William M. Jacobs

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Present Position

Assistant Professor of Chemistry, Princeton University 2019–present
Associated Faculty, Department of Chemical and Biological Engineering

Education

University of Cambridge 2010–2014
Ph.D. in Theoretical Chemistry

University of Virginia 2006–2010
B.S. with Highest Distinction
Majors: Physics and Engineering Science; Minor: Applied Mathematics

Training

Postdoctoral Fellow 2014–2019
Department of Chemistry and Chemical Biology, Harvard University
Adviser: Eugene Shakhnovich

Ph.D. Candidate 2010–2014
Department of Chemistry, University of Cambridge
Adviser: Daan Frenkel

Undergraduate Researcher 2009–2010
Computational Materials Group, University of Virginia
Adviser: Leonid Zhigilei

Visiting Researcher 2009
Aerodynamics Group, Technical University of Munich
Adviser: Christian Stemmer

Undergraduate Researcher 2007–2009
Center for Electrochemical Science and Engineering, University of Virginia
Adviser: Robert Kelly

Selected Honors

NSF CAREER Award 2021
NIH National Research Service Award (F32) Postdoctoral Fellow 2016–2018
Gates Cambridge Scholar 2010–2014
NSF Graduate Research Fellow 2010–2014
Edgar F. Shannon Award, University of Virginia 2010
Outstanding Physics Student Award, University of Virginia 2010
Barry M. Goldwater Scholar 2009–2010
Jefferson Scholar, University of Virginia 2006–2010
Rodman Scholar, University of Virginia 2006–2010
Micron Science and Technology Scholar 2006–2010

Publications

A. Hensley, W.M. Jacobs*, and W.B. Rogers*, "Self-assembly of photonic crystals by controlling the nucleation and growth of DNA-coated colloids," ***Proc. Natl. Acad. Sci. U.S.A.*** **119**, e2114050118 (2022).
(*Co-corresponding authors)

W.M. Jacobs, "Self-assembly of biomolecular condensates with shared components," ***Phys. Rev. Lett.*** **126**, 258101 (2021).
†Selected as a *PRL* Editors' Suggestion and highlighted in *APS Physics*.

A. Bitran, W.M. Jacobs, E.I. Shakhnovich, "Validation of DBFOLD: An efficient algorithm for computing folding pathways of complex proteins," ***PLoS Comp. Biol.*** **16**, e1008323 (2020).

V. Zhao, W.M. Jacobs, E.I. Shakhnovich, "Effect of protein structure on evolution of cotranslational folding," ***Biophys. J.*** **119**, 1123–1134 (2020).
†Selected by the editor for *Biophys. J.* New & Notable.

D.W. Sanders, ..., W.M. Jacobs, P. Ivanov, and C.P. Brangwynne, "Competing protein–RNA interaction networks control multiphase intracellular organization," ***Cell*** **181**, 306–324 (2020).

A. Bitran, W.M. Jacobs, X. Zhai, and E.I. Shakhnovich, "Co-translational folding allows misfolding-prone proteins to circumvent deep kinetic traps," ***Proc. Natl. Acad. Sci. U.S.A.*** **117**, 1485–1495 (2020).

W.M. Jacobs and E.I. Shakhnovich, "Accurate protein-folding transition-path statistics from a simple free-energy landscape," ***J. Phys. Chem. B*** **122**, 11126–11136 (2018).

M. Sajfutdinow, W.M. Jacobs, A. Reinhardt, C. Schneider, and D. Smith, "Direct observation and rational design of nucleation behavior in addressable self-assembly," ***Proc. Natl. Acad. Sci. U.S.A.*** **115**, E5877–E5886 (2018).

S. Bhattacharyya*, W.M. Jacobs*, B.V. Adkar, J. Yan, W. Zhang and E.I. Shakhnovich, "Accessibility of the Shine–Dalgarno sequence dictates N-terminal codon bias in *E. coli*," ***Mol. Cell*** **70**, 894–905 (2018). (*Equal contribution)

W.M. Jacobs and E.I. Shakhnovich, "Evidence of evolutionary selection for co-translational folding," ***Proc. Natl. Acad. Sci. U.S.A.*** **114**, 11434–11439 (2017).

W.M. Jacobs and D. Frenkel, "Phase transitions in biological systems with many components," ***Biophys. J.*** **112**, 683–691 (2017).
†Selected by the editor for *Biophys. J.* News & Views.

W.M. Jacobs and E.I. Shakhnovich, "Structure-based prediction of protein-folding transition paths," ***Biophys. J.*** **111**, 925–936 (2016).
†Selected by the editor for *Biophys. J.* News & Views.

W.M. Jacobs and D. Frenkel, "Self-assembly of structures with addressable complexity," ***J. Am. Chem. Soc.*** **138**, 2457–2467 (2016).

W.M. Jacobs, T.P.J. Knowles, and D. Frenkel, "Oligomers of heat-shock proteins: Structures that don't imply function," ***PLoS Comp. Biol.*** **12**, e1004756 (2016).

W.M. Jacobs and D. Frenkel, "Self-assembly protocol design for periodic multicomponent structures," ***Soft Matter*** **11**, 8930–8938 (2015).

W.M. Jacobs, A. Reinhardt, and D. Frenkel, "Rational design of self-assembly pathways for complex multicomponent structures," ***Proc. Natl. Acad. Sci. U.S.A.*** **112**, 6313–6318 (2015).

W.M. Jacobs, A. Reinhardt, and D. Frenkel, "Theoretical prediction of free-energy landscapes for complex self-assembly," ***J. Chem. Phys.*** **142**, 021101 (2015).

W.M. Jacobs, D.W. Oxtoby, and D. Frenkel, "Phase separation in solutions with specific and nonspecific interactions," ***J. Chem. Phys.*** **140**, 024108 (2014).
†Selected as a *JCP* Editors' Pick.

W.M. Jacobs and D. Frenkel, "Predicting phase behavior in multicomponent mixtures," ***J. Chem. Phys.*** **139**, 024108 (2013).

W.M. Jacobs, D.A. Nicholson, H. Zemmer, A.N. Volkov, and L.V. Zhigilei, "Acoustic energy dissipation and thermalization in carbon nanotubes: Atomistic modeling and mesoscopic description," ***Phys. Rev. B*** **86**, 165414 (2012).

Invited Talks

- ◇ APS March Meeting (Online, March 2021)
- ◇ Applied Math Seminar, Courant Institute, New York University, NY (December 2019)
- ◇ American Association of Crystal Growth and Epitaxy (Western Section) Conference, Fallen Leaf Lake, CA (June 2018)
- ◇ CECAM Workshop "Liquid–liquid Phase Separation in Cells," Lausanne, Switzerland (May 2018)
- ◇ Center for the Study of Complex Systems Seminar, University of Michigan, Ann Arbor, MI (January 2018)
- ◇ Chemistry Department Seminar, Princeton University, Princeton, NJ (January 2018)
- ◇ MRSEC Seminar, Brandeis University, Waltham, MA (April 2017)
- ◇ Center for Biological Physics Seminar, University of California, Los Angeles, CA (April 2017)
- ◇ Workshop "Self-assembly: From Atoms to Life," Tuxtla Gutierrez, Mexico (October 2016)
- ◇ James Franck Institute Seminar, University of Chicago, Chicago, IL (May 2016)
- ◇ Foundations of Nanoscience Conference, Salt Lake City, UT (*Keynote speaker*, April 2016)
- ◇ Gordon Research Conference on Protein-folding Dynamics, Galveston, TX (*Poster-prize speaker*, January 2016)
- ◇ Laboratory of Chemical Physics Seminar, National Institutes of Health, Bethesda, MD (April 2014)
- ◇ Chemistry Department Seminar, University of California, Berkeley, CA (April 2014)
- ◇ Physics Department Seminar, Brandeis University, Waltham, MA (April 2014)

Teaching

Princeton University:

- ◇ Topics in Physical Chemistry: Fluids In and Out of Equilibrium (graduate) 2021
- ◇ Phase Transformations in Materials: Theory and Simulation (graduate) 2020
- ◇ Adv. Physical Chemistry: Chemical Dynamics and Thermodynamics (undergraduate) 2020–2021
- ◇ Biophysical Chemistry I (graduate collaborative course) 2019

University of Cambridge (supervisions):

- ◇ Computational Methods in Theoretical Chemistry (graduate) 2013–2014
- ◇ Statistical Mechanics (undergraduate) 2011–2014
- ◇ Physical Chemistry, including quantum mechanics, molecular symmetry, thermodynamics and solid-state electronic structure (undergraduate) 2011–2013