

# Brian Koepnick

briankoepnick.com  
github.com/bkoepnick  
[bkoepnick@gmail.com](mailto:bkoepnick@gmail.com)  
919.271.9980

---

<b>Education</b>	<b>University of Washington</b> , Seattle, WA Ph.D. in Biochemistry, advised by David Baker	<b>April 2019</b>
	<b>Wake Forest University</b> , Winston-Salem, NC B.S. Biochemistry and Computer Science	<b>May 2012</b>
	<b>North Carolina School of Science and Math</b> , Durham, NC Competitive state high school	<b>June 2008</b>

---

<b>Research Experience</b>	<b>Research Scientist</b> , Institute for Protein Design, University of Washington Develop Foldit for design of complexes, protein binders, small-molecule binders Introduction of deep learning tools in Foldit software High throughput characterization of <i>de novo</i> designed proteins	<b>2019 – Present</b>
	<b>Ph.D. Graduate Student</b> , University of Washington (David Baker, Ph.D.) Development of Foldit game for protein design Analysis and characterization of <i>de novo</i> designed proteins by Foldit players	<b>2012 – 2019</b>
	<b>Lab Assistant</b> , Wake Forest University (Rebecca Alexander, Ph.D.) MD simulations of correlated motions in methionyl-tRNA synthetase Protein engineering and <i>in vitro</i> kinetics studies with radiolabeled <sup>35</sup> S-methionine	<b>2011 – 2012</b>
	<b>Research Intern</b> , NC Central University (Darlene Taylor, Ph.D.) Synthesis of small organic compounds (polyphenylene dimers) Characterization of organic compounds by LC/MS, IR, NMR spectroscopy Theoretical HOMO-LUMO band gap calculations	<b>2007 – 2008</b>

---

<b>Publications</b>	J. Dauparas, I. Anishchenko, N. Bennet, H. Bai, R.J. Ragotte, L.F. Milles, B.I. Wicky, A. Courbet, R.J. de Haas, N. Bethel, P.J.Y. Leung, T.F. Huddy, S. Pellock, D. Tischer, F. Chan, <b>Brian Koepnick</b> , H. Nguyen, A. Kang, B. Sankaran, A.K. Bera, N.P. King, D. Baker. <u><a href="#">Robust deep learning-based protein sequence design using ProteinMPNN</a></u> . <i>Science</i> <b>2022</b> .
	C. Norn, B.I.M. Wicky, D. Juergens, S. Liu, D. Kim, D. Tischer, <b>Brian Koepnick</b> , I. Anischenko, Foldit players, D. Baker, S. Ovchinnikov. <u><a href="#">Protein sequence design by conformational landscape optimization</a></u> . <i>PNAS</i> <b>2021</b> .
	<b>Brian Koepnick</b> , J. Flatten, T. Husain, A. Ford, D. Silva, M.J. Bick, A. Bauer, G. Liu, Y. Ishida, A. Boykov, R.D. Estep, S. Kleinfelter, T. Nørdgård-Solano, L. Wei, Foldit players, G.T. Montelione, F. DiMaio, Z. Popović, F. Khatib, S. Cooper, D. Baker. <u><a href="#">De novo protein design by citizen scientists</a></u> . <i>Nature</i> <b>2019</b> .
	F. Khatib, A. Desfosses, Foldit players, <b>Brian Koepnick</b> , J. Flatten, Z. Popovic, D. Baker, S. Cooper, I. Gutsche, S. Horowitz. <u><a href="#">Building de novo cryo-electron microscopy structures collaboratively with citizen scientists</a></u> . <i>PLoS Bio</i> <b>2019</b> .
	L. Dsilva, S. Mittal, <b>Brian Koepnick</b> , J. Flatten, S. Cooper, S. Horowitz. <u><a href="#">Creating custom Foldit puzzles for teaching biochemistry</a></u> . <i>Biochem. Mol. Biol. Educ.</i> <b>2019</b> .

Scott Horowitz\*, **Brian Koepnick\***, Raoul Martin\*, A. Tymieniecki, A.A Winburn, S. Cooper, J. Flatten, D.S. Rogawski, N.M. Koropatkin, T.T. Hailu, N. Jain, P. Koldewey, L.S. Ahlstrom, M.R. Chapman, A.P. Sikkema, M.A. Skiba, F.P. Maloney, F.R.M. Beinlich, Foldit players, University of Michigan students, Z. Popovic, D. Baker, F. Khatib, and J.C.A. Bardwell. Determining crystal structures through crowdsourcing and coursework. *Nature Communications* **2016**, 7, 12549.

**Brian D. Koepnick**, J.S. Lipscomb, D.K. Taylor. Effect of substitution on the optical properties and HOMO-LUMO gap of oligomeric polyphenylenes. *J. Phys. Chem. A* **2010**, 114, 13228-13233.

\*equal contributions

---

## Presentations

“Foldit and Citizen Scientists against COVID-19”

SACNAS Conference, October 22, 2020

ACSA Disaster Response Session, October 14, 2020

Virtual COVID-19 RosettaCon, April 20, 2020

NIH/NCI Citizen Science Seminar, April 13, 2020

“Foldit players design proteins” Talk at RosettaCon Meeting, August 9, 2018

Foldit demonstration with Mars, Inc. and ThermoFisher Scientific, Lindau Nobel Laureate Meeting, June 25-29, 2018

“Foldit: Solve Puzzles for Science!” Suds & Science Public Talk, ASBMB Annual Meeting 2014

“Foldit players design proteins” Poster at RosettaCon Meeting, annually 2013-22

“Allosteric mechanisms in methionyl-tRNA synthetase” Poster at Symposium on RNA Biology, RNA Society of North Carolina, October 21-22, 2011

---

## Awards & Fellowships

**NSF Graduate Research Fellowship**

**2014 – 2019**

Five-year fellowship with three years of funding for graduate research

**Hurd Fellowship**, University of Washington

**2012 – 2013**

One year of funding for graduate research

**Reynolds Scholarship**, Wake Forest University

**2008 – 2012**

Four-year “full-ride” academic merit scholarship

---

## Outreach

Online communications:

- Monthly [YouTube videos](#), “Foldit Lab Report” research updates
- Periodic [blog posts](#), discuss latest Foldit developments
- Periodic [Office Hours](#), live Q&A for Foldit players

Exhibitions:

- IUBMB Trainee Initiative Webinar, March 30, 2022
- Life Sciences Research Weekend/Curiosity Days at Pacific Science Center, Seattle, WA, annually 2013-18
- Shoreline Community College STEM Fair, annually 2015-17
- Bennett Elementary School Science Fair, annually 2014-16
- SciTech Northwest Expo, November 9, 2016
- Jane Addams Middle School STEAM Fair, June 14, 2016
- Hazel Wolf K-8 School Science Fair, April 21, 2016

- 
- Spiritridge School Science Fair, April 20, 2016
  - Bellevue STEM Career Conference, May 28, 2014
- 

## Skills

### *In silico:*

macOS, Linux, Windows  
C++, Python, Bash, Ruby on Rails, SQL, R  
Rosetta, PyRosetta, PHENIX, HKL2000, Coot, Chimera

### *In vitro:*

Cloning in *E. coli* and standard molecular biology  
Protein expression and purification, circular dichroism, bio-layer interferometry  
X-ray crystallography: sample prep, data processing, model building and refinement

### *In otio:*

Jazz piano, 20<sup>th</sup> century fiction, backpacking in the woods

---

## References

### **David Baker** (Ph.D. advisor)

Professor  
University of Washington, Department of Biochemistry  
[dabaker@uw.edu](mailto:dabaker@uw.edu)  
(206) 543-1295

### **Seth Cooper** (collaborator)

Associate Professor  
Northeastern University, College of Computer and Information Science  
[scooper@ccs.neu.edu](mailto:scooper@ccs.neu.edu)  
(617) 373-2339

### **Scott Horowitz** (collaborator)

Assistant Professor  
University of Denver, Department of Chemistry and Biochemistry  
[scott.horowitz@du.edu](mailto:scott.horowitz@du.edu)  
(303) 871-4326