Brian Hill

DEEP SPRINGS COLLEGE

250 Deep Springs Ranch Road, Highway 168, Big Pine, CA 93513

Curriculum Vitae

EDUCATION

Harvard University

Doctor of Philosophy (Ph.D.), Theoretical Physics, 1988.

University of Washington

Bachelor of Science (B.Sc.), Physics, 1982, *summa cum laude*.

EXPERIENCE

Herbert Reich Chair of Natural Science, Deep Springs College, July 2020 - Present

In addition to regular science chair duties, I am engaged in designing and building the [Deep Springs Observatory](). Ground was broken in October, 2020, and the observatory went into service for the Term 5 Observational Astronomy course held in March and April of 2022, even as many construction details remain to be completed.

Courses Taught:

Astronomy

The Cosmos: A Survey of Modern Astronomy
Observational Astronomy

Mathematics

Differential Equations (Independent Study)
Heavenly Mathematics
Mathematical Analysis: The Foundation of Calculus

Physics

History and Science of the Manhattan Project
Quantum Mechanics (Independent Study)
The Special Theory of Relativity

Technology

Cryptography: Algorithms and History
Introduction to Computer Science (based on Harvard CS50x)
Modeling, Simulation, and Rendering in Processing
Technological MacGyvering with the Arduino Microprocessor

Assistant Professor at Saint Mary's College of California, Feb. 2015 - June 2020

Adjunct Assistant Professor, and then—as of July, 2017—Assistant Professor in the Department of Physics & Astronomy. In addition to all typical physics faculty member duties, I ran the [Geissberger Observatory](#).

Courses Taught:

Physics 1, Introduction to Physics I
Physics 3, Introduction to Physics II
Physics 60, Modern Physics (Special Relativity, Statistical Mechanics, and Quantum Mechanics)
Physics 90, Introduction to Astronomy
Physics 125, Quantum Mechanics
Physics 170, Astrophysics
Physics 185, Observational Astronomy
MA/CS 190, Mobile Software Development (iOS Programming in Swift)
MA/CS 197, Cloud Software (Google App Engine Programming in Python)
Seminar 1, Critical Strategies and Great Questions

Independent Consultant, Jan. 2010 - Mar. 2017

For the Pesticide Research Institute (PRI), set up and performed statistical analysis on beehive strength (population of bees in hive) as a function of pesticide concentrations. The analysis is designed to determine correlations (or lack thereof) between bee colony collapse and specific pesticides. Authored an iOS app that showcases the PRI's proprietary pesticide toxicity database. As an independent consultant to InsideView, was the Product Owner for the API Team. Analyzed business requirements. Worked with development team to specify and design the product. Decomposed the requirements into a series of agile development deliverables. Delivered a successful, timely and on-budget product. As an independent consultant to New Energy Risk, created software models for estimating solar plant performance. Concurrently, in other independent consulting projects: Created the "watts up, mac?" Mac OS X desktop application for Lawrence Berkeley Laboratory. The application controls a device that measures electrical power consumption and uploads acquired data to their servers. For the Pesticide Action Network, performed multiple enhancements and updates of whatsonmyfood.org, pesticideinfo.org, and the "What's on my Food?" iPhone app.

Adjunct Professor at Los Medanos College, June 2015 - July 2015

Adjunct Professor for Astro 10 (Introduction to Astronomy), Summer Term, 2015, Los Medanos College, Brentwood campus.

Senior Platform Engineer at Getaround, Mar. 2012 - Jan. 2014

Developed an entirely new REST API to serve the company's second-generation iOS application. For the marketing and finance teams, developed map-reduce functionality to extract critical growth, operations and financial information. For the fleet management and customer service teams, developed operations-facing (administrative) functionality. Led the process of improving quality. Set up Sentry and Campfire for continuous monitoring of server health. Standardized engineering's Python development environment to enable quick ramp-up of new engineers and reproducible continuous integration results.

Staff Scientist at the Pesticide Action Network, June 2004 - Nov. 2009

Primary technical responsibility for www.pesticideinfo.org, the most comprehensive publicly-accessible compilation of pesticide use and toxicity information available. Also developed the Air and Pesticides Information Center (AirPIC), www.pesticideinfo.org/airpic, and "What's On My Food?" www.whatsonmyfood.org (also an iPhone app), which showcases PAN's database joining USDA data on pesticides in food with toxicity data. As a manager at the Pesticide Action Network ran both the small and productive Science Department and the cross-functional team that focused on pesticide drift issues. Responsible for tracking and critiquing the development of the U.S. Environmental Protection Agency (EPA) policy on fumigants in order to improve its outcome, and a variety of other scientific and regulatory issues.

Physics Teacher at the Athenian School, March 2004 - June 2004

Taught Physics without Calculus to sophomores and juniors. This was a substitute position for the final three months of the academic year.

Software Developer at Lawrence Berkeley Laboratory, Feb. 2004 - May 2004

Was the lead responsible for overhauling and enhancing the currentenergy.lbl.gov website which tied together load data from multiple CAISO's into a unified website. In a separate project, I modeled combined simulations of electrical load and weather data on electricity demand in California.

Sr. Software Engineer and Team Lead at NextBus, Inc., Mar. 2001 - Feb. 2004

Responsible for the software that displays vehicle arrival predictions and positions graphically in near real- time to waiting riders and web users. Conceived and implemented the company's history replay application. Created the company's NextStop product prototype, a passenger-facing display for announcing the vehicle's next stop. Did the design and led the team that put

together the winning bid for a major contract with the Chicago RTA. The Chicago project integrated multiple systems, web services, driver logins and schedule data from two transit agencies.

Sr. Software Engineer and Team Lead at DigitalThink Inc, Dec. 1999 - Feb. 2001

Led the development team that performed the internationalization of the DigitalThink course delivery system. The system is a two-tier web application with a Sybase database and course content being served through JSP's. Managed a lean team of three developers for internationalization, simultaneously did substantial implementation, and was the primary point of contact for the DB and QA teams. This was a strategic and successful effort touching every piece of a high-volume, production web application.

Sr. Software Engineer at Apple, Dec. 1996 - Dec. 1999

As the AppKit team's member of the group that brought up OS X, repeatedly identified critical path issues and resolved them or worked with other leads to get them resolved. Was also responsible for several components of the AppKit in the application services layer, including: the copy-and-paste system, distributed notifications and the drag-and-drop implementation. Implemented the communication interfaces between the components of the desktop, workspace and the pasteboard system.

Quality Engineer and Engineering Manager at NeXT Computer, July 1994 - Dec. 1996

Member of the team that developed the OpenStep Compliance Test Suite. This is an automated test suite designed to test ports of OpenStep to other platforms. Using automation techniques, we created tens of thousands of test cases covering the entire OpenStep API. Advanced to Quality Engineering Manager for automated tests with responsibility for the quality of the Enterprise Objects, Web Objects, and Distributed Objects products as well as the OpenStep API. Recruited and managed a lean team that oversaw QA for all these technologies as they were moving from engineering alphas to flagship product releases.

Postdoctoral Researcher at the UCLA Department of Physics, Sept. 1991 - June 1994

Continued to do research in quantum field theory, building on what I did at Fermilab. A complete list of publications is below.

Postdoctoral Researcher at Fermi National Accelerator Laboratory, July 1988 - Aug. 1991

Researcher in theoretical physics. A complete list of publications is below.

PUBLICATIONS

Books

Quantum Field Theory: Lectures of Sidney Coleman

Co-editors: Bryan Gin-ge Chen, David Derbes, David Griffiths, Brian Hill, Richard Sohn, Yuan-Sen Ting.

World Scientific, December, 2018.

Description: The motivation in creating a book from all the extant sources, is to ensure that Sidney's thinking and teaching style will be passed on to later generations. This book aims to be the record of his approach that he was too busy and too much of a perfectionist to leave himself.

Website: http://www.worldscientific.com/worldscibooks/10.1142/9371.

Papers While a Post-Doctoral Researcher at UCLA

Tadpole improved perturbation theory for heavy-light lattice operators, Oscar F. Hernandez (Montreal U.), Brian R. Hill (UCLA), Phys.Rev. D50 (1994) 495-500.

Masses and decay constants of heavy-light mesons using the multistate smearing technique, Anthony Duncan (Pittsburgh U.), Estia Eichten (Fermilab), Jonathan M. Flynn (Southampton U.), Brian R. Hill (UCLA), Hank Thacker (Virginia U.), Nucl.Phys.Proc.Suppl. 34 (1994) 444-452.

Properties of low lying heavy-light mesons, Anthony Duncan (Pittsburgh U.), Estia Eichten, Aida X. El-Khadra (Fermilab), Jonathan M. Flynn (Southampton U.), Brian R. Hill (UCLA), Hank Thacker (Virginia U.), Nucl.Phys.Proc.Suppl. 30 (1993) 433-440.

Improved heavy quark effective theory currents, Oscar F. Hernandez (McGill U.), Brian R. Hill (UCLA), Phys.Lett. B289 (1992) 417-422.

Point split lattice operators for B decays, Oscar F. Hernandez (McGill U.), Brian R. Hill (UCLA), Phys.Lett. B280 (1992) 91-96.

Papers While a Post-Doctoral Researcher at Fermilab

B - B* splitting: A Test of heavy quark methods, Jonathan M. Flynn, Brian R. Hill (Fermilab), Phys.Lett. B264 (1991) 173-177.

Renormalization of four fermion operators determining B anti-B mixing on the lattice, Jonathan M. Flynn (Santa Barbara, KITP), Oscar F. Hernandez (Wisconsin U., Madison), Brian R. Hill (Santa Barbara, KITP), Phys.Rev. D43 (1991) 3709-3714.

Heavy meson decay constants: 1/m corrections, Mitchell Golden (Boston U.), Brian R. Hill (Fermilab), Phys.Lett. B254 (1991) 225-230.

Continuum results for the determination of heavy meson decay constants, Brian R. Hill (Santa Barbara, KITP & Fermilab), Nucl.Phys.Proc.Suppl. 20 (1991) 498-499.

Static Effective Field Theory: 1/m Corrections, Estia Eichten, Brian R. Hill (Fermilab), Phys.Lett. B243 (1990) 427-431.

Renormalization of Heavy - Light Bilinears and F_B for Wilson Fermions, Estia Eichten, Brian R. Hill (Fermilab), Phys.Lett. B240 (1990) 193.

The Static Approximation, Staggered Fermions and F_B, Oscar F. Hernandez (Wisconsin U., Madison), Brian R. Hill (Fermilab), Phys.Lett. B237 (1990) 95.

An Effective Field Theory for the Calculation of Matrix Elements Involving Heavy Quarks, Estia Eichten, Brian R. Hill (Fermilab), Phys.Lett. B234 (1990) 511.

Papers While a Graduate Student at Harvard

Thesis: *Model Quantum Field Theories*, Brian R. Hill (Harvard U.). May 1988.

Angular Distribution of Hadrons in Two Jet Events, Brian R. Hill (Harvard U.). Phys.Lett. B214 (1988) 157.

On Chiral Symmetry Breakdown In A Lattice Theory Of Fermions, Brian R. Hill (Harvard U.), Phys.Lett. B199 (1987) 262.

K Balls in the Chiral Lagrangian, Jacques Distler, Brian R. Hill, Donald Spector (Harvard U.), Phys.Lett. B182 (1986) 71.

A Comment on Disordered Fermion Couplings and the Fermion Doubling Problem, Oscar F. Hernandez, Brian R. Hill (Harvard U.), Phys.Lett. B178 (1986) 405-408.

No More Corrections to the Topological Mass Term in QED in Three-Dimensions, Sidney R. Coleman, Brian R. Hill (Harvard U.), Phys.Lett. B159 (1985) 184.

PRESENTATIONS

Exoplanet Observing, 2020 offering of a workshop for the American Association of Variable Star Observers, November 9th to December 11th, 2020 (see listing below)

Exoplanet Observing, leader of a workshop for the American Association of Variable Star Observers (AAVSO) Caroline Hurless Online Institute for Continuing Education (CHOICE), November 4th to December 6th, 2019 (2019 CHOICE catalog)

Exoplanet Detection with Small Telescopes at Deep Springs (Slide Deck Part I and Part II) Presentation to the Deep Springs Community, October 13, 2019

Student poster: *Telescope Rehabilitation and Exoplanet Confirmation: Data Analysis in the TESS Follow-Up Observing Program,* by 2019 Summer Research Program (SRP) participant Connor Martin (Poster), Saint Mary's College, School of Science, SRP poster session, October 5th, 2019

Stepping Stones to TFOP, with Ariana Hofelmann (YouTube, Slide Deck), AAVSO 2018 Annual Meeting, Flagstaff, AZ, November 16th, 2018

Student poster: *Astrophotometry of Eclipsing Binaries and Exoplanets at the Saint Mary's College Geissberger Observatory,* by 2018 Summer Research Program (SRP) participant Ariana Hofelmann (Poster), Saint Mary's College, School of Science, SRP poster session, September 29th, 2018

The Great American Eclipse of 2017 (Slide Deck), SIR Branch 146 Luncheon, July 13th, 2017

Time Series in the AAVSO Database (Poster), Joint SAS/AAVSO Conference, June 15th, 2017

Launching a Variable-Star Observing Program at the Geissberger Observatory (Slide Deck), Saint Mary's College of California, February 22nd, 2017