

SARA I. WALKER, PH.D.

Assistant Professor
School of Earth and Space Exploration and
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Beyond Center for Fundamental Concepts in Science
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RESEARCH INTERESTS

Origins of Life; Astrobiology; Physics of Life; Emergence; Complex & Dynamical Systems; Artificial Life

EDUCATION

Dartmouth College	2010
Ph.D. in Physics and Astronomy	
Thesis: <i>Theoretical Models for the Emergence of Biomolecular Homochirality</i>	
Florida Institute of Technology	2005
B.S. Physics, <i>Cum Laude</i>	
Cape Cod Community College	2003
A.A. Math/Science/Pre-Engineering	

PROFESSIONAL EXPERIENCE

Postdoctoral Fellow, NSF/NASA Center for Chemical Evolution, Georgia Institute of Technology	2010 – 2011
NASA Postdoctoral Program Fellow, NASA Astrobiology Institute	2011 – 2013
Adjunct Faculty, Arizona State University	2011 – 2013
Assistant Professor, School of Earth and Space Exploration and Beyond Center for Fundamental Concepts in Science, Arizona State University	2013 – <i>present</i>
Board of Directors, Blue Marble Space (503c non-profit)	2013 – <i>present</i>
Faculty, Center for Social Dynamics and Complexity, Arizona State University	2014 – <i>present</i>
Graduate Faculty, Department of Physics, Arizona State University	2014 – <i>present</i>
Graduate Faculty, Complex Systems, Arizona State University	2014 – <i>present</i>
Honors Faculty, Barrett Honors College, Arizona State University	2015 – <i>present</i>
Fellow, ASU-SFI Center for Biosocial Complex Systems, ASU & Santa Fe Institute	2015 – 2018
Deputy Director, Beyond Center for Fundamental Concepts in Science, Arizona State University	2016 – <i>present</i>

HONORS AND AWARDS

- Essay Prize** 4th prize (\$1,000) for essay “Bio from Bit” 2017
 Foundational Questions Institute Essay Contest *Wandering Towards a Goal*
- Nominated, Zebulon Pearce Teaching Award**, College of Liberal Arts & Sciences, ASU 2016, 2017
- Essay Prize** “Out-of-the-box-thinking” prize (\$500) for essay “The Descent of Math” 2016
 Foundational Questions Institute Essay Contest *Trick or Truth: The Mysterious Connection Between Physics and Mathematics*
- Fellow**, ASU-SFI Center for Biosocial Complex Systems 2015 – 2018
 Joint appointment between Arizona State University and Sante Fe Institute
- Distinguished Lecturer in Interdisciplinary Science** (\$1,000), Gettysburg College 2015
- Omidyar Fellowship**, Sante Fe Institute (*Declined*) 2013
- Essay Prize** 4th prize (\$1,000) for essay “Is Life Fundamental?” 2012
 Foundational Questions Institute Essay Contest *Questioning the Foundations of Physics: Which of our Fundamental Assumptions are Wrong?*
- NASA Postdoctoral Program Fellowship**, NASA Astrobiology Institute 2011
- Carnegie Fellowship**, Geophysical Laboratory, Carnegie Institution (*Declined*) 2010
- Gordon F. Hull Fellowship**, Dartmouth College 2009 – 2010
- Filene Graduate Teaching Award** (\$1,000), Dartmouth College May 2009
- Selamawit Tsehaye Teaching Award**, Dartmouth College June 2008
- Community Service Award** (\$1,000), Dartmouth College May 2008
- Dartmouth Fellowship**, Dartmouth College 2005 – 2009
- New Hampshire Space Grant/NASA Graduate Fellowship**, NH Space Grant 2007 – 2008

FUNDED PROJECTS

Physics of the Observer: Accommodating Active Observers in Physics with Causal Mechanics, Foundational Questions in Science Institute (JTF sponsored), \$73,500, start-date 2017

Emergent Computation in Collective Decision Making by the Ant *Temnothorax rugatulus*, NSF, \$595,520, 05/01/2016 – 04/30/2019

The Evolution of “Read-Write” Information in Biology: Computational and Experimental Models of Non-Genomic Information Imprinted on Living Tissues (Co-PI), Templeton World Charity Foundation, \$ 393,111, 01/01/2016 – 08/31/2017

Multilevel evolution of chemical reaction networks (PI), NASA Exobiology, \$ 631,836, 07/01/2015 – 06/30/2018

Exoplanetary Ecosystems: Exploring Life's detectability on chemically diverse exoplanets (Co-I), NASA, \$6,100,000.00, 2014 - 2019

SMD Exploration Connection (Co-I), NASA, \$ 21,980,000.00, 2015 - 2020

The Emergence of Life as a Transition in Causal and Informational Architecture (Co-PI), Templeton World Charity Foundation, \$ 911,286, 08/01/2013 – 07/31/2017

The Power of Information Book Project (PI), Foundational Questions Institute, \$3,500, 01/2014 – 12/31/2015

PEER-REVIEWED PUBLICATIONS

h-index = 12 Total Citations = 430 (per year: 47 in 2015, 94 in 2016, 147 in 2017 (as of 10/2/17))

† ASU Postdoctoral Fellow. ‡ ASU graduate student. ‡† ASU undergrad, * Authors contributed equally.

Corresponding Author. • Invited Paper. •• Cover. IF = Journal Impact Factor (when available)

1. E, Borriello[†] and **S.I. Walker**. (2017) Information-theoretic Classification of Elementary Cellular Automata. *Complexity* 1280351. (IF = 3.514)
2. D. Moore[†], **S.I. Walker** and M. Levin. (2017) Cancer as a Disorder of Patterning Information: computational and biophysical perspectives on the cancer problem. *Convergent Science Physical Oncology* <https://doi.org/10.1088/2057-1739/aa8548> Citations = 1
3. • **S.I. Walker** (2017) Origins of Life: A Problem for Physics, A Key Issues Review. *Rep. Prog. Phys.* 80(9):092601. Citations = 2 (IF = 12.933)
4. •• A. Adams[‡], A. Berner^{‡†}, P.C.W. Davies and **S.I. Walker** (2017) Physical Universality, State-Dependent Dynamics and Open-Ended Evolution. *Entropy*, 19(9), 461. (IF = 1.743)
5. A. Adams[‡], H. Zenil, P.C.W. Davies and **S.I. Walker** (2017) Formal Definitions of Unbounded Evolution and Innovation Reveal Universal Mechanisms for Open-Ended Evolution in Dynamical Systems. *Sci. Rep.* 7: 997. [online] Citations = 8 (IF = 4.259)
6. C. Mathis[‡], T. Bhattacharya and **S.I. Walker** (2017) The Emergence of Life as a First Order Phase Transition. *Astrobiology* **17** (3): 266-276. [online] Citations = 9 (IF = 2.603)
7. Adams, A[‡] and **S.I. Walker** (2017) Real-World Open-Ended Evolution: A League of Legends Adventure. *Int. J. Design & Nature and Ecodynamics* 12(4): 458 – 469.

8. • P.C.W. Davies and **S.I. Walker** (2016) The Hidden Simplicity of Biology. *Rep. Prog. Phys.* **79** (10) 102601. Citations = 12 (IF = 12.933)
9. L. Cronin and **S.I. Walker** (2016) Beyond Prebiotic Chemistry. *Science* **352** 1174-1175. [online] Citations = 15 (IF = 37.205)
10. S.D. Domagal-Goldman, K.E. Wright, K. Adamala, A. de la Rubia Leigh, J. Bond, L.R. Dartnell, A.D. Goldman, K. Lynch, M.-E. Naud, I.G. Paulino-Lima, K. Singer, M. Walter-Antonio, X.C. Abrevaya, R. Anderson, G. Arney, D. Atri, A. Aza-Bustos, J.S. Bowman, W.J. Brazelton, G.A. Brennecka, R. Carns, A. Chopra, J. Colangelo-Lillis, C.J. Crockett, J. DeMarines, E.A. Frank, C. Frantz, E. de la Fuente, D. Galante, J. Glass, D. Gleeson, C.R. Glein, C. Goldblatt, R. Horak, L. Horodyskyj, B. Kacar, A. Kereszturi, E. Knowles, P. Mayeur, S. McGlynn, Y. Miguel, M. Montgomery, C. Neish, L. Noack, S. Rugheimer, E.E Stüeken, P. Tamez-Hidalgo, **S.I. Walker**, and T. Wong (2016) Astrobiology Primer 2.0. *Astrobiology* **16** 561-653. [online] Citations = 11 (IF = 2.603)
11. • **S.I. Walker**, H. Kim[†] and P.C.W. Davies (2016) The Informational Architecture of the Cell. *Phil. Trans. Roy. Soc. A* **374** 20150057. [online] Citations = 20 (IF = 2.97)
12. H. Kim[†], P.C.W. Davies and **S.I. Walker** (2015) New Scaling Relation for Information Transfer in Biological Networks. *J. Roy. Soc. Interface* **12** 20150944. [online] Citations = 5 (IF = 3.917)
13. P. Nghe, W. Hordijk, S. Kauffman, **S.I. Walker**, F. Schmidt, H. Kemble, J.A.M. Yeates and N. Lehman (2015) Prebiotic Network Evolution. *Roy. Soc. Chem. Mol. Biosys.* **11** 3206-3217. Citations = 20 (IF = 2.781)
14. • **S.I. Walker** (2014) Top-down Causation and the Rise of Information in the Emergence of Life. *Information* **5** 424-439. [online] Citations = 19 (IF = 0.78)
15. T.Pavlic[†], A.M. Adams[‡], P.C.W. Davies and **S.I. Walker** (2014) Self-Referencing Cellular Automata: A Model of the Evolution of Information Control in Biological Systems. *Proc. Artificial Life XIV* pp. 522- 529. [online] arXiv:1405.4070 Citations = 11 (IF = 1.316)
16. **S.I. Walker**, P.C.W. Davies, P. Samantray[‡] and Y. Aharanov. (2014) Quantum Non-barking Dogs. *New J. Phys.* **16** 063026. [online] Citations = 1 (IF = 3.786)
17. **S.I. Walker**^{*}, B. Callahan^{*}, G. Arya, J.D. Barry, T. Bhattacharya, S. Grigoryev, M. Pellegrini, K. Rippe, S.M. Rosenberg. (2013) Evolutionary Dynamics and Information Hierarchies in Biological Systems'. *Ann. N.Y. Acad. Sci.* DOI: 10.1111/nyas.12140 [online] Citations = 4 (IF = 4.039)
18. N. Vaiyda^{*}, **S.I. Walker**^{*} and N. Lehman. (2013) Recycling of Informational Units Leads to Selection of Replicators in a Prebiotic Soup. *Chemistry & Biology* **20**: 241 - 252. [online] Citations = 17 (IF = 6.743)

19. **S.I. Walker** and P.C.W. Davies “The Algorithmic Origins of Life” (2013) *J. Roy. Soc. Interface* **6**: 20120869. [online] Citations = 87 (IF = 3.917)
20. M. Gleiser and **S.I. Walker** (2012) Life’s Chirality from Prebiotic Environments. *Int. J. Astrobio.* **11**: 287-296. [online] Citations = 3 (IF = 1.598)
21. M. Wu, **S.I. Walker**, and P.G. Higgs. (2012) Autocatalytic Replication and Homochirality in Biopolymers: Is Homochirality a Requirement of Life or a Result of it? *Astrobiology* **12**: 809 – 817. [online] Citations = 10 (IF = 2.603)
22. **S.I. Walker**, L. Cisneros and P.C.W. Davies. (2012) Evolutionary Transitions and Top-Down Causation. *Proceedings of Artificial Life XIII*. p 283-290. [online] arXiv:1207.4808 Citations = 33 (IF = 1.316)
23. D. Schulze-Makuch, P.C.W. Davies and **S.I. Walker**. (2012) A Series of One-Way Missions to Explore and Colonize Mars. *Proceedings of the 2012 Global Space Exploration Conference*.
24. **S.I. Walker**, M.A. Grover and N. V. Hud. (2012) Universal Sequence Replication, Reversible Polymerization and Early Functional Biopolymers: A Model for the Initiation of Prebiotic Sequence Evolution. *PLoS ONE* **7**: e34166. [online] Citations = 39 (IF = 2.806)
25. M. Gleiser, B. Nelson, and **S.I. Walker** (2012) Chiral Polymerization in Open Systems From Chiral-Selective Reaction Rates. *Orig. Life Evol. Biosph.* **42**: 333-346. [online] Citations = 6 (IF = 1.0)
26. **S.I. Walker** “Homochirality”, In *Encyclopedia of Astrobiology*. M. Gargaud (ed.) (2011)
27. M. Gleiser and **S.I. Walker** (2010) The Chirality of Life: From Phase Transitions to Astrobiology. Astronomy and Relativistic Astrophysics: New Phenomena and New States of Matter in the Universe Proceedings of the Third Workshop (IWARA07) 17 - 30. [online] arXiv:0811.1291 Citations = 3
28. M. Gleiser and **S.I. Walker** (2009) Toward Homochiral Protocells in Noncatalytic Peptide Systems. *Orig. Life Evol. Biosph.* **39**: 479 - 493. [online] Citations = 13 (IF = 1.0)
29. M. Gleiser, J. Thorarinson, and **S.I. Walker** (2008) Punctuated Chirality. *Orig. Life Evol. Biosph.* **38**: 499 – 508. [online] Citations = 27 (IF = 1.0)
30. M. Gleiser and **S.I. Walker** (2008) An Extended Model for the Evolution of Prebiotic Homochirality: A Bottom-Up Approach to the Origins of Life. *Orig. Life Evol. Biosph.* **38**: 293 – 315. [online] Citations = 36 (IF = 1.0)

 IN PRESS AND ACCEPTED MANUSCRIPTS

31. • W.Marshall, H.Kim[†], G. Tononi, **S.I. Walker** and L. Albantakis (2017) How Causal Analysis Can Reveal Autonomy in Models of Biological Systems. Accepted *Phil. Trans. Roy. Soc. A* [arxiv:1708.07880] Citations = 1 (IF = 2.97)
32. • **S.I. Walker**, N. Packard and G. Cody (2017) Re-Conceptualizing the Origins of Life. Accepted *Phil. Trans. Roy. Soc. A* (IF = 2.97)
33. C. Mathis[‡], S. Ramprasad, **S.I. Walker**, and N. Lehman (2017) Prebiotic RNA Network Formation: A Taxonomy of Molecular Cooperation. Accepted *Life*
34. D. Moore[†], G. Valentini[†], **S.I. Walker** and M. Levin. (2017) Inform: A Toolkit for Information-Theoretic Analysis of Complex Systems. 2017 IEEE Symposium Series on Computational Intelligence (SSCI)

 IN REVIEW AND IN PREP

35. **S. I. Walker**, W. Bains, L. Cronin, S. DasSarma, S. Danielache, S. Domagal-Goldman, B. Kacar, N. Y. Kiang, A. Lenardic, C. T. Reinhard, W. Moore, E. W. Schwieterman, E. L. Shkolnik, H. B. Smith[‡] (2017) Exoplanet Biosignatures: Future Directions. In review *Astrobiology*.
36. E. W. Schwieterman, N.Y. Kiang, M.N. Parenteau, C. E. Harman, S. DasSarma, T. M. Fisher[‡], G.N. Arney, H. E. Hartnett, C. T. Reinhard, S. L. Olson, V. S. Meadows, C. S. Cockell, **S. I. Walker**, J.L. Grenfell, S. Hegde, S. Rugheimer, R. Hu, T. W. Lyons (2017) Exoplanet Biosignatures: A Review of Remotely Detectable Signs of Life. In review *Astrobiology*. Citations = 1
37. H. Kim^{†*}, H. Smith^{‡*}, C. Mathis[‡], J. Raymond and **S.I. Walker** (2017) Universal Scaling in Biochemical Networks. Submitted *Science*
38. A.J. Surman, M. Rodriguez Garcia, Y.M. Abul-Haija, G.J.T. Cooper, M. Mullin, C. Mathis[‡], **S.I. Walker** and L. Cronin (2017) Environmental control over random oligomerisation of amino acid monomers programs the emergence of structures with function. In review *Nature Chemistry*
39. E. Borriello[†], M. Laubichler and **S.I. Walker** (2017) The Evolution of Cell-Types. In prep.

 EDITED BOOKS

40. **S.I. Walker**, G.F.R. Ellis and P.C.W. Davies (eds) *From Matter to Life: Information and Causality* Cambridge University Press, 2017. Citations = 5

 PUBLISHED BOOK CHAPTERS AND TECHNICAL REPORTS

** *Prize winning.*

41. ** **S.I. Walker**, “Bio from Bit” To appear in *Wandering Towards a Goal*. A. Aguirre, B. Foster and Z. Merali (ed). Springer, 2018
42. **S.I. Walker** and P.C.W. Davies, “From the Origin of Life to the Nature of Intelligence” *Complexity and Society* In D. Krakauer, J. Flack (ed.) Princeton University Press. To appear in 2017.
43. **S.I. Walker** and P.C.W. Davies, “The “Hard Problem” of Life” In *From Matter to Life: Information and Causality* S.I. Walker, G.F.R. Ellis and P.C.W. Davies (ed.) Cambridge University Press. [arxiv:1606.07184] Citations = 3
44. **S.I. Walker** “More is not just different, its causal” in *Ahead of the Curve: Hidden breakthroughs in the biosciences*. M. Levin and D. Adams (eds) IOP Publishing, Bristol UK. 2017.
45. ****S.I. Walker**, “The Descent of Math” In *Trick of Truth: The Mysterious Connection Between Physics and Mathematics?* A. Aguirre, B. Foster and Z. Merali (ed.) Springer, 2016. Citations = 5
46. ****S.I. Walker**, “Is Life Fundamental?” In *Questioning the Foundations of Physics: Which of our Fundamental Assumptions are Wrong?* A. Aguirre, B. Foster and Z. Merali (ed.) Springer, 2014.
47. **S.I. Walker**, “Transition from Abiotic to Biotic: Is There an Algorithm for it?” In *Astrobiology: An Evolutionary Approach V*. Kolb (ed.) CRC Press, 2014. [online]
48. J.T.W. Goodwin, **S.I. Walker**, S. Amin, G. Armbrust, C.J. Burrows, and D.G. Lynn 2014. *Alternative Chemistries of Life: Empirical Approaches*. ISBN: 978-0-692-24992-5

 THESIS

S.I. Walker (2010) *Theoretical Models for the Emergence of Biomolecular Homochirality*. PhD Dissertation, Dartmouth College.

 CONFERENCE ABSTRACTS

1. S.J. Desch, H.E. Hartnett, S. Kane, and **S.I. Walker** (2017) Detectability, Not Habitability *Habitable Worlds 2017: A Systems Science Workshop*, held Laramie, Wyoming Nov. 13 - 17, 2017.
2. T.M. Fisher[‡], **S.I. Walker**, S.J. Desch, H.E. Hartnett and S. Glaser[‡] (2017) Limitations of Primary Productivity on “Aqua Planets”: Implications for Detectability. *Habitable Worlds 2017: A Systems Science Workshop*, held Laramie, Wyoming Nov. 13 - 17, 2017.

3. T.M. Fisher[‡], H.B.Smith[‡], C. Ruiz^{††}, M. Line, J. Lyons and **S.I. Walker** (2017) The Topology of Atmospheric Chemical Reaction Networks: A Potential New Biosignature for Exoplanets *Astrobiology Science Conference 2017*. held Apr. 24-28, 2017 in Mesa, AZ.
4. H.Kim[†], H.B.Smith[‡], J. Raymond and **S.I. Walker** (2017) Constraints that Deconstrain: Characterizing the Biological Hierarchy Across Levels of Organization *Astrobiology Science Conference 2017*. held Apr. 24-28, 2017 in Mesa, AZ.
5. C. Mathis[‡] and **S.I. Walker** (2017) Autocatalytic sets and the origins of life *Astrobiology Science Conference 2017*. held Apr. 24-28, 2017 in Mesa, AZ.
6. H.B.Smith[‡], W. Hordjik, S. Otto and **S.I. Walker** (2017) Computational Insights into the Emergence of Replication, Heredity and Speciation in Abiotic Systems *Astrobiology Science Conference 2017*. held Apr. 24-28, 2017 in Mesa, AZ.
7. A.Adams[‡] and **S.I. Walker** (2017) Understanding Real-World Open-Ended Systems: A League of Legends Adventure. *Astrobiology Science Conference 2017*. held Apr. 24-28, 2017 in Mesa, AZ.
8. H.Kim[†], P.C.W. Davies and **S.I. Walker** (2016) Informational architecture to characterize controllability of biological networks. *Conference on Complex Systems 2016*. held Amsterdam, The Netherlands 19-22 Sept. 2016.
9. H. Smith[‡], H.Kim[†], J. Raymond and **S.I. Walker** (2016) Network theoretic constraints on metabolic diversity explain universal features of life on Earth. *Conference on Complex Systems 2016*. held Amsterdam, The Netherlands 19-22 Sept. 2016.
10. A.Adams[‡], H. Zenil, P.C.W. Davies and **S.I. Walker** (2016) Quantifying Non-trivial Open-Ended Evolution Reveals Necessary and Sufficient Conditions. Second Workshop on Open-Ended Evolution (OEE2) held at Artificial Life XV, Cancun Mexico, July 4th ? 8th, 2016.
11. H.Kim[†], H. Smith[‡], J. Raymond and **S.I. Walker** (2016) Multilevel Evolution of Chemical Reaction Networks. NetSci 2016. Seoul, South Korea. held May 30 - Jun. 3, 2016.
12. **S.I. Walker** (2015) Self-Referencing Dynamical Systems *Conference on Complex Systems 2015*. held Sept. 28 - Oct.2, 2015 in Tempe AZ.
13. **S.I. Walker**, H.J. Kim[†], P.C.W. Davies (2015) The Informational Architecture of the Cell. *Conference on Complex Systems 2015*. held Sept. 28 - Oct.2, 2015 in Tempe AZ.
14. A. Adams[‡], **S.I. Walker** (2015) Implications of Open-Ended Evolution in a Deterministic Universe *Conference on Complex Systems 2015*. held Sept. 28 - Oct.2, 2015 in Tempe AZ.
15. A. Adams[‡], H. Zenil and **S.I. Walker** (2015) Open-Ended Evolution in a Deterministic Cellular Automata Universe *Conference on Complex Systems 2015*. held Sept. 28 - Oct.2, 2015 in Tempe AZ.
16. H.B. Smith[‡], H.J. Kim[†], J. Raymond and **S.I. Walker** (2015) The Evolution of Metabolic Communities: Computational Models and Empirical Results. *Conference on Complex Systems 2015*. held Sept. 28 - Oct.2, 2015 in Tempe AZ.
17. H.J. Kim[†], P.C.W. Davies and **S.I. Walker** (2015) Informational Architecture of Biological Networks. *Conference on Complex Systems 2015*. held Sept. 28 - Oct.2, 2015 in Tempe AZ.
18. **S.I. Walker** (2015) Recycling of Early Functional Biopolymers and Implications for the Emergence of Life *Astrobiology Science Conference 2015: Habitability, Habitable Worlds and Life*. held June 15-19, 2015 in Chicago IL.

19. P. Esch and **S.I. Walker** (2015) Computational Models for the Coexistence and Competition of Mirror-Image Lifeforms *Astrobiology Science Conference 2015: Habitability, Habitable Worlds and Life*. held June 15-19, 2015 in Chicago IL.
20. H.J. Kim[†], P.C.W. Davies and **S.I. Walker** (2015) Informational Architecture of Biological Networks. *Astrobiology Science Conference 2015: Habitability, Habitable Worlds and Life*. held June 15-19, 2015 in Chicago IL.
21. H.B. Smith[‡], H.J. Kim[†], J. Raymond and **S.I. Walker** (2015) The Evolution of Metabolic Communities: Computational Models and Empirical Results. *Astrobiology Science Conference 2015: Habitability, Habitable Worlds and Life*. held June 15-19, 2015 in Chicago IL.
22. C. Mathis[‡], T. Bhattacharya and **S.I. Walker** (2015) The Emergence of Life as a First Order Phase Transition. *Astrobiology Science Conference 2015: Habitability, Habitable Worlds and Life*. held June 15-19, 2015 in Chicago IL.
23. A. Adams[‡], H. Zenil, P.C.W. Davies and **S.I. Walker** (2015) Emergence of Open-Ended Evolution in a Minimalistic Model of Interactive Cellular Automata with Global Control. *Astrobiology Science Conference 2015: Habitability, Habitable Worlds and Life*. held June 15-19, 2015 in Chicago IL.
24. H.J. Kim[†], P.C.W. Davies and **S.I. Walker** (2014) Informational Architecture of the Fission Yeast Cell-Cycle Regulatory Network. *ALIFE 14: The Fourteenth Conference on the Synthesis and Simulation of Living Systems*, Vol. 14, pp. 569- 570.
25. **S.I. Walker** and P.C.W. Davies (2012) The Algorithmic Origins of Life. *Astrobiology Science Conference 2012: Exploring Life: Past and Present, Near and Far*, held April 16-20, 2012 in Atlanta, GA.
26. **S.I. Walker** (2012) Rise of information in the origins of life. *Astrobiology Science Conference 2012: Exploring Life: Past and Present, Near and Far*, held April 16-20, 2012 in Atlanta, GA.
27. **S.I. Walker** and P.C.W. Davies (2012) Rise of information in the origins of life. *Abstracts of papers of the American Chemical Society* Vol 243. 1155 16TH ST, NW, Washington, DC 20036 USA: AMER CHEMICAL SOC, 2012.
28. **S.I. Walker**, N.V. Hud and M.A. Grover (2012). Model for the emergence of the first functional polymers during sequence independent replication. *Abstracts of papers of the American Chemical Society* Vol 243. 1155 16TH ST, NW, WASHINGTON, DC 20036 USA: AMER CHEMICAL SOC, 2012.
29. **S.I. Walker**(2011) Collective Dynamics, Functional Evolution, and the Emergence of Life. *Abstracts of Astrobiology Graduate Conference (AbGradCon) 2011*, held June 5 - 8 2011 at Montana State University, Bozeman, Montana. *Astrobiology* 11(4): 367-389, AbAGC11-t34.
30. **S.I. Walker** and M. Gleiser (2010) Modeling Dynamics and Environmental Influence on the Emergence of Prebiotic Homochirality: From Chiral Symmetry Breaking to Emergent Biology. *Astrobiology Science Conference 2010: Evolution and Life: Surviving Catastrophes and Extremes on Earth and Beyond*, held April 26-20, 2010 in League City, Texas. LPI Contribution No. 1538, p.5271

POPULAR WRITING

1. **S.I. Walker** The Origin and Nature of Life on Earth The Emergence of the Fourth Geosphere (Review) *Physics Today* (2017)
2. **S.I. Walker** The New Science of Astrobiology. To appear in *NASA Space Futures Anthology*

3. **S.I. Walker** It from Vital Bit. To appear in *The Rightful Place of Science: Frankenstein*. M.K. Halpern, J. Sadowski, and J. Eschrich (eds)
4. **S.I. Walker** (2014) Little Green Men Might Not Be So "Green", Slate FutureTense [online]
5. **S.I. Walker** (2012) Is Life Fundamental? Foundational Questions Institute (FQXI) Essay Contest (Fourth Prize - awarded \$1,000) [online]

CURRENT POSTDOCTORAL SCHOLARS ADVISED

Dr. Enrico Borriello
Dr. Hyunju Kim
Dr. Douglas Moore
Dr. Gabriele Valentini

CURRENT GRADUATE STUDENTS ADVISED

Alyssa Adams (Department of Physics, Arizona State University)
Jake Hanson (School of Earth and Space Exploration, Arizona State University)
Teresa Fisher (School of Earth and Space Exploration, Arizona State University)
Hikaru Furukawa (School of Earth and Space Exploration, Arizona State University)
Dylan Gaggler (School of Earth and Space Exploration, Arizona State University)
Nicholas (Cole) Mathis (Department of Physics, Arizona State University)
Harrison Smith (School of Earth and Space Exploration, Arizona State University)
Siyu Zhou (Department of Physics, Arizona State University)

CURRENT GRADUATE STUDENTS ADVISED (SESE 2ND PROJECT ADVISOR)

Tucker Ely (School of Earth and Space Exploration, Arizona State University)
Steven Glaser (School of Earth and Space Exploration, Arizona State University)

PAST GRADUATE STUDENTS ADVISED

Ryan Brosch (Department of Physics rotation student, Fall '13)
Varda Fagir Hagh (Department of Physics rotation student, Spring '14)
Alicia Gonzalez (School of Earth and Space Exploration '15-'17) (2nd project)
Rachel Hoskins (Arizona State University Graduate College, '13 - '14)
Audrey Horne (School of Earth and Space Exploration, '14 - '15) (2nd project)
Samuel Rochelle (School of Earth and Space Exploration, '15-'16) (2nd project)

GRADUATE THESIS COMMITTEE MEMBER

Kevin Aiello (School of Life Sciences, Arizona State University)

Eric Alsop (School of Earth and Space Exploration, Arizona State University, graduated June 2014)

Matthew Kellom (School of Earth and Space Exploration, Arizona State University, graduated Sept. 2017)

Nathan Smith (School of Earth and Space Exploration, Arizona State University)

UNDERGRADUATE STUDENTS ADVISED

Angelica Brenner (honors SESE & physics major), NASA Space Grant Intern (2016-2018)

Coral Ruiz (SESE major) (2016), NASA Space Grant Intern (2017-2018)

Bradley Karas (SESE major) (2016 - 2017)

Kevin Smith (SESE major) (2017)

Emmanuel Banda (Economics major) (2016)

Indrajit Badvaram (Physics major) (2015 - 2016)

Patricia Esch (honors biology major), NASA Space Grant Intern (2014 - 2015)

Candace Ashley (SESE major), Summer 2014

TEACHING

Arizona State University

Instructor, GLG 460: Astrobiology Fall 2017

Instructor, Grad Seminar (3 credits): Fundamentals of Complexity Spring 2016

Instructor, Grad Seminar (1 credit): Origins of Life Spring 2016

Instructor, AST111: Introduction to Solar Systems Astronomy Fall 2014, 2015

Instructor, AST113: Astronomy Lab (online) Spring 2015, Fall 2016

Guest Lecturer, GLG 591 (Fall '13 and '14), PHY 494 (Spring '13), COM 394 (Fall '12, Spring '13)

Dartmouth College

Instructor, *TA Series: Difficult Situations* 2008 & 2010

Teaching Assistant, Dartmouth College Physics and Astronomy Department

Exploring the Universe (Astronomy 2/3) Fall '09, Summer '06, '07 & '08

Exploration of the Solar System (Astronomy 1) Winter 2009

The Development of Astronomical Thought (Astronomy 4) Spring 2007

Introductory Physics I (Physics 13) Fall & Winter 2006

Understanding the Universe: Physics Through the Ages (Physics 1) Spring 2006

CONFERENCE & WORKSHOP PRESENTATIONS

*** *Keynote/Plenary*, ** *Invited Talk*, * *Contributed Talk*, † *Panel*

- *** *Conceptual Issues in Astrobiology* Apr. 2017
Astrobiology Science Conference, Mesa AZ
- * *The Topology of Atmospheric Chemical Reaction Networks: A Potential New Biosignature for Exoplanets* Apr. 2017
Astrobiology Science Conference, Mesa AZ
- * *Constraints that Deconstrain: Characterizing the Biological Hierarchy Across Levels of Organization* Apr. 2017
Astrobiology Science Conference, Mesa AZ
- ** *Life, Hierarchies and Top-down Causation* Nov. 2016
Statistical Physics, Information Processing and Biology Workshop, Santa Fe Institute, Santa Fe NM
- *** *Statistical Signatures of Life* Jul. 2016
NASA NExSS Exoplanet Biosignatures Workshop without Walls, Seattle WA
- Informational Signatures of Life* Mar. 2016
Power of Information Workshop, Beyond Center, Arizona State University
- *** *Modeling the Origin of Life* Nov. 2015
Keynote address, Re-Conceptualizing the Origin of Life, Carnegie Institution, Washington DC
- ** *Coarse-graining, Open-Ended Evolution and Innovation* Oct. 2015
Arrow of Complexity Workshop, Santa Fe Institute, Santa Fe, NM
- ** *The Informational Architecture of the Cell* Oct. 2015
2015 American Physical Society Four Corners Meeting, Tempe AZ
- ** *Towards a Mathematical Definition of the Transition from Non-life to Life* Sept. 2015
2015 Conference on Complex Systems (CCS '15), Tempe AZ
- ** *The Informational Architecture of the Cell* Sept. 2015
2015 Conference on Complex Systems (CCS '15), Tempe AZ
- * *Self-Referencing Dynamical Systems* Sept. 2015
2015 Conference on Complex Systems (CCS '15), Tempe AZ
- † *Re-Conceptualizing the Origin of Life* June 2015
SciFoo, Google Campus, Mountain View CA
- ** *Recycling of Functional Biopolymers and Implications for the Origin of Life* June 2015
Astrobiology Science Conference, Chicago IL
- ** *Towards a Physics of Life* May 2015
Nature as Computation Workshop, Beyond Center, Arizona State University
- ** *The Informational Architecture of Life* Nov. 2014
Workshop on Schrödinger's Paradox, Santa Fe Institute, Santa Fe NM

- ** *What is life, and how did it emerge?* Sept. 2014
Information, Causality and Life Workshop, Beyond Center, Arizona State University
- † *The Origin of Life* Aug. 2014
SciFoo, Google Campus, Mountain View CA
- ** *The Emergence of Life as a Transition in Causal and Informational Architecture* Mar. 2014
The Power of Information, Oxford University, Oxford UK
- * *Mentoring through Social Media: Connecting Scientists to Students* Oct. 2013
Global STEMX Conference (virtual)
- ** *Chemistry, Complexity and the Arrow of Time* Oct. 2013
Thermodynamics, Disequilibrium and Evolution Focus Group Meeting, Florence Italy (virtual)
- *** *What Can Astrobiology Teach Us About Cancer?* Apr. 2013
*Plenary talk, 4th Annual Physical Sciences - Oncology Centers (PS-OCs) Network
 Investigators' Meeting, Scottsdale AZ*
- ** *The Algorithmic Origins of Life* Jan. 2013
Workshop on the Origins of Life, Princeton Center for Theoretical Science, Princeton NJ
- ** *The Way Ahead . . .* Nov. 2012
*Workshop on Oxidative Stress and the Deep Evolutionary Roots of Cancer
 Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ*
- ** *The Information Hierarchy, Chemical Evolution, and the Origin of Life* Sept. 2012
*Workshop on Evolutionary Dynamics and Information Hierarchies, Aspen Center for Physics,
 Aspen CO*
- * *Evolutionary Transitions and Top-down Causation* July 2012
*Artificial Life XIII: The 13th International Conference on the Simulation and Synthesis of
 Living Systems, East Lansing MI*
- ** *Non-life to Life: Is it all about Information Flow?* May 2012
*Workshop on the Origins and Nature of Biological Information
 Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ*
- * *A Series of One-Way Missions to Explore and Colonize Mars* May 2012
2012 Global Space Exploration Conference, L'Enfant Plaza Hotel, Washington DC
- ** *Is There a Physics of Intelligence?* Apr. 2012
2nd Intelligence in Astrobiology Virtual Workshop, Georgia Tech, Atlanta GA
- * *The Algorithmic Origins of Life* Apr. 2012
2012 Astrobiology Science Conference, Georgia Tech Hotel & Conference Center, Atlanta GA
- ** *The Rise of Information in the Origins of Life* Apr. 2012
2012 Astrobiology Science Conference, Georgia Tech Hotel & Conference Center, Atlanta GA
- * *The Rise of Information in the Origins of Life* Mar. 2012
American Chemical Society Spring Meeting 2012: The Chemistry of Life, San Diego CA
- ** *Is There a Physics of Intelligence?* Feb. 2012
1st Intelligence in Astrobiology Virtual Workshop, Arizona State University, Tempe AZ

- Steps Toward Life: A Model for the Initiation of Prebiotic Sequence Evolution* Jan. 2012
Origin of Life Gordon Research Seminar and Conference, Galveston TX
- Emergence of Population Structure and Functional Evolution in Simulations of Environmentally Driven Replication* July 2011
Origins 2011, Montpellier France (not attending)
- * *Collective Dynamics, Functional Evolution, and the Emergence of Life* June 2011
Astrobiology Graduate Student Conference (AbGradCon), Bozeman MT
- * *Astrobiology Research Focus Group Workshop 2011* June 2011
Astrobiology Graduate Student Conference (AbGradCon), Bozeman MT
- * *Information and the Origin of Life* Apr. 2011
Biophest, Department of Physics, Arizona State University, Tempe AZ
- Modeling Dynamics and Environmental Influence on the Emergence of Prebiotic Homochirality: From Chiral Symmetry Breaking to Emergent Biology* Apr. 2010
2010 Astrobiology Science Conference, League City TX
- ** *Could the First Replicator Survive Enantiomeric Poisoning?* Mar. 2010
Workshop on Homochirality in Biology
Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ
- From Prebiotic Chemistry to Biology: Modeling the Emergence of Protocells in Early Earth* Jan. 2010
Origin of Life Gordon Research Seminar and Conference, Galveston TX
- The Chirality of Life: From Phase Transitions to Astrobiology* July 2009
Astrobiology Graduate Student Conference (AbGradCon), U. of Washington, Seattle, WA
- From Prebiotic Chemistry to Biology: Modeling the Emergence of Protocells in Early Earth* May 2009
The Search for Life in the Universe, Space Telescope Science Institute, Baltimore, MD
- The Chirality of Life: From Phase Transitions to Astrobiology* May 2009
The Search for Life in the Universe, Space Telescope Science Institute, Baltimore, MD
- * *Chiral Symmetry Breaking and Emergent Protocells* Oct. 2008
Greater Boston Area Statistical Mechanics Meeting, Brandeis University, Waltham, MA
- ** *Right versus Left: Why Bigger is Better (... but not always enough)* Feb. 2008
Origins of Homochirality Conference, Nordic Institute for Theoretical Physics, Stockholm, Sweden
- ** *Punctuated Chirality* Feb. 2008
Origins of Homochirality Program, Nordic Institute for Theoretical Physics, Stockholm, Sweden
- * *The Chiral Origins of Life* Oct. 2007
Greater Boston Area Statistical Mechanics Meeting, Brandeis University, Waltham, MA
- Evolution of Prebiotic Homochirality: A Field Theory Approach to the Origin of Life* May 2007
Arts & Sciences Graduate Poster Session, Dartmouth College, Hanover, NH

SEMINARS, COLLOQUIA & LECTURES

- Reprogramming Reality* Sept. 2017
Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ
- Bio from Bit: Quantifying the Origins of Life* Mar. 2017
Waterloo Institute for Complexity and Innovation, University of Waterloo, Waterloo ON
- The Origins of Life* Nov. 2015
Origins Seminar, University of Arizona, Tuscon, AZ
- The Origin and Nature of Life* Sept. 2015
Inquiry on Astrobiology (NASA sponsored), Center for Theological Inquiry, Princeton NJ
- Towards a Physics of Life: From Origins to Free Will?* May 2015
Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ
- The Emergence of Life as a First Order Phase Transition* Feb. 2015
School of Earth and Space Exploration Colloquium, Arizona State University
- What is life ... And How Did it Emerge?* Feb. 2015
HHMI Distinguished Lecturer Colloquium, Gettysburg College, Gettysburg PA
- Information Hierarchies, Chemical Evolution and the Transition From Non-Life to Life* Feb. 2014
NASA Postdoctoral Program Alumni Inaugural Lecture, NASA Astrobiology Institute
- The Rise of Information in the Origin of Life* Feb. 2014
Astrobiology Coffee Hour Seminar, Arizona State University, Tempe AZ
- The Algorithmic Origins of Life* Apr. 2013
Physics Department Colloquium, Arizona State University, Tempe AZ
- Quantum Non-barking Dogs* Apr. 2013
Cosmology Seminar, Arizona State University, Tempe AZ
- Chemical Evolution from Geochemistry to Biology* Apr. 2013
Astrobiology Coffee Hour Seminar, Arizona State University, Tempe AZ
- The Algorithmic Origins of Life* Jan. 2013
Santa Fe Institute, Santa Fe NM
- The Algorithmic Origins of Life* Nov. 2012
The SETI Institute, Mountainview CA
- The Algorithmic Origins of Life* Oct. 2012
Astrobiology Program Colloquium, University of Washington, Seattle WA
- Is Life Fundamental?* Mar. 2012
Cosmology Seminar, Arizona State University, Tempe AZ
- Not Understanding the Physics Behind Origins* Mar. 2012
NASA Astrobiology Institute Origin of Life Focus Group Inaugural Virtual Seminar
- von Neumann Machines and the Origin and Distribution of Life in the Universe* Dec. 2011
Blue Marble Space Institute of Science Podcast Seminar
- NonDarwinian Dynamics and the Emergence of Life* Sept. 2011
Astrobiology Coffee Hour Seminar, Arizona State University, Tempe AZ

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- The Origin of Life: From Phase Transitions to Astrobiology* May 2011
Cosmology Seminar, Arizona State University, Tempe AZ
- Evolvability and the Emergence of Population Structure in Prebiotic Chemistry* Feb. 2011
Center for Chemical Evolution, Georgia Institute of Technology, Atlanta GA
- Punctuated Chirality* Mar. 2010
Origins Institute & Astrobiology Program, McMaster University, Ontario Canada
- Chirality and the Origin of Life* Mar. 2010
Carnegie Institution of Washington Geophysical Laboratory, Washington DC
- Chirality and the Origin of Life:
From Fundamental Physics to the Search for Life in the Universe* Feb. 2010
Department of Physics and Astronomy, Colgate University, Hamilton NY
- Life, Physics, and the Origin of Everything* Dec. 2009
Department of Physics and Astronomy, Denison University, Granville OH

OTHER EVENTS

- Dialog (organized by Auren Hoffman and Peter Thiel), off-the-record meeting for global and emerging leaders 2015, 2016, 2017
- Science Foo Camp (SciFoo), invite-only meeting for global leaders in science & technology
Google campus, Mountain View CA 2014, 2015

INVITED TALKS

- Invited Speaker, *Gordon Research Conference on Unifying Ecology Across Scales*
Biddeford, ME Jul. 2018
- Invited Speaker, *Gordon Research Conference on Systems Chemistry*, Newry, ME Jul. 2018
- Invited Speaker, *Information and Noise: Chemistry, Biology and Evolution Creating Complex Systems*, Beilstein Bozen Symposium, Prien am Chiemsee, Germany (*Declined*) 2018
- Invited Speaker *Toward a Computational Theory of Life*, Meeting at the Royal Society, London UK (*Declined*) Mar 2018
- Invited Speaker *Universal Biology Workshop*, Earth-Life Science Institute, Tokyo Tech, Japan (*Declined*) Aug 2017
- Invited Speaker *Freethought Festival*, University of Wisconsin-Madison (*Declined*) 2017
- Invited Speaker, *Conference on Complex Systems*, Cancun, Mexico (*Declined*) Sept 2017
- Invited Keynote, *Evolution, Development and Complexity*, Satellite Meeting at Conference on Complex Systems, Cancun, Mexico (*Declined*) Sept. 2017
- Invited Speaker, *34th Altenberg Workshop in Theoretical Biology*, Konrad Lorenz Institute Klosterneuburg, Austria (*Declined*) 2017
- Invited Speaker, *Special Chapters in RNA Research Lecture Series*, Max F. Perutz Laboratories, Vienna, Austria (*Declined*) 2017

- Invited Speaker, *Philosophical of Science Association Annual Conference*
 Atlanta GA (*Declined*) 2016
- Invited Keynote, *Artificial Life XV: The Fifteenth International Conference on the Synthesis and Simulation of Living Systems*, Cancun Mexico (*Declined*) 2016
- Invited Speaker, *Chemistry, Life and Evolution*, Beilstein Bozen Symposium, Prien am Chiemsee, Germany (*Declined*) 2016
- Invited Speaker, sDiv workshop: Functional Information: its potential for quantifying biodiversity and its relation to ecosystem functioning, Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany (*Declined*) 2015

PROFESSIONAL LEADERSHIP AND SERVICE

- Steering Committee**, Origins of Life Research Coordination Network 2017-2019
 National Science Foundation network based at the Sante Fe Institute
- Member**, Science Organizing Committee (non-attending) 2017
 Universal Biology Workshop, Earth-Life Science Institute, Tokyo Tech, Tokyo Japan
- Session Chair**, “Laws of Life” and “Recent Progress in Origins of Life” (plenary) Apr. 2017
 Astrobiology Science Conference 2017, Mesa AZ
- Member**, Science Organizing Committee 2017
 Astrobiology Science Conference, Tempe AZ
- Member**, Science Organizing Committee (non-attending) 2016
 NASA NExSS Exoplanet Biosignatures Workshop without Walls, Seattle WA
- Member**, Program Committee 2016
 Artificial Life 2016, Cancun Mexico
- Chair**, Science Organizing Committee 2015
 Re-Conceptualizing the Origin of Life, Carnegie Institution for Science, Washington DC
- Member**, Local Organizing Committee 2015
 2015 Conference on Complex Systems, Tempe AZ
- Chair**, Origins of Life: A Problem for Complexity Science 2015
 2015 Conference on Complex Systems Satellite Session, Tempe AZ
- Member**, Local Organizing Committee 2015
 2015 American Physical Society Four Corners Meeting, Tempe AZ
- Session Chair**, “Laws of Life” June 2015
 Astrobiology Science Conference 2015, Chicago IL
- Session Chair**, “From Prebiotic Chemistry to Functional Biopolymers” June 2015
 Astrobiology Science Conference 2015, Chicago IL
- Board of Directors** 2014 - *present*
 Blue Marble Space (education and research non-profit), Seattle WA USA
- Director**, SAGANet.org (astrobiology-themed education website) 2011 - 2015
- Editor**, “Information Hierarchies and Evolutionary Dynamics” 2013
 Aspen Center for Physics Workshop Proceedings, *Annals of the New York Academy of Sciences*

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Organizer, *Oxidative Stress and the Deep Evolutionary Roots of Cancer* Workshop Nov. 2012
Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ

Organizer, *The Origin and Nature of Biological Information* Workshop May 2012
Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ

Co-organizer and Co-author Apr. 2012
NASA/NSF Alternative Chemistries for Life Workshop and Report [online]

Organizer, Astrobiology Coffee Hour Seminar Series Spring 2012
“Follow the Elements” NASA Astrobiology Institute Center, Arizona State University, Tempe AZ

Chair, Gordon Research Seminar Jan. 2012
Origin of Life Gordon Research Seminar, Galveston TX

Organizer, Astrobiology Research Focus Group Workshop June 2011
2011 Astrobiology Research Focus Group Workshop for Early–Career Astrobiologists, Ennis MT

Co–Organizer, Astrobiology Research Focus Group Workshop Apr. 2010
2010 Astrobiology Research Focus Group Workshop for Early–Career Astrobiologists, Crockett TX

Discussion Leader, Prebiotic Chemistry and the Environments of Early Life Jan. 2010
Origin of Life Gordon Research Seminar, Galveston TX

ASU BEYOND CENTER WORKSHOPS (CHAIR)

Information and Non-Equilibrium Thermodynamics Apr. 2017

Quantifying Biological Complexity: Can it be done? Feb. 2017

The Power of Information Mar. 2016

Nature as Computation May 2015

Information, Causality and the Origin of Life Workshop Sept. 2014

Information, Complexity and Life Workshop Feb. 2014

Complex Systems Theory, Cancer Biology and Information Feb. 2014

Engines of Life: Thermodynamic Pathways to Metabolism Workshop May 2013

Evolution, Development and Cancer: Connecting the Dots Workshop Feb. 2012

PROFESSIONAL DEVELOPMENT

Alan Alda Communicating Science Workshop Apr. 2016

Preparing for Tenure Review Workshop Series Fall 2014
College of Liberal Arts and Sciences, Arizona State University

Introduction to Complexity Workshop Sept. 2014
Complex Adaptive Systems Initiative, Arizona State University

Frankenstein Bicentennial Workshop April 2014
Arizona State University

2012 Mentoring Conference: Facilitating Relationships for Success Oct. 2012
Mentoring Institute, University of New Mexico, Albuquerque NM

3rd Annual Aspen Brain Forum: Cracking the Neural Code Sept. 2012
The Aspen Institute, Aspen CO

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Workshop on Coming Opportunities in Physical Cosmology Arizona State University Origins Project & Cosmology Initiative, Tempe AZ	Jan. 2012
<i>Why the Quantum?</i> Workshop Beyond Center for Fundamental Concepts in Science, Arizona State University, Tempe AZ	Dec. 2011
2011 Mentoring Conference: Learning Across Disciplines Mentoring Institute, University of New Mexico, Albuquerque NM	Oct. 2011
Science Online 2011: The 5 th Annual Conference on Science on the Web Sigma Xi, Research Triangle SC	Jan. 2011

UNIVERSITY SERVICE

Deputy Director, Beyond Center for Fundamental Concepts in Science	appointed 2016
Graduate Admissions Committee, School of Earth and Space Exploration Chair (2017-2018)	2015 - 2018
SESE Development Program Committee – <i>Workshops for Success</i>	2016
Faculty Advisor, Women in Planetary Science at ASU	2015
SESE Exploration Fellowship Committee, School of Earth and Space Exploration	2014
Chair, Registration and Guest Services Subcommittee Earth and Space Exploration Day Committee	Fall 2014
Camp SESE volunteer, School of Earth and Space Exploration	Fall '13, '14 & '15'
Sundial volunteer	Summer 2014

PUBLIC ENGAGEMENT

Speaker , <i>What is Life?</i> with Carl Zimmer Caveat, New York City	Sept. 2017
Panelist <i>Life Beyond Earth: Where Will We Discover Alien Life?</i> Astrobiology Science Conference, Mesa AZ	Apr. 2017
Speaker , “A Unified Theory of Life: Math, Art . . . Information” TEDxASU, Tempe AZ	Mar. 2017
Career Panel Sundial Mentoring Class, Arizona State University, Tempe AZ	Sept. 2016
Keynote Speaker , “Alien Life: The Same as Us or Different?” Sundial Science Conference, Arizona State University, Tempe AZ	Apr. 2016
Panelist Total Recall Double Feature, Scottsdale Museum of Contemporary Art	Dec. 2015
Speaker , “Astrobiology and the Search for Life” New Discoveries Lecture Series, ASU School of Earth and Space Exploration, Tempe AZ	Nov. 2015
Appearance on “Through the Wormhole with Morgan Freeman” Discovery Science Channel	Spring 2015
Speaker , “The Search for ETI in the 21st Century: Beyond Radio Astronomy?” Valley Engineering Science & Technology Club , Phoenix AZ	May 2015

SciFri Book Club Discussion Leader , Science Friday National Public Radio (on air 2x, average listenership ~ 1.3 million)	July & Aug. 2014
Speaker , “Astrobiology and the Search for ETI” Phoenix Public Library, Phoenix AZ	July 2014
Speaker , “The Search for ETI in the 21st Century: Beyond Radio Astronomy?” West Valley Astronomy Club, Phoenix AZ	Mar. 2014
Panelist , Phoenix Comicon, Phoenix AZ	May 2014
Panelist , “Serenity, Software and the Science of Science Fiction”, Arizona State Univ.	May 2014
Keynote Speaker , “Sci-Fi Driving Sci-Fact” SpaceVision, Tempe AZ	Nov. 2013
Speaker , “The Emergence of Life: Here and Elsewhere” Earth and Space Exploration Day School of Earth and Space Exploration, Arizona State University, Tempe AZ	Nov. 2013
Program Coordinator & Science Mentor , SAGANet.org Mentorship Program 2013 – <i>present</i>	
Speaker , “What is Life?” Spirit of the Senses Salon, Phoenix AZ	Aug. 2013
Judge , Intel International Science and Engineering Fair, Phoenix AZ	May 2013
Panelist , Phoenix Comicon, Phoenix AZ	May 2013
Speaker , “The Search for ETI in the 21st Century: Beyond Radio Astronomy?” East Valley Astronomy Club, Mesa AZ	Feb. 2013
Speaker , “Astrobiology: Life in the Universe” Science Circle of Arizona, Tempe AZ	Feb. 2013
Panelist , “Wilder Ideas – One-Way Missions, Warp Drives, Starships ...” Beyond Center Symposium “The Future of Humans in Space”	Oct. 2012
Speaker , “The Origins of Life” Spirit of the Senses Salon, Phoenix AZ	Oct. 2012
Speaker , “The Origins of Life” East Valley Astronomy Club, Mesa AZ	Oct. 2012
Mentor , Astrobiology Science Conference	Apr. 2012
Competitor , FameLab Astrobiology Science Outreach Competition	Jan. 2012
Judge , <i>What If?</i> Prize Educator’s Competition	Jan. 2012
Guest Scientist , <i>I’m a Scientist: Get Me Out of Here!</i>	June 2011
Exhibitor for the NASA/NSF Center for Chemical Evolution, AAAS Annual Meeting	Feb. 2011
Women in Science Mentoring , Hanover NH	2009 – 2010
Co-founder & Organizer Dartmouth College Science Cafés	2008 – 2010
Founding Member , Dartmouth Graduate Women in Science & Engineering	2008 – 2010
Speaker , Thetford High School, Thetford VT	Oct. 2009
Speaker , Hanover High “Mind Blowing Physics” mini-course, Hanover NH	2008 & 2009
Activity Leader , Montshire Museum of Science Astronomy Day, Norwich VT	2008 & 2009
Howard Hughes Medical Institute/ Montshire Museum Mentor	Winter 2009
Facilitator , Non-Traditional Careers by Gender Workshop, Cape Cod Community College	2008

SELECTED PRESS COVERAGE AND INTERVIEWS

<i>First Support for a Physics Theory of Life</i> , Quanta	Aug. 2017
<i>Was the Origin of Life a Fluke? Or Was It Physics?</i> , LiveScience	Aug. 2017
<i>A Theory of Reality as More than the Sum of its Parts</i> , Quanta	Aug. 2017
<i>Aliens are probably out there, according to Winston Churchill</i> , Popular Science	Feb. 2017
<i>The four biggest milestones in the history of life on Earth</i> , Washington Post	Sept. 2016
<i>3.7-billion-year-old fossils may be the oldest signs of life on Earth</i> , Washington Post	Sept. 2016
<i>Cosmologists propose theory that building blocks of life may not be chemicals but information</i> Sydney Herald	Jul. 2016
<i>Why Physics Is Not a Discipline</i> , Nautilus	Apr. 2016
<i>Seeking New Insights into Life's Origins</i> , NASA feature story	Jan. 2016
<i>Is "Almost Alive" A Real Thing?</i> , Interview with Kevin Conklin, ASU Connections	Sept. 2015
<i>Identifying the Mechanisms Driving Abiogenesis in Chemical Systems that May Have Preceded Life</i> A2C2 Spring Quarterly, ASU	Spring 2015
<i>Guest</i> , HuffPost Live	Feb. 2015
<i>Defining Life's Digital Software</i> , Interview with Bruce Dorminey on Forbes.com	Aug. 2014
<i>Meet the 'Dune' Readers: Kim Stanley Robinson and Sara Imari Walker</i> , NPR's Science Friday Summer 2014	
<i>Dune Discussion Question: Week #2</i> , NPR's Science Friday	Summer 2014
<i>If the world is a computer, life is an algorithm</i> , Science News Blog	June 2014
<i>Life began when algorithms took control</i> , Science News Blog	June 2014
<i>From Soup to Cells: Measuring the Emergence of Life</i> , Astrobiology Magazine	Mar. 2014
<i>NASA Astrobiology NPP Alumni Series: Sara Walker</i> , NASA Astrobiology Institute	Feb. 2014
<i>The connection between cancer biology and astrobiology</i> , Interview with Pauline Davies	Apr. 2013
<i>A View From the Top</i> , Foundational Questions in Science Institute	Apr. 2013
<i>The RNA world's last hurrah?</i> , Interview with Suzan Mazur	Jan. 2013
<i>Life Redefined</i> , Interview on Huffpost Live	Jan. 2013
<i>The Secret of Life Won't be Cooked Up in a Chemistry Lab</i> , The Guardian	Jan. 2013
<i>New way to look at dawn of life: Focus shifts from 'hardware' to 'software'</i> Science Daily	Jan. 2013
<i>Mysterious origin of life needs a rethink, scientists argue</i> , NBC News	Jan. 2013
<i>A New Way to Look at the Dawn of Life</i> , NASA Astrobiology Institute	Jan. 2013
<i>Origin Of Life: New Study Spotlights Not Chemistry But How Living Things Store, Process Information</i> , OpEdNews.com	Jan. 2013
<i>The Origins of Life" –Radical New Theory Says Origin is Algorithmic vs Chemical</i> , Daily Galaxy	Jan. 2013
<i>Scientists Offer New Way To Look At The Origins Of Life</i> , RedOrbit	Jan. 2013
<i>An information-processing approach to the origin of life</i> , Kurzweil News	Jan. 2013

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<i>Rethink creation of life in terms of information, argues new theory</i> , Sci GoGo	Jan. 2013
<i>ASU researchers propose new way to look at the dawn of life</i> , ASU News	Jan. 2013
<i>Origin of life needs a rethink, scientists argue</i> , CBS News	Jan. 2013
<i>A New Way to Look at the Dawn of Life</i> , Astrobiology Magazine	Jan. 2013
<i>Little Atoms Roadtrip</i> , Interview with Neil Denny	June 2012
<i>There's No Place Like Home</i> , Nature News & Views	Feb. 2008

BOARDS

Board of Directors, Blue Marble Space (501(c)(3) research and education non-profit)
Astrobiology/SETI Advisory Board, LifeBoat Foundation

MEMBERSHIPS

NASA Astrobiology Institute
Foundational Questions Institute (FQXI)
International Society for Artificial Life
Complex Systems Society
Blue Marble Space Institute of Science
LifeBoat Foundation

EDITOR

Associate Editor, Journal of Molecular Evolution
Review Editor, Frontiers in Computational Intelligence

REVIEWER

Journals: Acta Astronautica, Artificial Life, Astrobiology, Entropy, FEBS Letters, Journal of Molecular Evolution, Journal of the Royal Society Interface, Journal of Systems Chemistry, Origins of Life and Evolution of Biospheres, Philosophical Transactions Royal Society A, Philosophy and Theory in Biology, Proceedings National Academy Sciences USA, Scientific Reports

Funding Agencies: National Aeronautics and Space Administration (Exobiology panelist 2016); National Science Foundation (Origin of Life Ideas Lab Panel 2017); John Templeton Foundation; Templeton World Charity Foundation