [Sorry, Einstein - physicists just reinforced the reality of quantum weirdness in the Universe](#), Bec Crew, *Science Alert*, Feb 8 2017
- 2017 [Cosmic Bell Test Confirms Wacky Quantum Mechanics](#), *Wochit News*, Dec 5 2016
- 2017 [Physicists first checked on the quantum physics of interstellar distances](#), *ria.ru*, RIA Science, Feb 3 2017 [[Original Russian](#)]
- 2016 [How to Evaluate the November 30th Big Bell Test](#) by Wei Zhiyuan, *Zhihu* (China), Nov 30 2016 [[Original Chinese](#)]
- 2016 [In the universe there is no local realism](#), *Trinitas*, [Academy Trinitarian](#), Nov 27 2016 [[Original Russian](#)]
- 2016 [Lack of Realism Proved in the Universe](#), *Lenta.RU*, Science and Technology (Russia), Nov 23 2016 [[Original Russian](#)]
- 2016 [Is This Why the Original Ghostbusters Don't Exist in the Reboot?](#), Evan Jacobs, *MovieWeb*, 6/25/16
- 2015 [Spooky Action is Real: Bizarre Quantum Entanglement Confirmed in New Tests](#), Tia Gose, *Live Science*, 11/17/15
- 2015 [Quantum weirdness proved real in first loophole-free experiment](#), Jacob Aron, *New Scientist*, 8/28/15
- 2015 [Quantum 'spookiness' passes toughest test yet](#), Zeeya Merali, *Nature News*, 8/27/15
- 2015 ["Spookiness" Confirmed by the First Loophole-free Quantum Test](#), Zeeya Merali, *FOXi Community*, 8/26/15
- 2015 [How to Travel Faster than Light Without Really Trying](#), Brian Koberlein, *Starts With A Bang! (Medium.com)*, 5/26/15
- 2014 [All Tangled Up](#), Dr. Jason Gallicchio, interviewed by Samantha Thomas, *University of Chicago Groks Science Radio Show and Podcast*, 12/3/14
- 2014 [Of Stephen Hawking, Eddie Redmayne, and Quantum Entanglement](#), Wade Roush, *Knight Science Journalism at MIT*, 11/17/14
- 2014 [The Berenstain Bears, Nelson Mandela, and how we may have slipped into an alternate time-stream](#), by Joe Crollard, *Newsvine*, 8/30/14
- 2014 [Exploring the Multiverse and the Origin of Life](#), Ramin Skibba, *Science Political*, 8/13/14
- 2014 [It would be strange if there was only one universe](#), Bas den Hond, *Trouw* (The Netherlands), 7/5/14
- 2014 [What if the world has always been inside a black hole?](#), Guido Meyer, *Die Welt* (Germany), 6/8/14
- 2014 [Free will, the quantum and the cosmos](#), Valerio Scarani, *Spreadquantum* (National University of Singapore), 3/4/14

- 2014 [Free Willy](#), Brian Koberlein, *Briankoberlein.com* (Rochester Institute of Technology), 2/28/14
- 2014 [Cosmic test for quantum theory](#), Rainer Kayser, *Weltraum Aktuell* (Germany), 2/26/14
- 2014 [Does Free Will Exist? Ancient Quasars May Hold the Clue](#), Jason Major, *Universe Today*, 2/25/14
- 2014 [MIT wants quasars to help put free will to rest: Ringing the Bell on inequality](#), Richard Chirgwin, *The Register* (United Kingdom), 2/24/14
- 2014 [For the last loophole, let there be light!](#), Vasudevan Munkuth, *The Hindu* (India), *The Copernican Blog*, 2/24/14
- 2014 [A Test of Bell's Theorems Using Distant Quasars](#), Andrius T., *Physics Database*, 2/24/14
- 2014 [Op-Ed: Do quantum or classical physics rule? MIT wants to find out](#), Paul Wallis, *Digital Journal*, 2/22/14
- 2014 [Distant quasars to fill a loophole of Bell's theorem](#), Analissa Arci, *Gaia News* (Italy), 2/21/14
- 2014 [Closing 'Free Will' Loophole From Bell's Theorem](#), Lee Rannals, *redOrbit*, 2/21/14
- 2014 [Bell's Inequality And The Speed Of Light: Quasar Findings Might Close The 'Free Will' Loophole](#), News Staff, *Science 2.0*, 2/20/14
- 2014 [The Dilemma of Randomness and Super-Determinism](#), Michael Gogins, *tumblr*, 2/20/14
- 2013 [Cosmic Bell](#), Sabine Hossenfelder, *Backreaction* (NORDITA), 11/27/13
- 2013 [Closing Loopholes in Quantum Mechanics](#), Warren Huelsnitz, *The Fun is Real!*, 10/16/13

## **PUBLIC TALKS**

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- 2017 Summer Science Program Guest Lecture, **New Mexico Tech**, 7/12/17
- 2016 Arthur C. Clarke Center for Human Imagination, **UC San Diego**, 8/10/16
- 2016 Center for Astrophysics and Space Sciences, **UC San Diego**, 8/3/16
- 2015 Summer Science Program Alumni Dinner, **MIT Media Lab**, 11/14/15
- 2015 Arthur C. Clarke Center for Human Imagination, **UC San Diego**, 8/6/15
- 2014 Arthur C. Clarke Center for Human Imagination, **UC San Diego**, 7/29/14
- 2012 Ph.D. Thesis Talk, Harvard/CfA Optical & Infrared Seminar, **Harvard Univ.**, 2/22/12
- 2008 Dudley House Crosstalk Series, (with Jason Gallicchio), **Harvard University**, 3/6/08
- 2006 Guest Lecture, **Summer Science Program**, Ojai, CA, 7/3/06
- 2005 Guest Lecture, The Math Circle, **Northeastern University**, 12/10/05
- 2005 Dudley House Crosstalk Series, (with Ryan Hickox), **Harvard University**, 12/8/05
- 2005 Guest Lecture, "Cosmic Connections", **Harvard University**, 11/7/05
- 2005 Guest Lecture, The Math Circle, **Northeastern University**, 5/22/05

## **OUTREACH**

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- 2017 [Cosmic Bell: Exploring Quantum Weirdness](#), *MIT Museum* [Video], Mar-Sep 2017
- 2016-17 Cosmic Bell Experiment Workshop, *MIT Museum's Compton Studio*, Sep 16-Feb 17
- 2016 [Fleet Night of Science](#) Volunteer, "Time Travel", San Diego Comic-Con After Party, Ruben H. Fleet Science Center, 7/21/16
- 2014 Science Consultant, [Video: Do We Live in a Multiverse?](#), by Charles Q. Choi and Greg Kestin, *NOVA*, PBS, WGBH Boston, 9/24/14
- 2014 [Do We Live in A Multiverse?](#), Guido Meyer interview, *IQ*, Bavarian Public Radio, Germany, 6/2/14

- 2014 Science Consultant, [What is Gravity Made Of?](#), by Greg Kestin, *NOVA*, PBS, WGBH Boston, 5/8/14
- 2014 [Heart of a Star, Revealed](#), Art of Astrophysics Contest, *MIT Kavli Institute for Astrophysics & Space Sciences*, 1/31/14
- 2013 [Science Consultant](#) for television series *Wilfred* on FX, Starring Elijah Wood, 8/13
- 2013 Created [animations to visualize current project](#), basis for MIT Museum Exhibit
- 2006 Gamma-Ray Bursts (GRBs): Andrew Friedman, Astronomy Q & A Podcast series, *Harvard-Smithsonian Center for Astrophysics Science Media Group*, Robert Naeye Interview, Senior Editor of *Sky & Telescope Magazine*, 5/10/06
- 2005 Temporary Autonomous Zones: Dialogue with an Astrophysicist, San Diego radio DJ  
Onto the Ontologist Interview, *American Astronomical Society Meeting #205*, 1/10/05

### MENTORING

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- 2017 – Advised high school sophomore *Isaac Broudy* with Prof. Brian Keating, **UCSD Physics/CASS**
- 2017 – Advised physics undergraduate *Kevin Crowley* with Prof. Brian Keating, **UCSD Physics/CASS**
- 2016 – Advised physics undergraduate student *Calvin Leung* with Prof. Jason Galicchio, **Harvey Mudd College Physics (University of Vienna)**
- 2015 – Advised physics graduate student *David Leon* with Prof. Brian Keating, **UCSD Physics/CASS**
- 2015-16 Advised physics undergraduate *Jonah Saidian* with Prof. Brian Keating, **UCSD Physics/CASS**
- 2012 – Advised *Isabella Sanders & Anthony Mark* on MIT Undergraduate Research Opportunities Astrophysics Project with Prof. David Kaiser, **MIT STS / Physics**
- 2012-13 Advised *Jeff Iuliano* on Harvard college senior thesis in philosophy of science with Prof. Edward Hall, **Harvard Philosophy**

### ACADEMIC LEADERSHIP POSITIONS

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- 2012 Resident Proctor, Harvard Summer Program in Cambridge, England: A Program on Nineteenth Century Science & Religion, Prof. Anne Harrington (Harvard History of Science), Prof. John Durant (MIT STS), **Cambridge University**
- 2003-10 Editor In Chief/Webmaster, The Harvard Satirical Press: A Graduate School of Arts & Sciences (GSAS) Student Organization, **Harvard University**
- 2006-07 Web Designer, Graduate Student Council, **Harvard University**
- 2006-07 Arts & Comedy Fellow, Dudley House, **Harvard University**
- 2004-06 Resident Advisor, GSAS Residence Halls, **Harvard University**
- 2003-04 Social Coordinator/Webmaster, Graduate Dormitory Council, **Harvard University**
- 1999-02 Staff Writer & Graphic Designer, **Berkeley Scientific Journal**
- 2001 Physics & Astronomy Tutor, Cesar E. Chavez Student Learning Center, **UC Berkeley**

## COMPUTER SKILLS

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**Programming Languages:** Python, IDL, Perl, php, MySQL, shell scripting, HTML, LaTeX  
**Software:** Photoshop, In Design, Quark, Dreamweaver, Word, Excel, Power Point, Keynote, Mathematica  
**Social Media:** Facebook, Twitter  
**Operating Systems:** Mac OSX, Unix/Linux, PC

## PRIMARY COLLABORATORS (27)

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D.I Kaiser, A.H. Guth (MIT), J. Gallicchio (Chicago), B.G. Keating (UCSD), A. Zeilinger (Vienna), R.P. Kirshner, P. Challis, K. Mandel, M. Hicken, G. Narayan, M.R. Drout, N. Sanders, R. Margutti, S. Meyer, A.M. Soderberg (Harvard/CfA), R.J. Foley (Illinois), W.M. Wood-Vasey (Pittsburgh), G.H. Marion (Texas), J.S. Bloom, A.V. Filippenko, W. Li, D.L. Starr (UC Berkeley), M. Modjaz, F.B. Bianco (NYU), A. Rest (Hubble STScI), C. Fransson (Stockholm), N. Gehrels (NASA/GSFC)

**Thesis Committee (5):** R.P. Kirshner (Ph.D. Advisor), E. Berger, A. Soderberg, D. Eisenstein (Harvard), W.M. Wood-Vasey (Pittsburgh)

**Graduate Advisors (2):** J.S. Bloom (UC Berkeley), R. Narayan (Harvard)

**Postdoctoral Sponsors (2):** D.I. Kaiser, A.H. Guth (MIT)

## STUDENTS MENTORED

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**Undergraduates (5):** Jeff Iuliano (Harvard), Isabella Sanders, Anthony Mark (MIT), Jonah Saidian, Kevin Crowley (UCSD), Calvin Leung (Harvey Mudd)

**High School Students (1):** Isaac Broudy (Bonita Vista High School / UCSD)

**Graduate Students (1):** David Leon (UCSD)

**Postdocs (1):** Arturo Avelino (Harvard)

## REFERENCES

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David I. Kaiser, Germeshausen Professor of the History of Science, Department Head, Program in Science, Technology, & Society, and Professor of Physics, Department of Physics, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, MIT STS Program, Building E51-179, (617) 452-3173, Fax: (617) 258-8118, [dikaiser@mit.edu](mailto:dikaiser@mit.edu)

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Assistant: Scott Morely, (617) 253-4852, Fax: (617) 253-8674, [morely@mit.edu](mailto:morely@mit.edu)



- Anton Zeilinger, Professor of Physics, University of Vienna, Director, Institute for Quantum Optics and Quantum Information, President, Austrian Academy of Sciences, Boltzmanngasse 3, 1090 Vienna, Austria, Tel: +43 1 4277 51201, Fax: +43 1 4277 29552, [www.iqoqi-vienna.at](http://www.iqoqi-vienna.at), [anton.zeilinger@univie.ac.at](mailto:anton.zeilinger@univie.ac.at)
- Brian G. Keating, Professor of Physics, UC San Diego, Center for Astrophysics and Space Sciences, 9500 Gilman Drive, La Jolla, CA, 92093, Office: SERF 322A, (858) 534-7930, [bkeating@ucsd.edu](mailto:bkeating@ucsd.edu)
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