

curriculum vitae of  
**Rachel C. Kurchin**

ASSISTANT RESEARCH PROFESSOR · CARNEGIE MELLON UNIVERSITY · MATERIALS SCIENCE AND ENGINEERING

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## EDUCATION

2014 – 2019	<b>Ph.D.</b> Materials Science and Engineering (GPA: 4.6/5.0) Thesis title: “Computational Frameworks to Enable Accelerated Development of Defect-Tolerant Photovoltaic Materials”	MASSACHUSETTS INSTITUTE OF TECHNOLOGY
2013 – 2014	<b>MPhil</b> Materials Science & Metallurgy (research-based)	UNIVERSITY OF CAMBRIDGE
2009 – 2013	<b>BS</b> Physics (Intensive) (GPA 3.9/4.0, magna cum laude)	YALE UNIVERSITY

## SELECTED PAST RESEARCH POSITIONS

2019 – 2022	<b>Postdoctoral Fellow</b> , Mechanical Engineering, advised by V. Viswanathan	CARNEGIE MELLON UNIVERSITY
2014 – 2019	<b>PhD student</b> , Materials Science and Engineering Advised by T. Buonassisi (Mechanical Engineering) (committee members V. Stevanović, B. Yildiz, J. Grossman)	MASSACHUSETTS INSTITUTE OF TECHNOLOGY
2016 – 2018	<b>Visiting student</b> , Solar Energy Research Facility Summer stays advised by V. Stevanović	NATIONAL RENEWABLE ENERGY LABORATORY
Summer 2012	<b>REU Student</b> , Renewable Energy MRSEC, advised by T. Furtak (Physics)	COLORADO SCHOOL OF MINES

## SELECTED HONORS

2023	Best Oral Presentation, Symposium EN10	MATERIALS RESEARCH SOCIETY FALL MEETING
2020	MolSSI Software Fellowship	MOLECULAR SCIENCES SOFTWARE INSTITUTE
	Rising Star in Computational and Data Sciences	ODEN INSTITUTE AT UT AUSTIN
2019	MFI Postdoctoral Fellowship	CMU MANUFACTURING FUTURES INSTITUTE
	Graduate Student Teaching Award	MIT DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING
	Graduate Student Teaching Award	MIT SCHOOL OF ENGINEERING
	CCE Symposium Poster Prize	MIT CENTER FOR COMPUTATIONAL ENGINEERING
2018	Materials Day Best Poster Award	MIT MATERIALS RESEARCH LABORATORY
2017	Blue Waters Graduate Fellowship	NATIONAL CENTER FOR SUPERCOMPUTING APPLICATIONS
2016	Total Energy Fellowship	MIT ENERGY INITIATIVE
2013	Gates Cambridge Scholarship	CAMBRIDGE GATES TRUST
	Howard L. Schulz Prize	YALE PHYSICS DEPARTMENT

## RESEARCH SOFTWARE DEVELOPMENT

2021 – present	<b>Co-Developer</b> , AtomsBase	<a href="#">GITHUB LINK</a>
2020 – present	<b>Lead Developer</b> , ElectrochemicalKinetics	<a href="#">GITHUB LINK</a>
2020 – present	<b>Lead Developer</b> , Chemellia	<a href="#">GITHUB LINK</a>
2017 – present	<b>Lead Developer</b> , Bayesim	<a href="#">GITHUB LINK</a>

## SELECTED PUBLICATIONS

For full list, see Google Scholar. Authors who equally contributed to a publication are marked with a †.

11. **R. C. Kurchin**, “Using Bayesian parameter estimation to learn more from data without black boxes”  
*Nat. Rev. Phys.* (2024)
10. **R. C. Kurchin** and V. Viswanathan. “Marcus-Hush-Chidsey kinetics at electrode-electrolyte interfaces.”  
*J. Chem. Phys.* 153, 134706 (2020)
9. **R. C. Kurchin** et al. “How much physics is in a current-voltage curve? Inferring defect properties from photovoltaic device measurements.” *IEEE JPV* 10, 1532–1537 (2020)
8. **R. C. Kurchin**, G. Romano, T. Buonassisi. “Bayesim: a tool for adaptive grid model fitting with Bayesian inference.” *Comp. Phys. Comm.* 239, 161–165 (2019)

7. **R. C. Kurchin**<sup>†</sup>, P. Gorai<sup>†</sup>, Tonio Buonassisi, Vladan Stevanović. “Structural and chemical features giving rise to defect tolerance of binary semiconductors.” *Chem. Mater.* **30**, 5583–5592 (2018)
6. R. E. Brandt, **R. C. Kurchin**, et al. “Rapid semiconductor device characterization through Bayesian parameter estimation.” *Joule* **1**, 843–856 (2017)
5. R. Hoyer, L. C. Lee, **R. C. Kurchin**, et al. “Strongly enhanced photovoltaic performance and defect physics of air-stable bismuth oxyiodide (BiOI)” *Adv. Mater.* **29**, 1702176 (2017)
4. J. R. Poindexter, R. Hoyer, L. Nienhaus, **R. C. Kurchin**, et al. “High tolerance to iron contamination in lead halide perovskite solar cells.” *ACS Nano* **11**, 7101–7109 (2017)
3. R. Hoyer, ..., **R. C. Kurchin**, et al. “Perovskite-inspired photovoltaics: best practices in materials characterization and calculations.” *Chem. Mater.* **29**, 1964–1988 (2016)
2. D. B. Needleman, J. R. Poindexter, **R. C. Kurchin**, et al. “Economically sustainable scaling of photovoltaics to meet climate targets.” *Energy Environ. Sci.* **9**, 2122–2129 (2016)
1. R. E. Brandt, **R. C. Kurchin**, R. Hoyer, et al. “Investigation of bismuth triiodide (BiI<sub>3</sub>) for photovoltaic applications.” *J. Phys. Chem. Lett.* **6**, 4297–4302 (2015)

## SELECTED INVITED TALKS

2024	<i>Materials Modeling: Bonding across Atoms, Code, and People</i> JuliaCon (keynote)	EINDHOVEN, THE NETHERLANDS
	<i>Using Computation to Accelerate Materials Engineering, from the Atomistic to Device Scale</i> IEEE Photovoltaic Specialists Conference (plenary)	SEATTLE, WA
	<i>Learning from Data and Distributions to Accelerate Engineering of Energy Materials and Devices</i> MRS Spring Meeting	SEATTLE, WA
2023	<i>It's All About That Bayes: Data-Driven Insights into Energy Devices without the Black Box</i> American Physical Society March Meeting	LAS VEGAS, NV
2022	<i>Design of Defect-Tolerant Materials for Photovoltaic Applications</i> American Physical Society March Meeting	CHICAGO, IL
2021	<i>Accelerating Energy Materials Discovery with Computation</i> Georgia Institute of Technology Department of Materials Science and Engineering	ATLANTA, GA
	<i>Accelerating Energy Materials Discovery with Computation</i> University of Illinois at Urbana-Champaign Department of Electrical & Computer Engineering	URBANA, IL
2019	<i>Bayesim Workshop</i> Helmholtz Institute for Renewable Energy	NUREMBERG, GERMANY (VIRTUAL)
2018	<i>Semiconductor Parameter Extraction (and more!) with Bayesian Inference</i> MIT Society of Industrial and Applied Mathematics	CAMBRIDGE, MA

## SELECTED SERVICE

### SCIENTIFIC PUBLICATIONS

2021 – present	<b>Editor</b> , Journal of Open-Source Software
2017 – present	<b>Reviewer</b> , various journals

### SELECTED LEADERSHIP AND UNIVERSITY SERVICE

2023 – present	<b>Member</b> , Undergraduate Education Committee	CMU MSE DEPARTMENT
2023 – present	<b>Member</b> , Open Science Advisory Board	CMU LIBRARIES
2022 – present	<b>Working Group Chair</b> , Notebooks Now! Initiative	AMERICAN GEOPHYSICAL UNION
2018 – 2019	<b>Co-President</b> , Womxn of Materials Science	MIT DMSE
2017	<b>Mentor</b> , Solar Spring Break (service trip)	MIT ENERGY INITIATIVE
2016 – 2019	<b>Member</b> , Energy Education Task Force	MIT ENERGY INITIATIVE
2016 – 2019	<b>Member</b> , Solar Test Bed Steering Committee	MIT OFFICE OF SUSTAINABILITY
2015 – 2017	<b>Co-Leader</b> , Solar/Grid Community	MIT ENERGY CLUB