Daniel C. Elton

www.moreisdifferent.com
www.github.com/delton137/
www.kaggle.com/danielelton

Education

Oct. 2016 **Ph.D. Physics**, *Stony Brook University*, Stony Brook, NY

Aug. 2009 **B.S., Physics**, *Rensselaer Polytechnic Institute* , Troy, NY
Mathematics minor, Magna Cum Laude, GPA 3.87

Recent Experience

2012-2016 **Graduate Research Assistant**, *Stony Brook University*
Ph.D. adviser: Prof. Marivi Fernández-Serra

- Planned and executed a detailed study of how water absorbs electromagnetic waves which led to the discovery of phonon-like modes in liquid water, which received media attention on Phys.org and other websites.
- Developed programming and code management skills by writing codes in Python and Fortran for quantum molecular dynamics simulation, spectrum fitting, and the computation of dielectric properties.
- Ran molecular dynamics simulations with thousands of molecules on HPC clusters, generating gigabytes of data for analysis.
- Parallelized my custom path integral molecular dynamics (PIMD) code with MPI.
- Developed a novel algorithm that speeds up PIMD simulation with density functional theory by a factor of 30 with acceptable losses in accuracy.
- Implemented a novel peak fitting technique in Python to fit dielectric spectra data.
- Published my work in the *Journal of Chemical Physics* and *Nature Communications*.
- Gave 6 talks at major conferences and numerous poster presentations.

2010-2012 **Graduate Teaching Assistant**, *Stony Brook University*

- Taught "Physics for the Life Sciences II" lab component.

2010 **Summer Internship**, *Los Alamos National Laboratory*

- Worked with Dr. Garrett Kenyon on biologically-inspired neural networks for computer vision.

2009-2010 **Graduate Teaching Assistant**, *Rensselaer Polytechnic Institute*

- Taught undergraduate and graduate astronomy labs at the Hirsch Observatory.

2008-2009 **Undergraduate Research Assistant**, *Rensselaer Polytechnic Institute*

2008 **Research Experience for Undergraduates**, *Stony Brook University*

Computer skills

- Fortran, Matlab (3+ years)
- Mathematica, Python (1-2 years)
- MP/MPI, C, Bash, HTML (<1 year)
- LaTeX, Git, GROMACS, SIESTA, Jmol
- MS Windows, GNU/Linux

Honors

2014 Peter B. Kahn travel prize
2009 Rensselaer Founder's Award of Excellence
2008 Sigma Pi Sigma
2006 Rensselaer Medal/Scholarship
2006 Willits Foundation Scholarship
2006 RIT Computing Award/Scholarship
2006 National Merit Scholarship Finalist
2004 Eagle Scout Award

Publications

2016 **D. C. Elton**, M. Fritz, M.-V. Fernández-Serra, and J. Soler. "Accurate path integral molecular dynamics simulation of ab-initio water at near-zero added cost" (in prep)

2016 **D. C. Elton** and M.-V. Fernández-Serra "The microscopic origin of the Debye relaxation and the high frequency excess response in liquid water" (in prep)

2016 **D. C. Elton** and M.-V. Fernández-Serra, "The hydrogen-bond network of water supports propagating optical phonon-like modes", *Nature Communications*, **7**, 10193

2014 **D. C. Elton** and M.-V. Fernández-Serra, "Polar nanoregions in water - a study of the dielectric properties of TIP4P/2005, TIP4P/2005f and TTM3F", *The Journal of Chemical Physics*, **140**, 124504

2009 J. J. Podesta, M. A. Forman, C. W. Smith, **D. C. Elton**, and Y. Malecot, "Accurate Estimation of Third-Order Moments from Turbulence Measurements", *Nonlin. Proc. Geophys*, **16**, 99

Professional development & service

2015-2016 Writer & Public Relations Director, *Stony Brook Frontiers* magazine

2013-2015 Senator & Social Concerns Committee member, Stony Brook Graduate Student Organization

2014-2015 Volunteer, Stony Brook Astronomy Open Nights

2014,2015 Judge, Nassau County Science Competition

2012 Improvisation for Scientists, Alda Center for Communicating Science

Talks & poster presentations

4-13-16 Institute for Advanced Computational Sciences Research Day, *Stony Brook University*
Poster: "The H-bond network of liquid water supports propagating phonons"

3-17-16 American Physical Society March Meeting, *Baltimore, Maryland*
Poster: "The hydrogen bond network of water supports propagating optical phonon-like modes"

3-16-16 American Physical Society March Meeting, *Baltimore, Maryland*
Talk: "Accurate path integral molecular dynamics simulation of *ab-initio* water at near-zero added cost"

2-3-16 Institute for Advanced Computational Science, *Stony Brook University*
Invited talk: "Propagating Optical-Phonon Like Modes in Liquid Water"

11-27-15 Young Researcher Symposium, *Brookhaven National Lab*
Contributed talk: "Propagating optical phonon-like modes in liquid water"

10-23-15 Chemistry Research Day, *Stony Brook University*
Poster: "The H-bond network of liquid water supports propagating phonons"

9-18-15 Institute for Advanced Computational Science Grand Opening, *Stony Brook University*
Poster: "The H-bond network of liquid water supports propagating phonons"

3-2-15 American Physical Society March Meeting, *San Antonio, Texas*
Talk: "Exploring the nonlocal dielectric susceptibility of liquid water in the terahertz regime - propagating modes, Debye relaxation and overscreening"

7-29-14 Gordon Research Conference - Water & Aqueous Solutions, *Holderness School, NH*
Poster: "Water - a Relaxor Ferroelectric?"

7-26-14 Gordon Research Seminar - Water & Aqueous Solutions, *Holderness School, NH*
Invited talk: "Water - a Relaxor Ferroelectric?"

3-21-14 5th New York Theoretical and Computational Chemistry Conference, *Stony Brook University*
Poster: "Polar nanoregions in water - a study of the dielectric properties of TIP4P/2005, TIP4P/2005f and TTM3F"

3-5-14 American Physical Society March Meeting, *Denver, Colorado*
Talk: "Polar nanoregions in water - a study of the dielectric properties of TIP4P/2005, TIP4P2005f and TTM3F"

4-17-14 Graduate Student Friday Afternoon Seminar, *Stony Brook University*
Talk: "Water - a Relaxor Ferroelectric?"

1-14-13 4th New York Theoretical & Computational Chemistry Conference, *City University of New York*
Poster: "The Dielectric Properties and Dipolar Correlations of Liquid Water Investigated using TIP4P/2005 Rigid and Flexible Models"