Jason Hyrum Steffen

Lindheimer Fellow and Research Assistant Professor
CIERA, Department of Physics and Astronomy, Northwestern University

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Citizenship: United States of America

Education

2006: Doctor of Philosophy in Physics (*Advisor: Eric Agol*)
University of Washington, Seattle, Washington
Dissertation: *Detecting New Planets in Transiting Systems*

2003: Master of Science in Physics
University of Washington, Seattle, Washington

2000: Bachelor of Science in Physics and in Mathematics, *Summa Cum Laude*
Weber State University, Ogden, Utah

Research Interests

Extrasolar Planets, Dark Energy, Dark Matter, Gravitation

Scientific Employment

2012–2013: CIERA Fellow and Research Assistant Professor, Northwestern University

2006–2012: Brinson Postdoctoral Fellow, Fermilab Center for Particle Astrophysics

2001–2006: Research Assistant, University of Washington, Seattle

1999: National Science Foundation REU Intern, Inst. for Nuclear Theory, Seattle, WA

Funded grants as PI or Science PI (grant awards total over $1,300,000)

2014–2017: PI, NASA Origins Program, ($380,000)

2014–2017: PI, NASA Kepler Participating Scientist Program Cycle 3, ($260,000)

2012–2014: PI, NASA Kepler Participating Scientist Program Cycle 2, ($170,000)

2009–2012: PI, CHASE (Fermilab T-991). ($300,000)

2008–2012: PI, NASA Kepler Participating Scientist Program Cycle 1, ($170,000)

2005–2006: Science PI, NASA Graduate Student Research Program (GSRP). ($72,000)

Students

Faculty Advisor for four Northwestern undergraduate students and one high school student

Three students received competitive summer grants from the college for their research projects (the fourth was an REU intern elsewhere).

Academic Employment

2012–Present: Lecturer, Northwestern University, Department of Physics
Courses: Integrated Science Program Astrophysics, Physics for Scientists and Engineers

2007–2012: Adjunct Faculty, Waubonsee Community College, Department of Physics
Course: Introduction to Astronomy

2001–2006: Adjunct Faculty, Edmonds Community College, Department of Physics
Courses: The Solar System, Stars and Galaxies, Physics in Everyday Life

2005: Adjunct Faculty, Bellevue Community College, Department of Physics
Course: Physics for Scientists and Engineers

Industry/Private Employment

2000–2001: Embedded Software Engineer, L-3 Communications, Salt Lake City, Utah

2000: Pricing Analyst, McLeod USA Telecommunications, Salt Lake City, Utah

Awards

CIERA, Northwestern University

Lindheimer Fellowship (2013), CIERA Fellowship (2012)

Fermilab Center for Particle Astrophysics

Fermilab Technology Award (2013), Research Recognition Award (2011), Brinson Postdoctoral Fellowship (2006)

University of Washington, Department of Physics

Mellam Fellowship (2001), Physics Department Fellowship (2001)

Weber State University

Weber State University Presidential Commendation Scholarship (1993)

Weber State University, Department of Physics

Outstanding Physics Graduate (2000), Paul H. Huish Scholarship (1999), Questar Corporation and Jim Bateman Scholarships (1998), Mary Margaret Clarke Scholarship (1997)

Weber State University, Department of Mathematics

Outstanding Mathematics Graduate (2000), Jerry Fields Award (1999)

Service

2014: Astrophysics Seminar Committee member, Northwestern University

2010–2011: Science Organizing Committee member, *First Kepler Science Conference*, Mountain View, CA (December 5-9, 2011).

2011: Chair of the Science Organizing Committee and Local Organizing Committee, *Laboratory Tests of Dark Energy*, Batavia, IL (October 28-29, 2011).

Reviewer: NASA Origins 2012, 2009, 2008, NASA Explorer Program 2011, Department of Energy Non-Accelerator Physics 2010

2006–2012: Fermilab Center for Particle Astrophysics: Chalk Talk organizer, Munch organizer, Seminar organizer, webmaster, and various committees member.

Referee for Astrophysical Journal, Astrophysical Journal Letters, Astronomy and Astrophysics, Monthly Notices of the Royal Astronomical Society, Publications of the Astronomical Society of Japan, Celestial Mechanics, Astroparticle Physics, and the Journal of Air Transport Management

Public Outreach and Media Coverage

Multiple workshops with K-12 school groups and extracurricular youth groups.

Several public lectures including: Adler Planetarium, Clark Planetarium (3x), Augustana College, Waubonsee Community College, and various private groups.

Several dozen radio interviews, both live and pre-recorded, including: three appearances on NPR's *Clever Apes*, twice on *Marketplace*, once on *All Things Considered*, multiple interviews with BBC affiliates, and many interviews on a variety of local and syndicated network shows.

Television interviews with PBS (NOVA), Chicago 5 news, CNN, "Rock Center with Brian Williams", as well as coverage on a variety of television, cable, and international news programs, and the premier episode of "This vs. That" by Jon Hotchkiss.

Print and internet coverage of all aspects of my research have appeared in the New York Times (front page), Nature, Science, New Scientist, the Economist, PhysOrg.com, Wired Magazine, Space.com, BBC, and a variety of other outlets around the world. My work was one of Discover Magazine's top 100 science stories for 2011.

References

Prof. Eric Agol
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Box 351580
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Prof. Fred Rasio
Northwestern University
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Evanston IL 60208
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Bibliography

Statistics: 60 reviewed papers (19 first author), >5700 citations, h index $\geq$37

Peer Reviewed

60 **Steffen, J.H.** and Hwang, J.A. "The period ratio distribution of Kepler's candidate multi-planet systems", MNRAS, Submitted, (2014) arXiv:1409.3320

59 Welsh, W.F. *et al.*, "KIC 9632895 - The 10th Kepler Transiting Circumbinary Planet", ApJ, Submitted, (2014) arXiv:1409.1605

58 Valsecchi, F., Rasio, F.A., and **Steffen, J.H.**, "From hot Jupiters to super-Earths via Roche lobe overflow", ApJL, 793, 3, (2014) arXiv:1408.3635

57 Fabrycky, D.C., *et al.*, "Architecture of Kepler's Multi-transiting Systems: II. New investigations with twice as many candidates", ApJ, 790, 146, (2014) arXiv:1202.6328

56 Rowe, J.F., *et al.*, "Validation of Kepler's Multiple Planet Candidates. III: Light Curve Analysis & Announcement of Hundreds of New Multi-planet Systems', ApJ, 784, 45, arXiv:1402.6534, (2014)

55 Lissauer, J.J., *et al.*, "Validation of Kepler's Multiple Planet Candidates. II: Refined Statistical Framework and Systems of Special Interest", ApJ, 784, 44, arXiv:1402.6352, (2014)

54 Margy, G., *et al.*, "Masses, Radii, and Orbits of Small Kepler Planets: The Transition from Gaseous to Rocky Planets", ApJS, 210, 20, arXiv:1401.4195, (2013)

53 Upadhye, A. and **Steffen, J.H.**, "Monopole radiation in modified gravity", PRL, Submitted, arXiv:1306.6113, (2013)

52 **Steffen, J.H.** and Farr, W., "A lack of short-period multiplanet systems with close-proximity pairs and the curious case of Kepler 42", ApJL, 774, L12, arXiv:1306.3526, (2013)

51 Borucki, W.J., *et al.*, "Kepler-62: A five-planet system with planets of 1.4 and 1.6 Earth radii in the Habitable Zone", Science, 340, 587, arXiv:1304.7387, (2013)

50 Mazeh, T., *et al.*, "Transit Timing Observations from Kepler: VIII. Catalog of Transit Timing Measurements of the First Twelve Quarters", ApJS, 208, 16, (2013)

49 **Steffen, J.H.**, "Kepler's Missing Planets", MNRAS, 433, 3246, (2013) arXiv:1301.2394

48 Batalha, N.M., *et al.*, "Planetary Candidates Observed by Kepler, III: Analysis of the First 16 Months of Data", ApJS, 204, 24, (2013) arXiv:1202.5852

47 **Steffen, J.H.**, *et al.*, "Transit Timing Observations from Kepler: VII. Confirmation of 27 planets in 13 multiplanet systems via Transit Timing Variations and orbital stability", MNRAS, 428, 1077, (2013) arXiv:1208.3499

46 **Steffen, J.H.**, *et al.*, "Transit Timing Observations from Kepler: VI. Potentially interesting candidate systems from Fourier-based statistical tests", ApJ, 756, 186, (2012) arXiv:1201.1873

45 Ford, E.B., *et al.*, "Transit Timing Observations from Kepler: V. Transit Timing Variation Candidates in the First Seventeen Months from Polynomial Models", ApJ, 756, 185, (2012) arXiv:1201.1892

44 Carter, J.A., Agol, E., *et al.*, "Kepler-36: A Pair of Planets with Neighboring Orbits and Dissimilar Densities", Science, 337, 556, (2012) arXiv:1206.4718

43 Upadhye, A., **Steffen, J.H.**, and Chou, A.S., "Designing dark energy afterglow experiments",

PRD, 86, 035006, (2012) arXiv:1204.5476

42 Howard, A.W., *et al.*, "Planet Occurrence within 0.25 AU of Solar-type Stars from Kepler", ApJS, 201, 15, (2012) arXiv:1103.2541

41 **Steffen, J.H.**, Upadhye, A., Baumbaugh, A., Chou, A.S., and Tomlin, R., "Anomalous afterglow seen in a chameleon afterglow search", PRD, 86, 012003, (2012) arXiv:1204.5476

40 Hooper, D. and **Steffen, J.H.**, "Dark matter and the habitability of planets", JCAP, 07, 046, (2012) arXiv:1103.5086

39 **Steffen, J.H.**, *et al.*, "Kepler constraints on planets near hot Jupiters", PNAS, 109, 7982, (2012) arXiv:1205.2309

38 Fabrycky, D.C., Ford, E.B., **Steffen, J.H.**, *et al.*, "Transit Timing Observations from Kepler: IV. Confirmation of 4 Multiple Planet Systems by Simple Physical Models", ApJ, 750, 114, (2012)

37 **Steffen, J.H.**, Fabrycky, D.C., Ford, E.B., *et al.*, "Transit Timing Observations from Kepler: III. Confirmation of 4 Multiple Planet Systems by a Fourier-Domain Study of Anti-correlated Transit Timing Variations", MNRAS, 421, 2342, (2012)

36 Ford, E.B., Fabrycky, D.C., **Steffen, J.H.**, *et al.*, "Transit Timing Observations from Kepler: II. Confirmation of Two Multiplanet Systems via a Non-parametric Correlation Analysis", ApJ, 750, 113, (2012)

35 Borucki, W.J., *et al.*, "Kepler-22b: A 2.4 Earth-radius Planet in the Habitable Zone of a Sun-like Star", ApJ, 745, 120 (2012) arXiv:1112.1640

34 Welsh, W.F., *et al.*, "Transiting circumbinary planets Kepler-34 b and Kepler-35 b", Nature, 481, 475 (2012)

33 Ballard, S., *et al.*, "The Kepler-19 System: A Transiting 2.2 R_{Earth} Planet and a Second Planet Detected via Transit Timing Variations", ApJ, 743, 200 (2011) arXiv:1109.1561

32 Lissauer, J.J., *et al.*, "Architecture and Dynamics of Kepler's Candidate Multiple Transiting Planet Systems", ApJS, 197, 8 (2011) arXiv:1102.0543

31 Cochran, W.D., *et al.*, "Kepler 18-b, c, and d: A System Of Three Planets Confirmed by Transit Timing Variations, Lightcurve Validation, Spitzer Photometry and Radial Velocity Measurements", ApJS, 197, 7 (2011) arXiv:1110.0820

30 Ford, E.B., *et al.*, "Transit Timing Observations from Kepler: I. Statistical Analysis of the First Four Months", ApJS, 197, 2 (2011) arXiv:1102.0544

29 **Steffen, J.H.**, *et al.*, "The architecture of the hierarchical triple star KOI 928 from eclipse timing variations seen in Kepler photometry", MNRAS Letters, 417, L31 (2011) arXiv:1106.4530

28 Doyle, L., *et al.*, "Kepler 16: A Transiting Circumbinary Planet", Science, 16, 333, 6049 (2011) arXiv:1109.3432

27 **Steffen, J.H.** and Hotchkiss, J., "Experimental test of airplane boarding methods", Jour. Air. Trans. Mgmt., 18, 64, (2012) arXiv:1108.5211

26 Borucki, W.J., *et al.*, "Characteristics of planetary candidates observed by Kepler, II: Analysis of the first four months of data", ApJ, 736, 19 (2011) arXiv:1102.0541

25 Latham, D.W., *et al.*, "A First Comparison of Kepler Planet Candidates in Single and Multiple

Systems", ApJ Letters, 732, 24 (2011) arXiv:1103.3896

24 Batalha, N.M., Borucki, W.J., *et al.*, "*Kepler's* first rockly planet: Kepler-10b", ApJ, 729, 27 (2011) arXiv:1102.0605

23 Carter, J.A., *et al.*, "KOI-126: a triply-eclipsing hierarchical triple with two low-mass stars", Science, 331, 562 (2011) arXiv:1102.0562

22 Lissauer, J.J., *et al.*, "A closely packed system of low-mass, low-density planets transiting Kepler-11", Nature (cover story), 470, 53 (2011) arXiv:1102.0291

21 Borucki, B., *et al.*, "Characteristics of Kepler Planetary Candidates Based on the First Data Set", ApJ, 728, 117 (2011) arXiv:1006.2799

20 Torres, G., *et al.*, "Modeling *Kepler* Transit Light Curves as False Positives: Rejection of Blend Scenarios for Kepler-9, and Validation of Kepler-9d, a Super-Earth-size Planet in a Multiple System", ApJ, 727, 24 (2011) arXiv:1008.4393

19 **Steffen, J.H.**, Baumbaugh, A., Chou, A.S., Mazur, P.O., Tomlin, R., Upadhye, A., Weltman, A., Wester, W., "Laboratory constraints on chameleon dark energy and power-law fields", Phys. Rev. Lett., 105, 261803 (2010) arXiv:1010.0988

18 **Steffen, J.H.**, *et al.*, "Five Kepler target stars that show multiple transiting exoplanet candidates", ApJ, 725, 1226, (2010) arXiv:1006.2763

17 Holman, M., *et al.*, "Kepler-9: A system of Multiple Planets Transiting a Sun-like Star, Confirmed by Timing Variations", Science (cover story), 330, 6000, (2010)

16 Agol, E., Cowan, N. B., Knutson, H. A., Deming, D., **Steffen, J. H.**, Henry, G. W., Charbonneau, D., "The climate of HD 189733b from fourteen transits and eclipses measured by Spitzer", ApJ, 721, 1861, (2010), arXiv:1007.4378

15 Borucki, B., *et al.*, "Kepler Planet Detection Mission: Introduction and First Results", Science, 327, 5968, 977 (2010)

14 Gilliland, R., *et al.*, "Kepler Asteroseismology Program: Introduction and First Results", PASP, 122, 131 (2010), arXiv:1001.0139

13 Upadhye, A., **Steffen, J.H.**, & Weltman, A., "Constraining chameleon field theories using the GammeV afterglow experiment", Phys. Rev. D, 81 (1), 015013, (2010), arXiv:0911.3906.

12 **Steffen, J.H.**, Moore, M.W., & Boynton, P.E. "Optimal Simultaneous Estimation of Several Linear Parameters in the Presence of Lorentzian Thermal Noise", Classical and Quantum Gravity, 26, 18, 185009, (2009), arXiv:0803.3199.

11 **Steffen, J.H.**, Upadhye, A., "The GammeV suite of experimental searches for axion-like particles", Invited Review, Mod. Phys. Lett. A, 24, 26, 2053, (2009), arXiv:0908.1529.

10 Chou, A.S., Wester, W., Baumbaugh, A., Gustafson, H.R., Irizarry-Valle, Y., Mazur, P.O., **Steffen, J.H.**, Tomlin, R., Upadhye, A., Weltman, A., Yang, X., Yoo, J., "Search for chameleon particles using a photon regeneration technique", Phys. Rev. Lett., 102, 030402, (2009), arXiv:0806.2438.

9 **Steffen, J.H.**, "A statistical mechanics model for free-for-all airplane passenger boarding", Am. J. Phys., Volume 76, No. 12, pp. 1114-1119 (2008), arXiv:0803.3199.

8 **Steffen, J.H.** & Valenzuela, O., "Constraints on the angular distribution of satellite galaxies

about spiral hosts", MNRAS, 387, 1199 (2008), arXiv:0712.2363.

7 **Steffen, J.H.**, "Optimal boarding method for airline passengers", Jour. Air. Trans. Mgmt., 14 (3), 146-150 (2008), arXiv:0802.0733.

6 Chou, A.S., Wester, W., Baumbaugh, A., Gustafson, H.R., Irizarry-Valle, Y., Mazur, P.O., **Steffen, J.H.**, Tomlin, R., Yang, X., Yoo, J., "Search for axion-like particles using a variable baseline photon regeneration technique", Phys. Rev. Lett., 100, 080402 (2008), arXiv:0710.3783.

5 Agol, E. & **Steffen, J.H.**, "A limit on the presence of Earth-mass planets around a Sun-like star", MNRAS, Volume 374, p. 941 (2007), arXiv:astro-ph/0610159.

4 **Steffen, J.H.** & Agol, E., "An analysis of the transit times of TrES-1b", MNRAS Letters, Volume 364, Issue 1, p. 96 (2005), arXiv:astro-ph/0509656.

3 Moore, M.W., **Steffen, J.H.**, & Boynton, P.E., "Optimal determination of the equilibrium displacement of a damped harmonic oscillator in the presence of thermal noise", Rev. Sci. Inst., Volume 76, p. 085106 (2005), arXiv:physics/0412102.

2 Agol, E., **Steffen, J.**, Sari, R., & Clarkson, W., "On detecting terrestrial planets with the timing of giant planet transits", MNRAS, Volume 359, Issue 2, pp. 567-579 (2005), arXiv:astro-ph/0412032.

1 **Steffen, J.H.**, "Exploring 5th force interactions with 18th century technology", IJMPD, Volume 13, Issue 10, pp. 2249-2254 (2004), arXiv:gr-qc/0503081.

Conference Proceedings and Other

Essig, R., *et al.*, "Dark Sectors and New, Light, Weakly-Coupled Particles", Working group report for Intensity Frontier (Snowmass), (2013), arXiv:1311.0029.

Hewett, J.L., *et al.*, "Fundamental Physics at the Intensity Frontier", Proceedings of the 2011 workshop on Fundamental Physics at the Intensity Frontier, (2011), arXiv:1205.2671.

Steffen, J.H., *for the CHASE collaboration*, "The CHASE laboratory search for chameleon dark energy", Proceedings of Identification of Dark Matter (IDM 2010) Conference, (2010), arXiv:1011.3802v2.

Steffen, J.H., *for the CHASE collaboration*, "The CHASE laboratory search for chameleon dark energy", Proceedings of International Conference for High Energy Physics (ICHEP 2010), (2010), arXiv:1011.3802v1.

Peterson, J. B., *et al.*, "21-cm Intensity Mapping", white paper submitted to the Astronomy 2010 Decadal Survey, (2009), arXiv:0902.3091.

Steffen, J.H., *for the GammeV collaboration*, "Constraints on Chameleons and Axion-like Particles from the GammeV Experiment", Proceedings of Identification of Dark Matter (IDM 2008), (2008), arXiv:0810.5070.

Agol, E., Cowan, N.B., Bushong, J., Knutson, H., Charbonneau, D., Deming, D., & **Steffen, J.H.**, "Transits and secondary eclipses of HD 189733 with Spitzer", Proceedings of IAU Symposium No. 253 "Transiting Planets", (2008), arXiv:0807.2434.

Steffen, J.H. & Agol, E., ASP Conference Series, "Developments in Planet Detection using Transit Timing Variations", *Transiting Extrasolar Planets Workshop* MPIA Heidelberg Germany, Eds: Cristina Afonso, David Weldrake & Thomas Henning, ASPC, Volume 366, p. 158 (2007), arXiv:astro-ph/0612442.

Steffen, J.H., Gaudi, B.S., Ford, E.B., Agol, E., Holman, M.J., "Detecting and Characterizing Planetary Systems with Transit Timing", White paper submitted to the Exoplanet Task Force, (2007), arXiv:0704.0632.

Boynton, P.E., Bonicalzi, R.M., Kalet, A.M., Kleczewski, A.M., Lingwood, J.K., McKenney, K.J., Moore, M.W., **Steffen, J.H.**, Berg, E.C., Cross, W.D., Newman, R.D., Gephart, R.E., "Gravitation Physics at BGPL", Proceedings of the Francesco Melchiorri Memorial Conference, New Astronomy Reviews, Volume 51, p. 334 (2007), arXiv:gr-qc/0609095.

Steffen, J.H., Ph.D. Dissertation, "Detecting new planets in transiting systems", (2006), arXiv:astro-ph/0609492.

Berg, E.C., Cross, W.D., Newman, R.D., Boynton, P.E., Moore, M.W., & **Steffen, J.H.**, "Planned tests of the equivalence principle with a cryogenic torsion pendulum", Contribution to *Testing The Equivalence Principle on Ground and in Space*, Ed. Lammerzahl, C., Everitt, C.W.F., & Ruffini, R., (Springer-Verlag: London), (2005).

Steffen, J.H., "Symmetry in a perturbed optical system", (2005), arXiv:physics/0503129.

Berg, E.C., Bantel, M.K., Cross, W.D., Inoue, T, Newman, R.D., **Steffen, J.H.**, Moore, M.W., & Boynton, P.E., "Laboratory tests of gravitational physics using a cryogenic torsion pendulum", Proceedings of 10th Marcel Grossman Meeting, Ed. Ruffini, R., et al. (World Scientific: Singapore), (2005), arXiv:gr-qc/0403021.

Invited Talks (2010 – Present)

Extrasolar Planets

Astronomy Seminar, Institut de Recherche en Astrophysique et Planétologie, Toulouse, France (September 2013).

Astronomy Seminar, Observatoire de la Côte d'Azur, Nice, France (September 2014).

Tel Aviv University Astronomy Seminar, Tel Aviv, Israel (December 2013).

University of Utah Physics and Astronomy Seminar, Salt Lake City, UT (October 2013).

Public Lecture, Clark Planetarium, Salt Lake City, UT (October 2013).

Brigham Young University Physics Colloquium, Provo, UT (October 2013).

Harvard University Astronomy Seminar, Cambridge, MA (September 2013).

Public Lecture, Clark Planetarium, Salt Lake City, UT (August 2013).

Cambridge University Astronomy Seminar, Cambridge, UK (April 2013).

UCLA Physics and Astronomy Seminar, Los Angeles, CA (April 2013).

Invited Talk, American Statistical Association Big Data Conference, Chicago, IL (January 2013).

Northern Illinois University Physics Colloquium, Dekalb, IL (October 2012).

Fermilab Colloquium, Batavia, IL (September 2012).

Lecture for ALCON 2012, Fermilab, Batavia, IL (July 2012).

CIPANP Conference 2012, St. Petersburg, FL (May 2012).

Goddard Space Flight Center Astrophysics Colloquium, Greenbelt, MD (March 2012).

Penn State Astronomy Colloquium, State College, PA (January 2012).

Public Lecture, Adler Planetarium, Chicago, IL (October 2011).

Physics Department Colloquium, Washington University, St. Louis, MO (September 2011).

Lecture for Chicago Astronomical Society, Adler Planetarium, Chicago, IL (May 2011).

Lecture for Chicagland Township Clerks, Chicago, IL (May 2011).

Astrophysics Colloquium, JPL, Pasadena, CA (April 2011).

Physics and Astronomy Deparmental Colloquium, Northwestern University, Evanston, IL (March 2011).

Theoretical Astrophysics Seminar, Northwestern University, Evanston, IL (February 2011).

Harry Nelson Lecture in Astronomy, Public Lecture, Augustana College, Rock Island, IL (October 2010).

Stanford/SLAC Astrophysics Colloquium, Palo Alto, CA (September 2010).

Invited Talk, Putting our Solar System in Context, Obergurgl, Austria (April 2010).

Public Lecture, Clark Planetarium, Salt Lake City, UT (February 2010).

Weber State University Physics Seminar, Ogden, UT (February 2010).

Particle Astrophysics

Jefferson National Laboratory Physics Seminar, Newport News, VA (September 2012).

8th Annual Patras workshop on Axions, WIMPs, and Wisps, Chicago, IL (July 2012).

Particle Astrophysics Seminar, Penn State University, State College, PA (January 2012).

Physics Department Colloquium, University of Central Florida, Orlando, FL (February 2012).

Physics Seminar, CERN, Geneva, Switzerland (January 2012).

Physics Seminar, DESY, Hamburg, Germany (January 2012).

Physics Colloquium, Northwestern University, Evanston, IL (November 2011).

Particle Astrophysics Seminar, Fermilab, Batavia, IL (November 2011).

Physics Department Theory Seminar, Washington University, St. Louis, MO (September 2011).

High Energy Physics Seminar, Northwestern University, Evanston, IL (April 2011).

UCLA Physics Department Seminar, Los Angeles, CA (October 2010).

LBL INPA Journal Club Talk, Berkeley, CA (September 2010).

Fermilab Joint Experimental-Theoretical Seminar, Batavia, IL (August 2010).

Invited Talk, The Dark Side of the Universe, Leon, Mexico, (June 2010).

University of Utah Physics Colloquium, Salt Lake City, UT. (February 2010).