

David Reid Jacobson, Ph.D.

Postdoctoral Research Associate
JILA, National Institute of Standards and Technology
and University of Colorado, Boulder

david.jacobson@jila.colorado.edu
<http://davidjacobson.net>

Education: Ph.D. in Physics, University of California, Santa Barbara (2011–2016)
Advisor: Omar A. Saleh

B.A. *cum laude* with Distinction in Physics and with Distinction in Biochemistry,
University of Pennsylvania (2007–2011)

Employment: Assistant Professor, Department of Chemistry, Clemson University (Starting
January, 2023)

Postdoctoral Research Associate, JILA, National Institute of Standards and
Technology and University of Colorado, Boulder (2017–Present)
Advisor: Thomas T. Perkins

Honors and Awards: NIH K99/R00 Pathway to Independence Award (2021–Present)

APS DBIO Award for Outstanding Doctoral Thesis Research in
Biological Physics (2017)

NIST NRC Postdoctoral Research Associateship (2017–2019)

NSF Graduate Research Fellowship (2013–2016)

Chair’s Award, Biochemistry Program, University of Pennsylvania (2011)

Roy and Diana Vagelos Molecular Life Science Program, University of
Pennsylvania (2007–2011)

Publications: D.R. Jacobson, T.T. Perkins, “Free-energy changes of bacteriorhodopsin point
mutants measured by single-molecule force spectroscopy”, *Proc. Natl. Acad.
Sci. U.S.A.* **118**, e2020083118 (2021).

S.N. Innes-Gold, D.R. Jacobson, P.A. Pincus, M.J. Stevens, O.A. Saleh, “Flexible,
charged biopolymers in monovalent and mixed-valence salt: Regimes of
anomalous electrostatic stiffening and salt insensitivity”, *Phys. Rev. E* **104**,
014504 (2021).

D.R. Jacobson, T.T. Perkins, “Correcting molecular transition rates measured by
single-molecule force spectroscopy for limited temporal resolution”, *Phys.
Rev. E* **102**, 022402 (2020).

*Co-first
authors

H. Yu*, D.R. Jacobson*, H. Luo, T.T. Perkins, “Quantifying the native energetics stabilizing bacteriorhodopsin by single-molecule force spectroscopy”, *Phys. Rev. Lett.* **125**, 068102 (2020).

D.R. Jacobson, L. Uyetake, T.T. Perkins, “Membrane-protein unfolding intermediates detected with enhanced precision using a zigzag force ramp”, *Biophys. J.* **118**, 667–675 (2020).

D.R. Jacobson, D.B. McIntosh, M.J. Stevens, M. Rubinstein, O.A. Saleh, “Single-stranded nucleic acid elasticity arises from internal electrostatic tension”, *Proc. Natl. Acad. Sci. U.S.A.* **114**, 5095–5100 (2017).

D.R. Jacobson, O.A. Saleh, “Counting the ions surrounding nucleic acids”, *Nucleic Acids Res.* **45**, 1596–1605 (2017).

D.R. Jacobson, O.A. Saleh, “Magnetic tweezers force calibration for molecules that exhibit conformational switching”, *Rev. Sci. Instrum.* **87**, 094302 (2016).

D.R. Jacobson, O.A. Saleh, “Quantifying the ion atmosphere of unfolded, single-stranded nucleic acids using equilibrium dialysis and single-molecule methods”, *Nucleic Acids Res.* **44**, 3763-3771 (2016).

C.-Y. Park, D.R. Jacobson, D.T. Nguyen, S. Willardson, O.A. Saleh, “A thin permeable-membrane device for single-molecule manipulation”, *Rev. Sci. Instrum.* **87**, 014301 (2016).

D.R. Jacobson, O.A. Saleh, “Measuring the differential stoichiometry and energetics of ligand binding to macromolecules by single-molecule force spectroscopy: An extended theory”, *J. Phys. Chem. B* **119**, 1930-1938 (2015).

D.R. Jacobson, D.B. McIntosh, O.A. Saleh, “The snakelike chain character of unstructured RNA”, *Biophys. J.* **105**, 2569-2576 (2013).

J.L. Sievers, et al., “The Atacama Cosmology Telescope: Cosmological parameters from three seasons of data”, *J. Cosmol. Astropart. P.* **10**, 060 (2013).

L. Laureano-Perez, R. Collé, D.R. Jacobson, R. Fitzgerald, N.S. Kahn, I.J. Dmochowski, “A novel application for ²²²Rn emanation standards: Radon-cryptophane host chemistry”, *Appl. Radiat. Isotopes* **70**, 1997-2001 (2012).

*Co-first
authors

D.R. Jacobson*, N.S. Kahn*, R. Collé, R. Fitzgerald, L. Laureano-Pérez, Y. Bai, I.J. Dmochowski, “Measurement of radon and xenon binding to a cryptophane molecular host”, *Proc. Natl. Acad. Sci. U.S.A.* **108**, 10969-10973 (2011).

Research Talks:Invited:

- “Probing the energetics of single membrane proteins by atomic force microscopy” [Faculty candidate talk] (2021–2022)
 - School of Applied and Engineering Physics, Cornell University, Ithaca, NY
 - Department of Biochemistry and Molecular Biology, Rutgers Robert Wood Johnson Medical School, Piscataway, NJ
 - Department of Physics, Brown University, Providence, RI
 - Department of Chemistry, Clemson University, Clemson, SC
 - Department of Biological Chemistry, University of Michigan Medical School, Ann Arbor, MI
 - Thomas C. Jenkins Department of Biophysics, Johns Hopkins University, Baltimore, MD
 - Department of Chemistry, University of Kansas, Lawrence, KS
 - Department of Chemistry, University of Washington, Seattle, WA
 - Department of Physiology and Biophysics, Boston University School of Medicine, Boston, MA
- “Unfolding free-energy changes of membrane-protein point mutants measured by AFM”, Colorado Single Molecules and Membranes Meeting, Denver, CO (2020)
- “Single-stranded nucleic acid elasticity arises from internal electrostatic tension” [Award lecture], APS March Meeting, Los Angeles, CA (2018)

Contributed:

- “Measuring equilibrium unfolding free energy changes of membrane proteins by single-molecule force spectroscopy”, Protein Folding Dynamics Gordon Research Seminar, Ventura, CA (2022)
- “Quantifying the ion atmosphere of unfolded, single-stranded nucleic acids”, Biophysical Society Meeting, Los Angeles, CA (2016)
- “Using single-molecule ligand counting to quantify the ion atmosphere of nucleic acids”, International Chemical Congress of Pacific Basin Societies, Honolulu, HI (2015)

Teaching Experience:

Teaching assistant for three quarters of introductory physics lab (Phys. 4 and 6C, UCSB, 2011–2012)

Advised two undergraduate researchers in the lab of Prof. Omar Saleh (UCSB, 2013–2015) and two undergraduates and one high-school student in the lab of Prof. Thomas Perkins (JILA, 2017–2022)

Evidence-Based Introduction to Teaching Workshop (CU Boulder, July 23–27, 2018)

CIMER Entering Mentorship Workshop (JILA, July 7–9, 2020)

Professional Service:

Reviewer, National Science Foundation

Reviewer, *Biophysical Journal*
Nano Letters
Physical Review Letters

Physical Review E
Physical Review Research