

# Nathan J. Dawson

## Curriculum Vitae

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### EDUCATION

**PhD** – Physics, December 2010, Washington State University

**Grad. Cert. in Opto-Electronics** - December 2010, Washington State University

**BS** – Physics, May 2004, University of Idaho

### EXPERIENCE

1. **Assistant Professor**, Hawaii Pacific University, Appointment on August 16th, 2017
1. **Adjunct Assistant Professor**, Washington State University, February 2016 – *Present*
2. **Assistant Professor**, University of The Bahamas, August 2015 – July 2017
3. **Post-doc**, Case Western Reserve University, June 2013 – May 2015
4. **Post-doc**, Youngstown State University, June 2011 – May 2013
5. **Teaching/Research Assistant**, Washington State University, August 2004 – May 2011
6. **Substitute Teacher** (math/science 7<sup>th</sup> -12<sup>th</sup> grade) May-June '05 & May-June '08, Kellogg, ID

### COURSES TAUGHT

1. Phys 164 (Algebra-based introductory physics I, includes lab), University of The Bahamas
2. Phys 176 (Calc-based introductory physics I), University of The Bahamas
3. Phyl 176 (Calc-based introductory lab I), University of The Bahamas
4. Phys 2610 (Calc-based introductory physics I), Youngstown State University
5. Phys 2611 (Calc-based introductory physics II), Youngstown State University
6. Phys 2611L (Calc-based introductory lab II), Youngstown State University
7. Phys 410 *laboratory portion only* (Electronics lab for physicists), Washington State University
8. Phys 201L (Calc-based introductory lab I), Washington State University
9. Phys 202L (Calc-based introductory lab II), Washington State University
10. Astr 150L (Introductory astronomy lab), Washington State University
11. Astr 390 (Lab only astronomy course), Washington State University

### PEER-REVIEWED PUBLICATIONS

1. Nathan J. Dawson, Stephen Spinella, Kyle C. Peters, Anthony Majorana, Qian Qian, Victoria Hepworth, Richard Gross, and Kenneth D. Singer, “Optical interactions of silver nanoparticle decorated cellulose nanocrystals created from a one-pot reduction method,” *J. Appl. Phys.*, **121**, 095502 (2017).
2. Nathan J. Dawson and Mark G. Kuzyk, “Determining one-dimensional power series potentials that possess large nonlinear optical coefficients,” *J. Opt. Soc. Am. B*, **33**, E83-E92 (2016).
3. Nathan J. Dawson, “The static hyperpolarizability of space-fractional quantum systems,” *J. Opt. Soc. Am. B*, **33**, E24-E30 (2016).
4. Stephen Spinella, Anthony Maiorana, Qian Qian, Nathan Dawson, Victoria Hepworth, Manoj Ganesh, Ken Singer, and Richard A. Gross, “Concurrent cellulose hydrolysis and esterification to prepare a surface-modified cellulose nanocrystal decorated with carboxylic acid moieties,” *ACS Sustainable Chem. Eng.* **4**, 1538–1550 (2016).
5. Nathan J. Dawson, Michael S. Patrick, Sanjoy Paul, Brett Ellman, Alexander Semyonov, Robert J. Twieg, Rachael Matthews, Emily Pentzer, and Kenneth D. Singer, “Interfacial trapping in an aged discotic liquid crystal semiconductor,” *J. Appl. Phys.*, **118**, 085502 (2015).
6. Nathan J. Dawson, “Lowest-order relativistic corrections to the fundamental limits of nonlinear-optical coefficients,” *Phys. Rev. A*, **91**, 013832 (2015).
7. Nathan J. Dawson, James H. Andrews, and Michael Crescimanno, “Modeling off-resonant nonlinear-optical cascading in mesoscopic thin films and guest-host molecular systems,” *Phys. Rev. A*, **88**, 0111342 (2013).

8. James H. Andrews, Michael Aviles, Michael Crescimanno, Nathan J. Dawson, Anthony Mazzocco, Joshua Petrus, Kenneth D. Singer, Eric Baer, and Hyunmin Song, "Thermo-spectral study of all-polymer multilayer lasers," *Opt. Mater. Express*, **3**, 1152-1160 (2013).
9. Nathan Dawson, Kenneth D. Singer, James H. Andrews, Michael Crescimanno, Guilin Mao, Joshua Petrus, Hyunmin Song, and Eric Baer, "Post-Process Tunability of Folded One-Dimensional All-Polymer Photonic Crystal Microcavity Lasers," *Nonlin. Opt. Quant. Opt.*, **45**, 101-111 (2012).
10. Michael Crescimanno, Nathan J. Dawson, and James H. Andrews, "Coherent Perfect Rotation," *Phys. Rev. A*, **86**, 031807(R) (2012).
11. James H. Andrews, Michael Crescimanno, Nathan J. Dawson, Guilin Mao, Joshua B. Petrus, Kenneth D. Singer, Eric Baer, and Hyunmin Song, "Folding flexible co-extruded all-polymer multilayer distributed feedback films to control lasing," *Opt. Express*, **20**, 15580-15588 (2012).
12. Nathan J. Dawson and James H. Andrews, "The Local Field Factor and Microscopic Cascading: A Self-Consistent Method Applied to Confined Systems of Molecules," *J. Phys. B*, **45**, 035401 (2012); Corrigendum, *J. Phys. B*, **45**, 229501 (2012).
13. Shiva K. Ramini, Nathan Dawson, and Mark G. Kuzyk, "Testing the diffusion hypothesis as a mechanism of self-healing in Disperse Orange 11 doped in poly(methyl methacrylate)," *J. Opt. Soc. Am. B*, **28**, 2408-2412 (2011).
14. Nathan J. Dawson, Benjamin R. Anderson, Jennifer L. Schei, and Mark G. Kuzyk, "A Quantum Mechanical Model of the Cascading Contribution to the Second Hyperpolarizability," *Phys. Rev. A*, **84**, 043407 (2011).
15. Nathan J. Dawson, Benjamin R. Anderson, Jennifer L. Schei, and Mark G. Kuzyk, "A Classical Model of the Cascading Contribution to the Second Hyperpolarizability," *Phys. Rev. A*, **84**, 043406 (2011).
16. Nathan J. Dawson, Mark G. Kuzyk, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Modeling the Mechanisms of the Photomechanical Response of a Nematic Liquid Crystal Elastomer," *J. Opt. Soc. Am. B*, **28**, 2134-2141 (2011).
17. Nathan J. Dawson, Mark G. Kuzyk, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Experimental Studies of the Mechanisms of Photomechanical Effects in a Nematic Liquid Crystal Elastomer," *J. Opt. Soc. Am. B*, **28**, 1916-1921 (2011).
18. Nathan J. Dawson, Mark G. Kuzyk, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Cascading of Liquid Crystal Elastomer Photomechanical Optical Devices," *Opt. Commun.*, **284**, 991-993 (2011).

## MANUSCRIPTS

1. Moussa Kounta and Nathan J. Dawson, "LQG Homing for Markov processes with Regime Switching," submitted to *SICON*.
2. Najee Stubbs, Mauricio Bridgewater, Michaela Stubbs, Michael Crescimanno, Mark G. Kuzyk, and Nathan J. Dawson, "Polylactic acid promotes healing of photodegraded organic molecule," submitted to *Opt. Mater.*
3. Nathan J. Dawson, Onassis Nottage, and Moussa Kounta, "The second hyperpolarizability of systems described by the space-fractional Schrödinger equation," submitted to *Phys. Lett. A*.

## CONFERENCES / PROFESSIONAL PAPERS / PROCEEDINGS

1. Nathan J. Dawson, "Role of dimensionality on nonlinear optical coefficients," *Foundations of Nonlinear Optics*, May 23-25, Nassau (2017). **Invited**
2. Nathan J. Dawson and Mark G. Kuzyk, "Determining one-dimensional power series potentials that possess large nonlinear optical coefficients," *Foundations of Nonlinear Optics*, August 9-11, Medford (2016). **Invited**
3. Nathan Dawson, Kenneth Singer, Richard Gross, Anthony Maiorana, Fei Liu, Spinella Stephen, Michael McMaster, Kyle Peters, Mohammad Ibrahim, and Shekar Mekala, "Biobased materials for

optoelectronics,” 32<sup>nd</sup> International conference of the Polymer Processing Society, July 25-29, Lyon (2016). **Keynote**

4. Nathan J. Dawson, Kyle C. Peters, Stephen Spinella, Anthony Maiorana, Richard A. Gross, Kenneth D. Singer, “Optical properties of cellulose nanocrystals decorated with silver nanospheres,” Proc. SPIE 9564, 956406 (2015). **Invited**

5. Nathan J. Dawson, Michael S. Patrick, Kyle Peters, Sanjoy Paul, Brett Ellman, Rachael Matthews, Emily Pentzer, Robert J. Twieg, Kenneth D. Singer, “Effects of degradation on the performance of a triphenylene based liquid crystal organic semiconductor,” Proc. SPIE 9616, 96160B (2015). **Invited**

6. Nathan J. Dawson, “Relativistic correction to the sum rules and effects on the limits of nonlinear optical coefficients,” Symposium on Applications of Sum Rules and Scaling in Nonlinear Optics, Pullman (2014). **Invited**

7. Nathan J. Dawson, Michael S. Patrick, Sanjoy Paul, Brett Ellman, Kenneth D. Singer, Alexander Semyonov, and Robert J. Twieg, “Understanding delayed charge injection observed in time-of-flight measurements of hexapentylxytriphenylene,” DAMOP, June 2-6, Madison (2014).

8. Nathan J. Dawson, “The q-index from generalized statistical mechanics as a measure of the strength of perturbations in a Maier-Saupe potential,” APS Ohio sectional meeting, April 4-5, Youngstown (2014).

9. Nathan J. Dawson, Michael Aviles, James H. Andrews, Michael Crescimanno, Joshua B. Petrus, Anthony Mazzocco, Kenneth D. Singer, Eric Baer, and Hyunmin Song, “Thermo-spectral properties of plastic lasers,” Proceedings of SPIE, **8876**, San Diego (2013). **Invited**

10. Nathan J. Dawson, James H. Andrews, and Michael Crescimanno, “Enhancing local field and microscopic cascading contributions to higher-order nonlinear-optical responses through forced geometric constraints,” Proceedings of SPIE, **8519**, San Diego (2012). **Invited**

11. Nathan J. Dawson, Mark G. Kuzyk, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, “Integration of Liquid Crystal Elastomer Photomechanical Optical Devices,” Proceedings of SPIE, **8475**, San Diego (2012).

12. Nathan J. Dawson, Mark G. Kuzyk, Jeremy Neal, Paul Luchette, Peter Palffy-Muhoray, “Photo-induced deformations of liquid crystal elastomers,” APS Northwest section, Walla Walla (2010).

13. Nathan J. Dawson, Mark G. Kuzyk, Jeremy Neal, Paul Luchette, Peter Palffy-Muhoray, “Mechanisms of photo-induced deformations of liquid crystal elastomers.” APS March Meeting, Portland (2010).

## CONTRIBUTED CONFERENCES / PROF. PAPERS / PROCEEDINGS

1. Sanjoy Paul, Alexander Semyonov, Nathan J. Dawson, Kenneth D. Singer, Robert J. Twieg, Brett Ellman, “Spatially resolved charge transport study in discotic liquid crystalline organic semiconductors.” APS March meeting, March 18, Baltimore (2016).

2. Michael Aviles, Anthony Mazzocco, Jim Andrews, Nathan Dawson, and Michael Crescimanno, “The theory of the anti-maser: coherent perfect absorption of RF,” APS Ohio-Region Section, October 6, Detroit (2012).

3. Anthony Mazzocco, Michael Aviles, Jim Andrews, Nathan Dawson, and Michael Crescimanno, “Experimental demonstration of the anti-maser,” APS Ohio-Region Section, October 6, Detroit (2012).

4. Michael Crescimanno, James H. Andrews, Michael Aviles, Nathan J. Dawson, Joshua Petrus, and Anthony Mazzocco, “Understanding temperature tuning of the all-polymer co-extruded laser,” APS Ohio-Region Section, October 6, Detroit (2012).

5. Mark G. Kuzyk, David Watkins, Nathan J. Dawson, Benjamin R. Anderson, and Jennifer L. Schei, “From universal properties to cascading: using sum rules for developing broad principles and phenomena,” Proceedings of SPIE, **8474**, San Diego (2012).

6. Michael Crescimanno, Nathan J. Dawson, and James H. Andrews, “Coherent Perfect Rotation – The Conservative Analog to CPA,” APS Division of Atomic, Molecular and Optical Physics, June 4-8, Orange County (2012).

7. Michael Crescimanno, Nathan J. Dawson, and James H. Andrews, “Coherent Perfect Rotation,” APS Ohio-Region Section, April 14, Columbus (2012).

8. Mark G. Kuzyk, Nathan J. Dawson, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Mechanisms of the Photomechanical Effect in Dye-Doped Liquid Crystal Elastomers," 9th Mediterranean Topical Meeting on "Novel Optical Materials and Application" NOMA, Cetraro, Italy, June 5th – June 11th (2011).
9. Mark G. Kuzyk and Nathan Dawson, "Smart morphing systems based on photomechanical optical devices," SPIE Photonics West, Organic Photonic Materials and Devices XIII **7935** (2011).
10. Mark G. Kuzyk, Nathan J. Dawson, Jeremy Neal, Paul Luchette, Peter Palffy-Muhoray, and Shiva Ramini, "The future: smart polymeric materials," AMARIS'10, Cachan, France (2010).
11. Mark G. Kuzyk, Nathan J. Dawson, Shiva K. Ramini, "Reversing the arrow of time via photonics using polymer-dye interactions." ICOOPMA, Budapest, Hungary (2010).
12. Mark G. Kuzyk, Nathan J. Dawson, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Nonlinear optical and photo-mechanical phenomena in dye-doped polymer fibers as the basis for making ultra smart materials," POF 2009, Sydney, Australia (2009).
13. Mark G. Kuzyk, Nathan J. Dawson, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Using liquid crystal elastomers to transmit and receive a force on a beam of light," 9th Mediterranean Topical Meeting on "Novel Optical Materials and Application" Cetraro, Italy on June 7th - June 14th, (2009).
14. Mark G. Kuzyk, Nathan J. Dawson, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "A Hierarchical Approach to Making a New Class of Ultra-Smart Morphing Materials," New Molecular Materials for Advanced Optical Applications in a Changing World, May 18th & 19th, Brussels, Belgium (2009).
15. Mark G. Kuzyk, Nathan J. Dawson, Jeremy Neal, Paul Luchette, and Peter Palffy-Muhoray, "Transmitting Mechanical Forces on a Beam of Light," ICOOPMA, Edmonton (2008).

## POSTERS

1. Nathan J. Dawson, James Andrews, Eric Baer, Kyle Comeau, Michael Crescimanno, Chris Ellison, Anne Hiltner, Josh Katzenstein, Tawfik Khattab, Guilin Mao, Joshua Petrus, Kenneth D. Singer, Hyunmin Song, Robert Twieg, Yeheng Wu, Juefei Zhou, "All-Polymer Multilayer Tunable Lasers and Emissive Films," NSF site visit at the Center for Layered Polymeric Systems at Case Western Reserve, Cleveland, April 10th (2012).
2. James H. Andrews, Mike Aviles, Eric Baer, Aaron Bishop, Kyle Comeau, Michael Crescimanno, Nathan J. Dawson, Guilin Mao, Tom N. Oder, Joshua Petrus, Chris Reed, Sean Robinson, Bijay Shakya, Kenneth D. Singer, Hyunmin Song, "Coherent Multilayer Optical Effects and Patterning," Center for Layered Polymeric Systems meeting at Case Western Reserve, Cleveland, March 15th (2012).

## COLLOQUIA

1. Hawaii Pacific University – 05/05/17
2. Colorado Mesa University – 04/21/17
3. University of Michigan, Flint – 04/06/17
4. Northern Arizona University – 02/27/17
5. Kennesaw State University – 02/22/17
6. University of The Bahamas – 09/02/2016
7. University of The Bahamas – 02/19/2016
8. University of The Bahamas – 09/22/2015
9. Sacramento State University – 02/12/2015
10. Youngstown State University – 02/06/2015
11. Arkansas State University - 02/27/2012

## ACKNOWLEDGEMENTS

1. James H. Andrews, Michael Crescimanno, Kenneth D. Singer, Eric Baer, "Melt-Processed Polymer Multilayer Distributed Feedback Lasers: Progress and Prospects," J. Polym. Sci. Polym. Phys. **51**, 1-29 (2013).

2. Michael Crescimanno, Brandon Latronica, Andrews James, and Madeline Smotzer, "Linear Distributed Bragg Cavity Effects on Optical Limiting in Three-Level Media," J. Opt. Soc. Am. B, **33**, E102-E108 (2016).

## PROFESSIONAL SOCIETIES

American Physical Society (APS)  
International Society for Optics and Photonics (SPIE)

## PROFESSIONAL & INSTITUTIONAL SERVICE

1. Organizing Committee, Foundations of Nonlinear Optics (FoNLO) 2018, June 19-21, Saratoga Springs (2018).
2. Student Recruitment Committee for School of Mathematics, Physics, and Technology at the University of The Bahamas (2017).
3. Chair of Organizing Committee / Coordinator, 2<sup>nd</sup> Annual Optical Sciences Summer Camp (OSSC), June 6-8, Nassau (2017).
4. Chair of Organizing Committee, Foundations of Nonlinear Optics (FoNLO) 2017, May 23-25, Nassau (2017).
5. Chair of Organizing Committee / Coordinator, 1<sup>st</sup> Annual Optical Sciences Summer Camp (OSSC), August 2-4, Nassau (2016).
6. Organizing Committee, Foundations of Nonlinear Optics (FoNLO) 2016, August 9-11, Medford (2016).
7. Session Chair, Foundations of Nonlinear Optics (FoNLO) 2016, August 9-11, Medford (2016).
8. Program Committee, International Symposium on SPIE Optical Engineering + Applications: Nanophotonics and Macrophotonics for Space Environments IX, August 9-13, San Diego (2015).
9. Session Chair, International Symposium on SPIE Optical Engineering + Applications: Nanophotonics and Macrophotonics for Space Environments IX, August 9-13, San Diego (2015).
10. Guest lecturer for the polymer envoys program through the NSF Science Center for Layered Polymeric Systems, June 22<sup>nd</sup> and 24<sup>th</sup>, Cleveland (2014).
11. Program Committee, International Symposium on SPIE Optical Engineering + Applications: Nanophotonics and Macrophotonics for Space Environments VIII, August 17-21, San Diego (2014).
12. Session Chair, International Symposium on SPIE Optical Engineering + Applications: Nanophotonics and Macrophotonics for Space Environments VII, August 25-29, San Diego (2013).
13. Program Committee, International Symposium on SPIE Optical Engineering + Applications: Nanophotonics and Macrophotonics for Space Environments VII, August 25-29, San Diego (2013).
14. Session Chair, International Symposium on SPIE Optical Engineering + Applications: Nanophotonics and Macrophotonics for Space Environments VI, Session 4 - Self-Healing Materials for Space Applications, August 12-16, San Diego (2012).

## REFEREE

Reviewer for Applied Optics, Applied Physics B, Applied Physics Letters, Journal of Applied Physics, Journal of the Optical Society of America B, Journal of Physics B, Journal of Photochemistry and Photobiology A, Optics Express, Optical Materials Express, Optics Letters, and Polymer Chemistry.

## GRANTS & AWARDS

1. University of The Bahamas, Annual Fund grant, 2015 (\$3430).
2. Sponsorships for FoNLO 2017 (\$2150).