

Colin G. West  
Curriculum Vitae  
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## EDUCATION

- 2016**      **Ph.D., C. N. Yang Institute for Theoretical Physics, Stony Brook University**  
“Applications of Tensor Network Algorithms in Quantum Many-Body Physics”
- 2010**      **B.S., University of Colorado at Boulder**  
Engineering Physics, Magna Cum Laude  
Applied Mathematics, Cum Laude

## UNIVERSITY TEACHING EXPERIENCE

- 2022- Present**    **University of Colorado at Boulder: Associate Teaching Professor**
- 2018-2022**    **University of Colorado at Boulder: Assistant Teaching Professor**  
Courses taught:  
General Physics I, physics for bioscience students  
General Physics II, physics for bioscience students  
General Physics I, physics for engineers  
General Physics II, physics for engineers  
Experimental Physics 1 (developed new “flipped classroom” video content)  
Experimental Physics 1 (remote, “CURE” version)  
Calculus 1 for Engineers (applied math dept)
- 2018**      **Front Range Community College at Westminster: Adjunct Professor**  
Planetary Astronomy
- 2016 – 2017**    **University of California at Santa Cruz: Postdoctoral Education Fellow**  
Physics 7: Elementary Physics I & II (Designed new flipped-classroom course)
- 2020**      **Physics 6b: Introductory Physics 2 (Remote)**
- 2010- 2016**    **Stony Brook University: Graduate Student Instructor and TA**  
Talking Science (Co-instructor, science communication course)  
Modern Physics  
Physics of Sports Lab (designed new lab sequence)  
Introductory Physics with Calculus I & II  
Physics for Life Sciences I & II

## **RESEARCH EXPERIENCE**

### **University of Colorado, Boulder**

2018-Present Currently affiliated with PER group: I am interested in interventions in large-lecture contexts and laboratory courses, including specific teaching methods and materials for teaching physics to life-science students and the role of authentic research in lab courses.  
Other research: applications of classical simulation techniques to entangled quantum systems, topological phases, and topological invariants

### **University of California, Santa Cruz**

2016-2018 HHMI Postdoctoral Fellow: designing new “active learning” introductory physics curriculum for bioscience students. Developing and assessing techniques to combat “stereotype threat” in STEM classrooms, and improved methods for TA teacher training.  
Physics research: Extending quantum simulation algorithms from ground-state physics to study quantum thermodynamic effects such as many-body localization.

### **C.N. Yang Institute for Theoretical Physics, Stony Brook University**

2012-2016 Research Assistant: Quantum information theory and many-body physics  
Developed computational algorithms for simulating interacting quantum systems.

### **University of Colorado, Boulder**

2006-2010 Undergraduate researcher: BaBar Collaboration and Fermilab E-906

## **PUBLICATIONS**

Werth, A., West, C. G., Sulaiman, N. And Lewandowski, H. J. (2023). Enhancing students' views of experimental physics through a course-based undergraduate research experience. *Physical Review Physics Education Research*, 19(2), 020151.

Mason, J. P., Werth, A., West, C. G., Youngblood, A., Woodraska, D. L., Peck, C. L., ... & Lewandowski, H. J. (2023). Coronal Heating as Determined by the Solar Flare Frequency Distribution Obtained by Aggregating Case Studies. *The Astrophysical Journal*, 948(2), 71.

West, C. G. (2023). Lessons for student interactions from the world of improvisational theater. *Phys. Teach.* 61, 246 (editor's suggested article)

Schumm, B., Ishii, J., and West, C. G. (2023) The Problem project: Assessment via invitation to directed creativity. *Phys. Teach.* 61, 292

Werth, A., Oliver, K., West, C. G., & Lewandowski, H. J. (2022). Assessing student engagement with teamwork in an online, large-enrollment course-based undergraduate research experience in physics. *Physical Review: Physics Education Research*, 18(2), 020128.

Werth, A., Oliver, K., West, C.G., & Lewandowski, H.J. (2022) Engagement in collaboration and teamwork using Google Colaboratory. *PERC Proceedings*

West, C.G., Honig, S.E., Lui, L., & Raschke, L. (2022). Integration of authentic STEM practices in real-world education and research environments. In S. Seagroves, A. Barnes, L. Hunter, A. Metevier, & J. Porter (Eds.), *Impact through inquiry: Twenty years of preparing leaders in effective and inclusive education at the Institute for Scientist & Engineer Educators*. UC Santa Cruz: Institute for Scientist & Engineer Educators.

Werth, Alexandra, West, C.G., and Lewandowski, H.J. (2022). Impacts on student learning, confidence, and affect in a remote, large-enrollment, course-based undergraduate research experience in physics. *Phys. Rev. Phys. Educ. Res.* 18, 010129

Lewandowski, H. J., Pollard, B., & West, C. G. (2020). Using custom interactive video prelab activities in a large introductory lab course. *PERC Proceedings*.

Prakash, A., West, C. G., & Wei, T. C. (2016). Detection of gapped phases of a one-dimensional spin chain with on-site and spatial symmetries. *Physical Review B*, 94(4), 045136.

West, C. G., Garcia-Saez, A., & Wei, T. C. (2015). Efficient evaluation of high-order moments and cumulants in tensor network states. *Physical Review B*, 92(11), 115103.

Bevan, A. J., et al. (BaBar Collaboration, including C.G. West)(2014) "The physics of the B factories." *The European Physical Journal C* 74.11: 3026.

Mueller, K., Vidal, A., Robbins, S., Golombek, M., & West, C. G. (2014) "Fault and fold growth of the Amenthes uplift: Implications for Late Noachian crustal rheology and heat flow on Mars." *Earth and Planetary Science Letters* 408: 100-109.

Aubert, B., et al. (BaBar Collaboration, including C. G. West) (2013) "The BaBar detector: upgrades, operation and performance." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 729: 615-701.

Damle, A. S., West, C. G., & Benzel, E. J. (2010) "Centroids, Clusters, and Crime: Anchoring the Geographic Profiles of Serial Criminals." *UMAP Journal*, 129 .

Aubert, B. et al (BaBar Collaboration, including C.G. West). (2008). "Observation of  $B^+ \rightarrow \eta \rho^+$  and search for  $B^0$  decays to  $\eta' \eta$ ,  $\eta \pi^0$ ,  $\eta' \pi^0$ , and  $\omega \pi^0$ " *Physical Review D* 78.1: 011107.

## **ACCEPTED PUBLICATIONS**

## **PUBLICATIONS UNDER REVIEW**

West, C. G. (2023) Apparent Advances in Conceptual Physics Reasoning in A Large Learning Model. Under review at *Phys Rev: PER*

## **PREPRINTS**

West, C. G. (2023). AI and the FCI: Can ChatGPT Project an Understanding of Introductory Physics?. *arXiv preprint arXiv:2303.01067*.

West, C. G., & Wei, T. C. (2020). Global and short-range entanglement properties in excited, many-body localized spin chains. *arXiv preprint arXiv:1809.04689*.

## **IN PREPARATION**

## **CONFERENCES AND PRESENTATIONS**

### **Presentations**

- 2023 STEM Teaching and Learning Center, UC Santa Cruz: “Why Teach Physics to Nonphysicists?” Invited Talk
- 2023 Partnership for Integration of Computation in Undergraduate Physics (PICUP) Invited Panelist: “Exploring the Intersection of Physics Education and AI: The Role of ChatGPT”
- 2022 Conference on Advancing Inclusive Leaders in STEM, Hilo HI  
“Integration of authentic STEM practices in real-world education and research environments”
- 2019 APS March Meeting, Boston MA  
“Global and Short-Range Entanglement Properties in Many-Body Localized Systems”
- 2017 HHMI UC-STEM Faculty Learning Community Annual Meeting  
“Strategies for active engagement in large lecture settings”
- 2017 UCSC STEM Collaboration Hour: “Forming and Facilitating Productive Student Groups in the Classroom”
- 2017 UC Santa Cruz Symposium on Assessment: “Assessing our Assessments: Do We Really Know What Our Students Know?”
- 2016 APS March Meeting, Baltimore, MD  
“Characterizing Gapped Phases of a 1D Spin Chain”
- 2015 APS March Meeting, San Antonio, TX  
“Evaluation of High-Order Moments and Cumulants in Quantum Spin Systems”
- 2014 APS March Meeting, Denver, CO  
“The Extended Haldane Phase in Bilinear-Biquadratic Spin-1 chains”

### **Invited Participation**

- 2017 Institute for Scientist and Engineer Educators: Professional Development Program

## **STUDENT ADVISING**

Honors Thesis committees: Grace Merritt (2019), Makinzie Hamilton, Alina Harmann (2020)  
Comps II committees: Yorick Andeweg (2023)  
Comps III committees: Alex Engel (2022), Gayle Geschwin(2022)  
Comps IV committees: Alex Engel (2023)

## **DEPARTMENTAL SERVICE**

2023	EIC organizing committee; Chair
2022-Present	Diversity and Climate Committee
2022-Present	EPEN Major Advising Committee
2022	EIC organizing committee; Chair
2021-Present	Saturday Physics Organizing Committee (chair)
2021-2022	CU-B Common Curriculum Planning Committee (A&S Representative)
2020	Summer session project to develop online labs for 1140 and 2150
2019-2021	Learning Assistant Organizing Committee
2019	Teaching Circles (faculty group for mutual support improving teaching techniques)
2019	Met with and successfully recruited two Boettcher Scholar prospective students
2018-2022	Physics Major Advising committee
2018-Present	“Equity, Inclusion, and Cookies” organizing committee Events run: Inclusive Mentorship (parts 1&2), Impostor Syndrome Metacognition Colorblind Racism Allyship Inclusive Hiring Practices Myth of Meritocracy Intersectionality “Strike for Black Lives” town hall DEI Organization meet-and-greet Understanding Privilege (parts 1 & 2) Equity in undergraduate research Inclusive Mentorship Training
2017	Co-designed and facilitated “CAISE (Creating Active and Inclusive Section Experiences): A Teaching Workshop for Graduate Students”
2017	Contributed a section on group work for the UCSC Graduate Division TA Manual
2016	Organizing member, UCSC STEM-Active Learning Speaker Series Committee
2016	Advised undergraduates pursuing top scholarships, including one Goldwater winner

## **OTHER PROFESSIONAL SERVICE**

2023-Present	Faculty director, Engineering Honors Program
2022-2023	Associate faculty director, Engineering Honors Program
2022-2023	Executive Committee, Center for Leadership, CU Boulder
2019	Co-authored five instructional videos on introductory physics to be published in the Journal of Video Experiments
2019-Present	Contributes and reviews passage sets for a national higher education entrance exam
2018	Reviewed NGSS testing items as part of the ASPIRE physics assessment research
2018	Peer reviewer for “College Physics, 3 <sup>rd</sup> ed” by Freedman et al
2018	Peer reviewer for to the Science Education Initiative (SEI) Handbook ( <a href="https://pressbooks.bccampus.ca/seihandbook/">https://pressbooks.bccampus.ca/seihandbook/</a> )
2018	Peer reviewer for “Communicating Science with the Public,” by CITI
2014-Present	Peer reviewer for various Journal publications in TPT and Phys Rev

## **OUTREACH ACTIVITIES**

### **CU Boulder Engineering Honors Program**

2022 Annual Breakfast Banquet: Keynote Speaker

### **CU Boulder Tau Beta Pi**

2021 Invited Panelist: “The Science of Interstellar”

### **CU Boulder Technology, Cybersecurity, and Policy Seminar**

2020 Invited talk: The Truth and Myth of Quantum Technologies

### **CU Boulder Boettcher Scholars**

2020 CU Boettcher Graduation Ceremony: Closing Remarks

2019 Alumni Seminar Series: “Cryptography in the Quantum Age”

### **CU Boulder LEAD 4000**

2020 Guest lecture: Leadership in Diverse Disciplines

### **Boettcher Foundation**

2019 Scholars’ Weekend: Keynote Presentation and Senior Seminar

### **CU Boulder APPM 4720/5720: Cryptosystems**

2019 Guest lecture: Shor’s Algorithm for Prime Factorization

### **CU Boulder Presidents’ Leadership Class**

2019 “Taste of PLC” recruitment event: Keynote Speaker

2019 Annual Alumni Lecture Event: Keynote Speaker

2018 Annual Junior Retreat: Keynote Speaker

### **CU Boulder Engineering Honors Program**

2018 Annual Breakfast Banquet: Keynote Speaker

### **CU Boulder “Saturday Physics” Series**

2023 “The C-PhLARE project: One Thousand Students vs the Paradox of the Sun”

2018 “The Physics of Keeping Secrets: A Look Inside the World of Quantum Encryption”

### **“Think About This!” YouTube Channel**

2016-2018 Short-form web videos about memorable science in our everyday lives

[YouTube.com/c/ThinkAboutThis](https://www.youtube.com/c/ThinkAboutThis)

### **UCSC Algebra Academy Day**

2017 Keynote speaker: “Math, Spies, and Theoretical Physics”

### **Alan Alda Center for Communicating Science**

2017 Science communication instructor, University of Nebraska workshop

2017 Science communication instructor, University of Utah workshop

2017 Science communication instructor, Utah State University workshop

- 2016 Webcast guest, “Quantum Mechanics and Theoretical Physics”
- 2015 Patchogue-Medford High School Career Day  
Guest lecture: “The Power of a Quantum Computer”
- 2014 Video Presentation: “2014 Nobel Prize in Physics”  
<https://vimeo.com/112136911>
- 2014 Video Presentation: “The Superhero in the Machine”  
<https://vimeo.com/97270987>
- 2014 Brentwood Senior High School  
Guest lecture: “The Power of a Quantum Computer”
- 2013 Assistant Trainer for Physics TA training initiative

#### **New York “CSTEP” Program**

- 2015 Created “Physics Activity Day” at Country Fair Entertainment Park

#### **Mount Sinai-Port Jefferson STEM Initiative**

- 2015 Guest lecture: “Journey to the Fourth Dimension”
- 2014 Guest lecture series: “Cryptography through Number Theory”

#### **Della Pietra High School Applied Math Program**

- 2015 Guest lecture: “Game Theory, Probability, and Poker!”
- 2014 Guest lecture series: “Cryptography through Number Theory”

#### **Mathematics Summer Camp, Stony Brook University**

- 2015 Guest lecture series “The Mathematics of Cracking Secret Codes”

#### **National Museum of Mathematics Enrichment Program**

- 2015 Guest lecture: “Journey to the 4<sup>th</sup> Dimension”

#### **Courant Institute “CSPLASH” Enrichment Program (NYU)**

- 2013 Guest lecture: “The Unbreakable Quantum Code”

#### **Graduate Council Lecture Series at Stony Brook University**

- 2011 Guest lecture: “Quantum Physics and Technology”

### **AWARDS AND RECOGNITION**

- 2022 Outstanding Teaching Award, Physics Department, CU Boulder
- 2022 Selected for participation in CU Boulder Online Teaching Academy, Feb 2022
- 2020 Selected for participation in CU Boulder Active Learning Academy, Oct 2020
- 2017 Inaugural Faculty Fellow at the UCSC Center for Innovation in Teaching and Learning
- 2016 NASA FameLab National Finalist  
Video: [https://www.youtube.com/watch?v=Fm\\_PvBhtYAA](https://www.youtube.com/watch?v=Fm_PvBhtYAA)
- 2015 NASA FameLab Regional Competition for science communication: 1<sup>st</sup> place

Video: <https://www.youtube.com/watch?v=qQwmUyB4dqA>  
<https://www.youtube.com/watch?v=k0E7taL6Hss>

- 2015 Stony Brook University Science Playwriting Competition: 3<sup>rd</sup> place  
Play title: “Counting Sheep” (available upon request)
- 2014 Stony Brook University Science Playwriting Competition: 1<sup>st</sup> place  
Play title: “Understanding” (available upon request)
- 2012 12<sup>th</sup> Canadian Summer School on Quantum Information Scholarship
- 2011 “Best in School” distinction for highest TA evaluations at Stony Brook University
- 2010 MAA Prize for best paper in mathematical modelling
- 2010 Mathematical Competition in Modeling: Outstanding Paper (highest distinction)
- 2006 Boettcher Scholarship (merit-based full ride to Colorado colleges and universities)

### **ADDITIONAL TEACHING EXPERIENCE**

**CSTEP Program** (NY program for underrepresented minorities in STEM fields)

- 2013, 2015 Intro to College Physics (Instructor and course designer; non-credit summer course)
- 2012-2015 Physics Workshop Instructor (weekly workshop on material from Physics I and II)

### **ADDITIONAL PEDAGOGICAL TRAINING**

- 2022 Online Teaching Academy, CU Boulder  
Completed training in best-practices for online courses
- 2020 Active Learning Academy, CU Boulder:  
Completed “Learning By Design” professional development course
- 2017 Institute for Scientist & Engineer Educators, Santa Cruz CA:  
Certificate in Inclusive Inquiry STEM Education



## **REFERENCES**

### **Michael Dubson**

Teaching Professor, Associate Chair  
Department of Physics  
University of Colorado at Boulder  
390 UCB  
Boulder, CO 80309-0390  
Tel: (303) 492-4938  
[Michael.Dubson@colorado.edu](mailto:Michael.Dubson@colorado.edu)

### **Joshua Deutsch**

Professor  
Department of Physics  
University of California at Santa Cruz  
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Santa Cruz, CA 95064  
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### **Manny Ares**

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### **Tzu-Chieh Wei**

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### **Elizabeth Bass**

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