ALEX KINSELLA

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Research Interests

Intraseasonal oscillations of the Indian monsoon, tropical air-sea interaction, biological-physical interaction, three-dimensional watermass subduction pathways

Academic Appointments

2021-Present **Woods Hole Oceanographic Institution**
Postdoctoral Investigator, Mahadevan Group

Education

2015-21 **UC Santa Barbara**
Ph.D. Physics, June 2021
Advisor: David R. Morrison
Dissertation Title: M-Theory and Heterotic String Theory on Special Holonomy Fibrations
M.A. Physics, May 2018

2011-15 **Stanford University**
B.S. Mathematics and Physics (with distinction and physics departmental honors)
Honors Thesis Advisor: Sean Hartnoll
Honors Thesis Title: No Negative Modes About the Axionic Wormhole Instanton
Six quarters of geophysics research in earthquake propagation modeling and observation, mentored by Professors Eric Dunham and Simon Klemperer

Publications

Author ordering in high energy theoretical physics is alphabetical by last name

In prep. A. Kinsella, A. Fisher, and N. Nidzieko. "Koopman Mode Decomposition of Ocean and Atmosphere Model Data in the Santa Barbara Channel." In prep. for *Geophysical Research Letters.*

Accepted B. Acharya, A. Kinsella, and D. Morrison. "Non-Perturbative Heterotic Duals of M-Theory on G_2 Orbifolds." Accepted by *Journal of High Energy Physics.* https://arxiv.org/abs/2106.03886

2021 B. Acharya, A. Kinsella, and E. Eik Svanes. "T^3-invariant heterotic Hull-Strominger solutions." *Journal of High Energy Physics.* doi.org/10.1007/JHEP01(2021)197

2018 S. B. Giddings and A. Kinsella. "Gauge-invariant observables, gravitational dressings, and holography in AdS." *Journal of High Energy Physics.* doi.org/10.1007/JHEP11(2018)074

Grants, Fellowships, and Awards

2020-21 UC Santa Barbara National Science Foundation Extension Fellowship ($24,000)

2017-21 Simons Collaboration on Special Holonomy in Geometry, Analysis, and Physics
Multi-year research stipend and travel funding for international conferences

2015-20 National Science Foundation Graduate Research Fellowship ($102,000)

2015 Award for Excellence in Honors Thesis Presentation, Stanford Oral Communication Program ($350)

2013 Stanford Vice Provost for Undergraduate Education Major Grant ($6,000)
To support research on the effect of fault roughness on radiation patterns of earthquakes

2012 Best Poster Presentation, Stanford Earth Science Undergraduate Research Program

2010 Manson Scholar, The Bay School of San Francisco
Awarded by the faculty and administration for intellectual merit, commitment to the school's values, and leadership in the school community. Included a full four-year college scholarship.

Selected Presentations

2021 **Freshwater Feedbacks on the Indian Monsoon**. Talk at the WHOI Postdoc Symposium, November 2021

2021 **Freshwater Feedbacks on the Indian Monsoon**. Talk at the MISO-BoB Annual PI Meeting, November 2021

2021 **A Journey from String Theory to Oceanography**. Invited talk at Sonoma State University *What Physicists Do* Seminar, November 2021

2021 **String Theory, the Biological Pump, and Modes of the Santa Barbara Channel**. Invited talk at the Mahadevan Lab Group Meeting, January 2021

2019 **Heterotic Duals of M-Theory on Joyce Orbifolds**. Talk at the Simons Collaboration Meeting on *Physics and Special Holonomy*, Kavli Institute for Theoretical Physics, April 2019

2017 **Diffeomorphism-Invariant Bulk Observables in AdS**. Talk at Pacific Coast Gravity Meeting, UC Santa Barbara, March 2017

2013 **Fully Coupled Models of (Idealized) Buildings and Seismic Waves from Earthquakes**. Poster at 2013 Southern California Earthquake Center Annual Meeting, Palm Springs, CA

2012 **Rapid Lateral Variation of Seismic Anisotropy in the Salton Trough, Southern California**. Poster at 2012 American Geophysical Union Fall Meeting, San Francisco, CA

2016-20 UCSB Internal Seminars
Physics of the Ocean and Climate, May 2020
Seiberg-Witten Theory and 4-Manifolds, February 2019
The Supersymmetric Proof of the Index Theorem, May 2018
The Category of Topological B-Branes, February 2018
BRST, Gauge Theory, and Cohomological Field Theory, January 2018
The Kodaira Embedding Theorem, November 2017
Mirror Symmetry for G_2 Manifolds from Dual Tops, November 2017
D-Branes and Matrix Theory, October 2017
The A- and B-Model Topological Field Theories, May 2017
The Virasoro Algebra, January 2017
Lattice Gauge Theories, October 2016

Teaching and Mentorship Experience

2019-20 **Teaching assistant**, UC Santa Barbara Physics Department
Physics 219: Statistical Mechanics (Winter 2020)
Physics 210A: Electricity and Magnetism (Winter 2020)
Physics 101: Complex Analysis (Spring 2019)

2015 **Residential counselor**, Stanford Pre-Collegiate Studies
Ten week program in which I tutored high school students in special relativity, quantum mechanics, and number theory

2014-15 **Tutor**, Stanford University Mathematics Organization
Linear algebra, multivariable calculus, and differential equations

2013 **Counselor,** Women in Physics Program, Stanford Society of Physics Students
Events for freshman women interested in physics and physics demonstrations for local Girl Scouts

Service

2021-Present Co-Organizer of the WHOI Monthly Monsoon Meeting

2019-20 Organizer of the UC Santa Barbara High Energy Grad Seminar

2017-18 Co-Organizer of the UC Santa Barbara Mathematical Physics Seminar

Skills

Extensive graduate-level coursework in oceanography, physics, and mathematics
Relevant graduate-level coursework for oceanography: physical oceanography, ocean-atmosphere dynamics, ocean modeling, biogeochemistry, numerical methods, climate modeling, chemical oceanography, geological oceanography, fluid mechanics, computational fluid dynamics, seismology

Experience with numerical model operation and output: ocean circulation inverse models, Regional Ocean Modeling System (ROMS), CESM, earthquake propagation modeling

Experience with retrieving and analyzing large datasets: North American Mesoscale Forecast System (NAM), World Ocean Atlas (WOA), Global Ocean Data Analysis Project for Carbon (GLODAP), National Data Buoy Center (NDBC), Estimating the Circulation and Climate of the Ocean (ECCO)

Experience with geophysical data analysis: time series analysis, spectral methods, mode decompositions, earthquake moment tensor solutions

Proficiency in Matlab, Mathematica, Python. Experience with Java, Fortran.

Memberships

2017-21 Simons Collaboration for Special Holonomy in Geometry, Analysis, and Physics

Association for the Sciences of Limnology and Oceanography (ASLO)

American Physical Society (APS)

American Geophysical Union (AGU)

Broader Interests and Activities

Birdwatching
Member of National Audubon Society, Santa Barbara Audubon Society, Mass Audubon, Native Plant Trust

Men's artistic gymnastics
Former member of UC Santa Barbara Gymnastics Club and National Intercollegiate Association of Gymnastics Clubs

Backpacking and hiking
Completed Wilderness First Responder certification and a 23-day outdoor leadership course