Ryan A. Colyer, Ph.D.

https://rcolyer.net *ryancolyer@yahoo.com*

Education

- **University of Illinois**—Urbana, IL
  Graduate study in Physics: August 2002–June 2008
  - Ph.D.: June 2008. Thesis: "Development of a fluorescence lifetime based method to detect and analyze single molecule reactions in solution" (Advisor: Professor Enrico Gratton)
  - Master's Degree: August 2004
- **Allegheny College**—Meadville, PA
  Bachelor of Science: August 1998–May 2002
  - Double-majored in Physics and Computer Science.
  - Minored in Psychology.
  - Senior Project: "Quantum Computing: Implementing Simulations of Quantum Mechanical Systems on a Quantum Computer" (Advisors: Dr. Shafiq Rahman and Dr. Robert D. Cupper)

Experience

- **University of Pennsylvania – Computational Memory Lab**—Philadelphia, PA
  Scientific Programmer: June 2019–present
  - Leading system development team.
  - Developing new EEG acquisition and brain stimulation system.
  - Mentoring lab members in analysis methods.
  - Overseeing computing cluster issues and resourcing.
- **Cabrini University**—Radnor, PA
  Assistant Professor of Physics: August 2015–May 2019
  Lecturer in Physics: August 2013–May 2015
  - Frequent presentations, individual mentoring, team and committee work including leadership positions, and self-driven scholarship.
  - Taught Advanced Statistics for the Biological Sciences, using Python, SciPy, and NumPy for data analysis.
  - Taught University Physics using Python-based analysis and simulations.
  - Managed 9 Adjunct Professors as Science Department Coordinator.
  - Mentored 15 undergraduate theses.
  - Courses: General Physics I/II Lecture/Lab, University Physics I Lecture/Lab, Non-majors Physics using 3D Printing, Advanced Statistics for the Biological Sciences, Senior Capstone, and Undergraduate Research.
  - Interim Academic Council Chair: 2018 Spring
  - Faculty Cabinet: 2018 Spring
  - Science Department Coordinator: 2017–2018
  - Internship Coordinator: 2016–2017
  - Academic Council: 2016–2019
  - Pre-medical Advisor: 2016–2019
  - Assessment Committee: 2015–2019
- **Maven Biotechnologies**—Monrovia, CA
  Senior Software Engineer: January 2012–November 2012

  - Developed scientific analysis and control software for a new ellipsometry imaging device.
  - Programmed with C++ and Qt, and wrote custom build management scripts.
  - Developed a comprehensive managed event queue threading architecture which resolved a large number of reliability issues, and produced a stable program.
  - Used OpenCV to develop custom image stabilization routines for reliable sample tracking.
  - Used git version control and issue tracking as part of an agile development process with a team of software engineers.
- **Shimon Weiss Group**—University of California, Los Angeles, CA
  Postdoctoral Researcher: July 2008–December 2011
  - Worked on the H33D photon counting lifetime imager, and on high throughput multipixel detectors.
  - Co-developed the SOFI super-resolution technique.
  - Wrote C++ software for the simulation of photon wavefront propagation.
  - Used C++, Perl, Python, bash scripts, Maxima, MATLAB, and LabVIEW for new data acquisition and data analysis software.
- **Laboratory for Fluorescence Dynamics**—Urbana, IL; Irvine, CA
  Research Assistant: May 2004–June 2008
  - Developed the phasor trajectory method for analysis of protein conformational transitions in single-molecule experiments.
  - Designed and developed a digital frequency domain lifetime image acquisition system with optimal precision for phasor analysis.
  - Wrote custom fluorescence lifetime simulation and analysis software in C++.
- **University of Illinois**—Urbana, IL
  Teaching Assistant: January 2003–May 2004
  - Thermal Physics; Quantum Physics; Space, Time, and Matter
- **Los Alamos National Laboratory**—Los Alamos, NM
  Student Researcher: June 2001–August 2001
  - Designed and developed a modular order-N molecular dynamics simulation package in C using GTK and OpenGL providing runtime 3D visualization for materials research.
- **Allegheny College Computer Science Department**—Meadville, PA
  System Administrator: September 2000–May 2002
  - Administered Linux and Sun workstations and servers.
  - Designed, developed, and implemented a system for automated multi-system management.
- **Cigital**—Dulles, VA
  Software Researcher: May 2000–August 2000
  - Worked on a research team developing an automated system for analysis, verification, and specification assurance of closed source commercial off-the-shelf software components.
  - Designed, developed, and implemented a general wrapper system for Java class methods using dynamic bytecode insertion.
- **Allegheny College Computing Services**—Meadville, PA
  Technical Support: September 1998–May 2000
- **Marsulex Environmental Technologies**—Lebanon, PA
  Web Designer / System Administrator: June 1998–August 1999

Publications

- **Silicon photon counting avalanche diodes for single-molecule fluorescence spectroscopy**—Xavier Michalet, Antonino Ingargiola, Ryan A. Colyer, Giuseppe Scalia, Shimon Weiss, Piera Maccagnani, Angelo Gulinatti, Ivan Rech, Massimo Ghioni
IEEE J. Sel. Topics Quantum Electron., 20(6), 3804420, 2014

- **Toward Single-Molecule Optical Mapping of the Epigenome**—Michal Levy-Sakin, Assaf Grunwald, Soohong Kim, Natalie R. Gassman, Anna Gottfried, Josh Antelman, Younggyu Kim, Sam Ho, Robin Samuel, Xavier Michalet, Ron R. Lin, Thomas Dertinger, Andrew S. Kim, Sangyoon Chung, Ryan A. Colyer, Elmar Weinhold, Shimon Weiss, and Yuval Ebenstein
ACS Nano 8(1):14-26, 2014

- **Development of new photon-counting detectors for single-molecule fluorescence microscopy**—X. Michalet, R. A. Colyer, G. Scalia, A. Ingargiola, R. Lin, J. E. Millaud, S. Weiss, Oswald H. W. Siegmund, Anton S. Tremsin, John V. Vallerga, A. Cheng, M. Levi, D. Aharoni, K. Arisaka, F. Villa, F. Guerrieri, F. Panzeri, I. Rech, A. Gulinatti, F. Zappa, M. Ghioni, S. Cova
Phil Trans R Soc B 368(1611):20120035, 2012

- **Enzymatically incorporated genomic tags for optical mapping of DNA binding proteins**—Soohong Kim, Anna Gottfried, Ron R. Lin, Thomas Dertinger, Andrew S. Kim, Sangyoon Chung, Ryan A. Colyer, Elmar Weinhold, Shimon Weiss, Yuval Ebenstein
Angewandte Chemie, 51(15):3578-81, 2012

- **Phasor imaging with a widefield photon-counting detector**—Ryan A. Colyer, Oswald H. W. Siegmund, Anton S. Tremsin, John V. Vallerga, Shimon Weiss, Xavier Michalet
Journal of Biomedical Optics 17(1), 016008, 2012

- **High-throughput FCS using an LCOS spatial light modulator and an 8 x 1 SPAD array**—Ryan A. Colyer, Giuseppe Scalia, Ivan Rech, Angelo Gulinatti, Massimo Ghioni, Sergio Cova, Shimon Weiss, Xavier Michalet
Biomedical Optics Express 1(5):1408-31, 2010 (OSA Spotlight)

- **Achieving increased resolution and more pixels with Superresolution Optical Fluctuation Imaging (SOFI)**—Thomas Dertinger, Ryan Colyer, Robert Vogel, Jörg Enderlein, Shimon Weiss
Optics Express 18(18):18875-85, 2010

- **Fast, background-free, 3D super-resolution optical fluctuation imaging (SOFI)**—T. Dertinger, R. Colyer, G. Iyer, S. Weiss, J. Enderlein
Proc Natl Acad Sci 106(52):22287-92, 2009

- **Single-quantum dot imaging with a photon counting camera**—X. Michalet, R. A. Colyer, J. Antelman, O. H. W. Siegmund, A. Tremsin, J. V. Vallerga, S. Weiss
Curr Pharm Biotechnol 10:543-57, 2009

- **A Novel Fluorescence Lifetime Imaging System that Optimizes Photon Efficiency**—Ryan A. Colyer, Claudia Lee, Enrico Gratton
Microsc Res Tech 71(3):201-13, 2008

Proceedings and Book Chapters

- **Parallel multispot smFRET analysis using an 8-pixel SPAD array**—Antonino Ingargiola, Ryan A. Colyer, Dongsik Kim, Francesco Panzeri, Ron Lin, Angelo Gulinatti, Ivan Rech, Massimo Ghioni, Shimon Weiss, Xavier Michalet
Proc. of SPIE Vol 8228. January 21, 2012

- **Superresolution Optical Fluctuation Imaging (SOFI)**—Thomas Dertinger, Ryan Colyer, Robert Vogel, Mike Heilemann, Markus Sauer, Jörg Enderlein, and Shimon Weiss
Nano-Biotechnology for Biomedical and Diagnostic Research in Advances, in Experimental Medicine and Biology 733. December 2011

- **Microchannel Plate Imaging Photon Counters for Ultraviolet through NIR Detection with High Time Resolution**—Oswald H.W. Siegmund, John V. Vallerga, Anton S. Tremsin, Jason McPhate, X. Michalet, R. A. Colyer, S. Weiss
  Proc. of SPIE Vol 8033. April 2011
- **New photon-counting detectors for single-molecule fluorescence spectroscopy and imaging**—Xavier Michalet, Ryan A. Colyer, Giuseppe Scalia, Shimon Weiss, Oswald H. Siegmund, Anton S. Tremsin, John V. Vallerga, Federica A. Villa, Fabrizio Guerrieri, Ivan Rech, Angelo Gulinatti, Simone Tisa, Franco Zappa, Massimo Ghioni, Sergio Cova
  Proc. of SPIE Vol 8033. April 29, 2011
- **Ultra high-throughput single molecule spectroscopy with a 1024-pixel SPAD**—Ryan A. Colyer, Giuseppe Scalia, Federica Villa, Fabrizio Guerrieri, Simone Tisa, Franco Zappa, Sergio Cova, Shimon Weiss, Xavier Michalet
  Proc. of SPIE Vol 7905. January 2011
- **High-throughput multispot single-molecule spectroscopy**—Ryan A. Colyer, Giuseppe Scalia, Taiho Kim, Ivan Rech, Daniele Resnati, Stefano Marangoni, Massimo Ghioni, Sergio Cova, Shimon Weiss, Xavier Michalet
  Proc. of SPIE Vol. 7571. January 2010
- **High-throughput single-molecule fluorescence spectroscopy using parallel detection**—Xavier Michalet, Ryan A. Colyer, Giuseppe Scalia, Taiho Kim, Moran Levi, Daniel B. Aharoni, Adrian M. Cheng, Katsushi Arisaka, Jacques E. Millaud, Ivan Rech, Stefano Marangoni, Massimo Ghioni, Sergio D. Cova, Shimon Weiss
  Proc. of SPIE Vol. 7608. January 2010
- **Phasor-based single-molecule fluorescence lifetime imaging using a wide-field photon-counting detector**—R. Colyer, O. Siegmund, A. Tremsin, J. Vallerga, S. Weiss, X. Michalet
  Proc. of SPIE Vol. 7185. January 25, 2009
- **An Approach to Identifying and Understanding Problematic COTS Components**—Gregory M. Kapfhammer, C.C. Michael, Jennifer Haddox, Ryan Colyer
  ISACC 2000. September, 2000

Presentations and Posters

- **The Development and Characterization of an Open Body Fluorescence Microscopy System for Fluorescence Lifetime Imaging**—Danielle Ayer, Ryan Colyer
  Pennsylvania Academy of Science, March 30, 2019
- **Fluorescence Lifetime Imaging Microscopy Using Compressed Phasors**—Ryan A. Colyer, Sarah Grant, Sarah Eplett
  Biophysical Society Meeting, Poster. March 3, 2019
- **Construction and Characterization of an Open Body Fluorescence Microscopy System for Fluorescence Lifetime Imaging**—Danielle Ayer, Ryan A. Colyer
  Pennsylvania Academy of Science, March 24, 2018
- **Development of a Custom Detection and Acquisition System Able to Perform Fluorescence Lifetime Imaging**—Sarah Eplett, Ryan A. Colyer
  Pennsylvania Academy of Science, April 1, 2017
- **Development of a Novel Fluorescence Lifetime Imaging Technique Using Compressive Sensing**—Sarah Grant, Ryan A. Colyer
  Pennsylvania Academy of Science, April 1, 2017
- **Phasor Analysis with a New Widefield Photon-Counting FLIM Detector**—Ryan A. Colyer, Oswald H. W. Siegmund, Anton S. Tremsin, John V. Vallerga, Rick Raffanti, Shimon Weiss, Xavier Michalet
  Biophysical Society Meeting, Poster. February 26, 2012

- **Phasors and FLIM with Widefield Photon Counting**—Ryan A. Colyer, Oswald H. W. Siegmund, Anton S. Tremsin, John V. Vallerga, Rick Raffanti, Luc Veya, Shimon Weiss, Xavier Michalet
  7th Workshop on Advanced Fluorescence Spectroscopy and Microscopy, Picoquant. January 19, 2012
- **New photon-counting detectors for single-molecule fluorescence spectroscopy and imaging**—Xavier Michalet, Ryan A. Colyer, Giuseppe Scalia, Shimon Weiss, Oswald H. Siegmund, Anton S. Tremsin, John V. Vallerga, Federica A. Villa, Fabrizio Guerrieri, Ivan Rech, Simone Tisa, Angelo Gulinatti, Franco Zappa, Massimo Ghioni, Sergio Cova
  SPIE Defense, Security, and Sensing, Advanced Photon Counting Techniques V. April 29, 2011
- **Ultra high-throughput single molecule spectroscopy with a 1024-pixel SPAD**—Ryan A. Colyer, Giuseppe Scalia, Federica Villa, Fabrizio Guerrieri, Simone Tisa, Franco Zappa, Sergio Cova, Shimon Weiss, Xavier Michalet
  SPIE BiOS, Single Molecule Spectroscopy and Imaging IV. January 22, 2011
- **Versatile Superresolution for Everyone with SOFI (Superresolution Optical Fluctuation Imaging)**—Ryan A. Colyer, Thomas Dertinger, Robert Vogel, Jörg Enderlein, Shimon Weiss
  6th Workshop on Advanced Fluorescence Spectroscopy and Microscopy, Picoquant. January 20, 2011
- **Superresolution Optical Fluctuation Imaging (SOFI)**—T. Dertinger, R. Colyer, R. Vogel, M. Heilemann, G. Iyer, M. Sauer, J. Enderlein, Shimon Weiss
  Frontiers in Optics / Laser Science XXVI Conference. October 28, 2010
- **Superresolution Optical Fluctuation Imaging (SOFI) - more pixels and higher resolution**—Thomas Dertinger, Ryan Colyer, Robert Vogel, Jörg Enderlein, Shimon Weiss
  16th International Workshop, PicoQuant. September 16, 2010
- **High Throughput Single-Molecule Spectroscopy with Highly Parallel Excitation and Detection**—Ryan A. Colyer, Giuseppe Scalia, Fabrizio Guerrieri, Adrian Cheng, Moran Levi, Daniel Aharoni, Katsushi Arisaka, Jacques Millaud, Yoshihiko Kawai, Motohiro Suyama, Massimo Ghioni, Ivana Rech, Simone Tisa, Franco Zappa, Sergio Cova, Shimon Weiss, Xavier Michalet
  Biophysical Society Meeting, Platform. February 24, 2010
- **H33D Gen II: A New Photon Counting Camera for Single-Molecule Imaging and Spectroscopy**—Xavier Michalet, Ryan A. Colyer, Anton Tremsin, John Vallerga, Oswald Siegmund, Shimon Weiss
  Biophysical Society Meeting, Platform. February 24, 2010
- **Fast, background-free, 3D superresolution optical fluctuation imaging (SOFI)**—Thomas Dertinger, Ryan A. Colyer, Robert Vogel, Gopal Iyer, Shimon Weiss, Jörg Enderlein
  SPIE BiOS, Single Molecule Spectroscopy and Imaging III. January 2010
- **Fast, Background-Free, 3D Superresolution Optical Fluctuation Imaging (SOFI)**—Thomas Dertinger, Ryan Colyer, Robert Vogel, Gopal Iyer, Shimon Weiss, Jörg Enderlein
  15th International Workshop, PicoQuant. September 17, 2009
- **Development of a Fluorescence Lifetime Based Method to Detect and Analyze Single Molecule Reactions in Solution**—Ryan A. Colyer
  Doctoral Thesis Defense, Urbana, IL. June 24, 2008
- **How to Analyze Fluorescence Lifetime Images: An introduction to phasor analysis**—Ryan A. Colyer
  Introductory Course in Fluorescence Techniques, Spectroscopy and Microscopy. March 27, 2008
- **A Novel Fluorescence Lifetime Imaging System that Optimizes Photon Efficiency**—Ryan A. Colyer, Claudia Lee, Enrico Gratton
  Biophysical Society Meeting, Poster. February, 2008
- **FRET Phasor-FLIM Analysis of Homotypic and Heterotypic Non-covalent Interactions of Membrane Receptors in Living Cells**—Moreno Zamai, Valeria R. Caiolfa, Olga Barreiro, Ryan A. Colyer, Michelle A. Digman, Nicolai Sidenius, Francisco Sanchez-Madrid, Enrico Gratton
  Biophysical Society Meeting, Poster. February, 2008

- **Development of a Fluorescence Lifetime Based Method to Detect and Analyze Single Molecule Reactions in Solution**—Ryan A. Colyer
  LFD Seminar. November 8, 2007
- **Digital Frequency Domain Fluorescence Lifetime Imaging**—Ryan A. Colyer, Claudia Lee, Enrico Gratton
  2nd LFD Workshop in Advanced Fluorescence Imaging and Dynamics. October 24, 2007
- **Time-Resolved Frequency-Domain Fluorescence Lifetime Imaging Microscopy in the Photon-Counting Regime**—Ryan A. Colyer, Claudia Lee, Enrico Gratton
  Biophysical Society Meeting, Poster. March, 2007
- **The Point Spread Function in Fluorescence Fluctuation Spectroscopy**—Jay Unruh, Ryan A. Colyer
  LFD Workshop in Advanced Fluorescence Imaging and Dynamics. October 23, 2006
- **Frequency-Domain Fluorescence Lifetime Imaging Microscopy in the Photon-Counting Regime with Field-Programmable Gate Arrays**—Ryan A. Colyer, Claudia Lee, Enrico Gratton
  Biophysical Society Meeting, Poster. February, 2006
- **Spatial Resolution Enhancement using Non-Linear Temporal Cross-Correlation Techniques in Pump-Probe Confocal Microscopy**—Ryan A. Colyer, Jason Sutin, Bryant Chhun, Enrico Gratton
  Biophysical Society Meeting, Poster. February, 2005
- **An approach to wrapping java components and jini services**—Gregory M. Kapfhammer, Jennifer Haddox, Michael A. Schatz, Ryan Colyer
  25th Annual Software Engineering Workshop. November, 2000

Patent

- **Method for understanding and testing third party software components**—Jennifer M. Haddox, Gregory M. Kapfhammer, Ryan Colyer, Timothy Tsai
  U.S. Patent #7539978; Cigital, Inc.; November, 2002

Fellowships and Awards

- **David Dunbar Research Fund**—Cabrini University, 2017
- **PicoQuant Young Investigator Award**—SPIE BiOS, 2010
- **GAANN Fellowship**—University of Illinois, Urbana-Champaign, 2002

Professional and Honorary Memberships

- **Cognitive Neuroscience Society**—2019–present
- **American Physical Society**—2008–present
- **Biophysical Society**—2005–present
- **Sigma Pi Sigma**—2002–present
- **American Chemical Society**—2011–2014
- **American Association of Physics Teachers**—2018–2019
- **Pennsylvania Academy of Science**—2017–2019
  - Director at Large, 2018–2019