
Personal Information

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Birthdate	18 June 1973	
Birthplace	Halle, Germany	

Education

1999 – 2002 **University of California, San Diego, CA**,
Ph.D. in Physics.
Advisor: Prof. H. D. I. Abarbanel
Thesis: Chaos Synchronization and Communications in Semiconductor Lasers

1997 – 1999 **University of California, San Diego, CA**,
M.Sc. in Physics.

1994 – 1997 **Humboldt Universität, Berlin, Germany**,
Vordiplom in Physics.

Professional Appointments & Work Experience

2023 – present **David W. Brauer Professor of Physics**, *Department of Physics, Reed College*, Portland, OR.

2021 – 2023 **Professor of Physics**, *Department of Physics, Reed College*, Portland, OR.

2021 – 2022 **Visiting Professor**, *School of Mathematical Sciences, University College Cork*, Cork, Ireland.

2013 – 2021 **Associate Professor of Physics**, *Department of Physics, Reed College*, Portland, OR.

2014 **Invited Research Professor**, *Femto-ST Institute & University of Franche-Comté*, Besançon, France.
Host: Laurent Larger

2007 – 2013 **Assistant Professor of Physics**, *Dept. of Physics, Reed College*, Portland, OR.

2005 – 2007 **Senior Research Scientist**, *Dept. of Physics, Duke University*, Durham, NC.

2003 – 2005 **Research Associate**, *Dept. of Physics, Duke University*, Durham, NC.
Mentor: Daniel Gauthier

- 2002 – 2003 **Postgraduate Research Scientist**, *Institute for Nonlinear Science, University of California*, San Diego, CA.
Mentor: Henry D. I. Abarbanel
- 2000 **Visiting Scientist**, *Universität Göttingen*, Göttingen, Germany.
Host: Ulrich Parlitz
- 1999 – 2002 **Research Assistant**, *Dept. of Physics, University of California*, San Diego, CA.
Advisor: Henry D. I. Abarbanel

Fellowships

- 2011 Faculty Research Participation Program at the U.S. Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC) administered by the Oak Ridge Institute for Science and Education.
- 1997 Fulbright Fellowship (awarded but declined), Fulbright Commission.

Publications

Peer-Reviewed Publications

(Reed College student co-authors are underlined)

- [24] Lucas Illing, Pierce Ryan, and Andreas Amann, Dynamics of a time-delayed relay system, *Physical Review E* **109**, 014223 (2024).
- [23] Lucas Illing, Kees Benkendorfer, Pierce Ryan, and Andreas Amann, Dynamics of an electronic relay systems with bandpass filtered feedback, *16th Chaotic Modeling and Simulation International Conference* (2024).
- [22] Edgar Perez, Colleen Werkheiser, Alex Striff, and Lucas Illing, Exploring delay dynamics with a programmable electronic delay circuit, *American Journal of Physics* **88**, 1006 (2020).
- [21] Lucas Illing and Noah Shofer, Reservoir-computing machine-learning algorithms as observers of spatio-temporal chaos, *CMSIM 2*: 163–173 (2020).
- [20] Yunjia Bao, Ella Banyas, and Lucas Illing, Periodic and quasiperiodic dynamics of optoelectronic oscillators with narrow-band time-delayed feedback, *Physical Review E* **98**, 062207 (2018).
- [19] L. Illing, Amplitude death of identical oscillators in networks with direct coupling, *Physical Review E* **94**, 022215 (2016).
- [18] B. A. M. Owens, M. T. Stahl, N. J. Corron, J. N. Blakely, and L. Illing, Exactly solvable chaos in an electromechanical oscillator, *Chaos* **23**, 033109 (2013).
- [17] L. Illing, A. M. Saunders, and D. Hahs, Multi-parameter identification from scalar time series generated by a Malkus-Lorenz water wheel, *Chaos* **22**, 013127 (2012).
- [16] L. Illing, R. F. Fordyce, A. M. Saunders, and R. Ormond, Experiments with a Malkus-Lorenz water wheel: Chaos and Synchronization, *American Journal of Physics* **80** (3), 192–202 (2012).

- [15] L. Illing, C. D. Panda, and L. Shareshian, Isochronal chaos synchronization of delay-coupled optoelectronic oscillators, *Physical Review E* **84**, 016213 (2011).
- [14] L. Illing, G. Hoth, L. Shareshian, and C. May, Scaling behavior of oscillations arising in delay-coupled optoelectronic oscillators, *Physical Review E* **83**, 026107 (2011).
- [13] K. E. Callan, L. Illing, Z. Gao, D. J. Gauthier, and E. Schöll, Broadband Chaos Generated by an Optoelectronic Oscillator, *Physical Review Letters* **104**, 113901 (2010).
- [12] L. Illing, Digital communication using chaos and nonlinear dynamics, *Nonlinear Analysis: Theory, Methods & Applications* **71**, e2958 (2009).
- [11] A. M. C. Dawes, L. Illing, S. M. Clark, and D. J. Gauthier, All-optical Switching with Transverse Optical Patterns, *Physical Review A* **77**, 013833 (2008).
- [10] L. Illing and D. J. Gauthier, Ultra-high-frequency chaos in a time-delay electronic device with band-limited feedback, *Chaos* **16**, 033119 (2006).
- [9] L. Illing and D. J. Gauthier, Hopf bifurcations in time-delay systems with band-limited feedback, *Physica D* **210**, 180 (2005).
- [8] A. M. C. Dawes, L. Illing, S. M. Clark, and D. J. Gauthier, All-optical switching in rubidium vapor, *Science* **308**, 672 (2005).
- [7] J. N. Blakely, L. Illing, and D. J. Gauthier, Controlling Fast Chaos in Delay Dynamical Systems, *Physical Review Letters* **92**, 193901 (2004).
- [6] L. Illing and M. Kennel, Shaping Current Waveforms for Direct Modulation of Semiconductor Lasers, *IEEE Journal of Quantum Electronics* **40**, 445 (2004).
- [5] J. N. Blakely, L. Illing, and D. J. Gauthier, High speed chaos in an optical feedback system with flexible timescales, *IEEE Journal of Quantum Electronics* **40**, 299 (2004).
- [4] N. F. Rulkov, M. A. Vorontsov, and L. Illing, Chaotic Free-Space Laser Communication over a Turbulent Channel, *Physical Review Letters* **89**, 277905 (2002).
- [3] L. Illing, J. Bröcker, L. Kocarev, U. Parlitz, and H. D. I. Abarbanel, When are synchronization errors small?, *Physical Review E* **66**, 036229 (2002).
- [2] H. D. I. Abarbanel, M. Kennel, L. Illing, S. Tang, H. F. Chen and J. M. Liu, Synchronization and Communication Using Semiconductor Lasers With Optoelectronic Feedback, *IEEE Journal of Quantum Electronics* **37**, 1301 (2001).
- [1] C. Lewis, H. D. I. Abarbanel, M. Kennel, M. Buhl, L. Illing, Synchronization of chaotic oscillations in doped fiber ring lasers, *Physical Review E* **63**, 016215 (2000).

Published Book Chapters and General Audience Publications

- [5] K. E. Callan, L. Illing, and D. J. Gauthier, Broadband Chaos, an invited chapter in *Nonlinear Laser Dynamics: From Quantum Dots to Cryptography* (Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2012), pp. 317–332.
- [4] L. Illing, D. J. Gauthier, and J. N. Blakely, Controlling fast chaos in opto-electronic delay dynamical systems, an invited chapter in *Handbook of Chaos Control, 2nd. Ed.*, E. Schöll and H. G. Schuster, Eds., (WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2008), pp. 407–425.
- [3] L. Illing, D. J. Gauthier, and R. Roy, Controlling Optical Chaos, Spatio-temporal Dynamics, and Patterns, an invited chapter in *Advances in Atomic, Molecular and Optical Physics* **54**, P. R. Berman, E. Arimondo, and C. Lin, Eds. (Academic Press, 2006), pp. 616–697.
- [2] N. F. Rulkov, A. R. Volkovskii, M. M. Sushchik, L. S. Tsimring, and L. Illing, Digital Communication Using Self-Synchronizing Chaotic Pulse Position Modulation, an invited chapter in *Digital Communications Using Chaos and Nonlinear Dynamics*, L. E. Larson, J. M. Liu, and L. S. Tsimring, Eds. (Springer, 2006), pp. 29–57.
- [1] A. M. C. Dawes, L. Illing, S. M. Clark, and D. J. Gauthier, All-optical switch controls strong beams with weak ones, *Optics & Photonics News* **16** (12), 34 (2005).

Proceedings

- [6] L. Illing, J. N. Blakely, and D. Gauthier, Time delay systems with band-limited feedback, *Proceedings of the Fifth EUROMECH Nonlinear Dynamics Conference (ENOC-2005)*; D. H. Van Campen, M. D. Lazurko, W. P. J. M. Van der Oever; Eds., ISBN 90-386-2667-3, 1115 (2005).
- [5] A. M. C. Dawes, S. M. Clark, L. Illing, and D. J. Gauthier, Observation of ultra-low-light-level all-optical switching, *Advanced Optical and Quantum Memories and Computing II*; H. J. Coufal, Z. U. Hasan, and A. E. Craig; Eds., Proc. SPIE 5735, 60 (2005).
- [4] I. Tokuda, U. Parlitz, L. Illing, M. Kennel, and H. D. I. Abarbanel, Parameter Estimation of Neuron Models, *AIP Conference Proceedings of the 7th Experimental Chaos Conference* **676**, 251 (2003).
- [3] L. Illing, N. F. Rulkov, and M. A. Vorontsov, Chaotic Optical Communication over Turbulent Channel, *AIP Conference Proceedings of the 7th Experimental Chaos Conference* **676**, 307 (2003).
- [2] N. F. Rulkov, L. Illing and M. A. Vorontsov, Chaos-based communication over turbulent channel, *Proceedings of the IASTED International Conference. Communications, Internet, and Information Technology*, 326 (2002).

- [1] S. Tang, L. Illing, J. M. Liu, H. D. I. Abarbanel, M. Kennel, Communication using Synchronization of Chaos in Semiconductor Lasers with optoelectronic feedback, *AIP Conference Proceedings of the 6th Experimental Chaos Conference* **622**, 224 (2002).

Presentations

Invited Talks & Conference Organization

- [25] Seminar, Physics Department, Reed College, 10 October 2022.
- [24] RUSA Lecture 47 (online), Department of Nonlinear Dynamics, Bharathidasan University, India, 7 July 2022.
- [23] Applied Mathematics Seminar, University College Cork, Ireland, 19 September 2021.
- [22] Seminar, Physics Department, Willamette University, 3 March 2017.
- [21] Seminar, Physics Department, Reed College, 18 November 2015.
- [20] Mini Symposium 43: Applications of Exactly Solvable Chaos. SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, 17–21 May 2015 (Organizer).
- [19] Seminar, Femto-ST Institute, Besançon, France, 20 November 2014.
- [18] Seminar, Mathematics & Science Departments, University of Puget Sound, 24 October 2013.
- [17] Seminar, Physics Department, Bard College, 12 December 2012.
- [16] Seminar, Physics Department, Reed College, 2 November 2011.
- [15] Seminar, Physics Department, Willamette University, 14 October 2011.
- [14] Seminar, Physics Department, Willamette University, 12 March 2010.
- [13] Oregon Center for Optics, Fall retreat, 17 September 2009.
- [12] Colloquium, Mathematics Department, Pacific University, 9 April 2009.
- [11] Colloquium, Physics Department, Linfield College, 12 March 2009.
- [10] Colloquium, Oregon Center for Optics and Department of Physics, University of Oregon, 4 December 2008.
- [9] Colloquium, Physics Department, Lewis & Clark College, 10 November 2008.
- [8] Fifth World Congress of Nonlinear Analysts (WCNA 2008), Orlando, FL, 2–9 July 2008.
- [7] 10th Experimental Chaos Conference, Catania, Italy, 3–6 June 2008.
- [6] Colloquium, Physics Department, Queens College, CUNY, 26 February 2007.
- [5] Lecture Series, Department of Physics and Astronomy, Oberlin College, 22 February 2007.
- [4] Seminar, Physics Department, Reed College, 5 February 2007.
- [3] Center for Nonlinear and Complex Systems Seminar Series, Duke University, Durham, NC, 15 February 2005.

- [2] Third Physical Institute, University of Göttingen, Germany, Seminar, 1 March 2004.
- [1] Workshop on Multivariate Time Series Analysis, Internationales Wissenschaftsforum (IWH), Heidelberg, Germany, 25–28 February 2004.

Recent Contributed Talks & Posters

16th CHAOS 2023 International Conference, Heraklion, Crete, Greece, 13–16 June 2023 (talk).

SIAM Conference on Applications of Dynamical Systems, Portland, OR, 14–18 May 2023 (poster).

12th CHAOS 2019 International Conference, Chania, Crete, Greece, 18–22 June 2019 (talk).

SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, 18–23 May 2019 (poster).

15th Experimental Chaos and Complexity Conference, Madrid, Spain, 4–7 June 2018 (poster).

19th Annual Meeting of the Northwest Section of APS, University of Puget Sound, Tacoma, WA, 31 May – 2 June 2018 (poster).

Students and Postgraduates Mentored

Reed College

Undergraduate Theses

Brent Ellis (2023/2024), Tarn McQuistan (2023/2024), Ella Pascoe (2023/2024), Hannah Kuder (2022/2023), Ryan Tang (2022/2023), Théo Lavier (2020/2021), Quinn Morgan (2020/2021), Zehui Zhao (2020/2021), Josh Dey (2019/2020), Cosmos Dong (2019/2020), Maham Zia (2019/2020), Sean C. Allen (2018/2019), Nikki Johnston (2018/2019), Oona Sullivan-Marcus (2018/2019), Matthew Chau (2017/2018), Giovanni Corti (2017/2018), Noah Shofer (2017/2018), Yuka Esashi (2016/2017), Robby Gottesman (2016/2017), Lara Kincheloe (2016/2017), Ace Furman (2015/2016), Mateo Ochoa Coloma (2015/2016), Colleen Werkheiser (2015/2016), Tobias Koppel (2013/2014), Rachel Pincus (2013/2014), Anya Demko (2013/2014), Xueping Long (2012/2013), Jon Kindem (2012/2013), Lukas Kuczynski (2012/2013), Lindsay Sonderhouse (2012/2013), Jeremy Lawrence (2011/2012), Cris Panda (2011/2012), Wes Erickson (2011/2012), Gray Davidson (2011), Greg Hoth (2009/2010), Sam Spencer (2009/2010), Rachel Fordyce (2008/2009), Cody Myers (2008/2009), Drew Atwater (2007/2008), Christopher May (2007/2008), Erin McCowen (2007/2008).

Summer Research

Charles Ottman (2024), Azra Hrnjica (Spring 2024), Maggie Auerbach (Spring 2024), Tarn McQuistan (2023, 2024), Sunny Wang (2023), Brent Ellis (2023), Jesse Cao (2020), Thomas Malthouse (2019), Alex Striff (2019), Kees Benkendorfer (2018), Yunjia Bao (2017, 2018), Noah Shofer (2016, 2018), Edgar Perez (2016, 2017), Ella Banyas (2016), Kyu Yeon Cho (2016), Dan Guo (2013), Lindsay Sonderhouse (2013), Andrew Warren (2013), Xueping Long

(2012), Cris Panda (2010, 2011, 2012), Alison Saunders (2010), Greg Hoth (2009), Adarsh Pyarelal (2009), Matt Jemielita (2008, 2009), Christopher May (2008), Seth Terashima (2008).

Research Associate Collaborator

Lauren Shareshian, M.A. (2009-2010)

Duke University

Graduate

Kristine Callan: Experiments and theory on the dynamics of coupled opto-electronic devices with delayed-feedback (2006 - 2007).

Undergraduate

Barry Wright, summer research: Introduction to dynamical systems and circuit design (2005).

Grant A. Degler, summer research: PIC-controller for chaotic circuits (2005).

Susan Clark, honor thesis: Collaborated on ultra-low light level all-optical switching (2004).