Jonathan Guiang

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Skills

- **Languages:** Python, C++, Javascript, Matlab
- **Technologies:** Pytorch, Tensorflow, Keras, XGBoost, Pandas, Numpy, Docker, Kubernetes, React, JQuery, Flask, FastAPI, Spark SQL, HTML, CSS, PHP, LaTeX, Mathematica, Git, OpenSCAD, ROOT, Slurm, Hadoop, HTCondor

Education

University of California, San Diego — San Diego, CA
PhD. in Physics, M.S. in Physics — *2019 - Present*

University of California, Santa Barbara — Santa Barbara, CA
B.S. in Physics — *2015 - 2019*

Professional Development

- SREB Institute on Teaching and Mentoring. Tampa, FL, Oct. 2023
- SLAC Summer Institute: Machine Learning Across the Frontiers. Stanford, CA, Aug. 2023

Experience

Würthwein-Yagil Group — San Diego, CA
Graduate Student Researcher — *2020 - Present*

- **VBS Higgs analyses**
  - Performed a variety of searches for anomalous Higgs boson couplings via the production of a Higgs and vector boson(s) by vector boson scattering.
  - Wrote performant C++ analysis code to down-select petabytes of CMS proton-proton collision data to the megabytes relevant to analysis.
  - Leveraged Python-based data science tools to turn that data into physics insights.
  - Synthesized results into technical presentations and scientific publications (in preparation) presented to an international audience of peers.
- **Particle tracking ML**
  - Explored and implemented machine learning (DNNs, GNNs) solutions for resolving particle tracks out of massive point clouds with large-throughput and high-efficiency.
  - Designed ML training pipeline, compared performance against existing track quality selections, and successfully incorporated ML into a highly parallelizable prototype.
- **US-CMS Tier 2 Data Manager**
  - Helped manage 3 petabytes of CMS data stored at the UCSD Tier 2 computing facility which services thousands of scientists.
  - Assisted in transfer of this data to a new system.
- **Rucio-SENSE Interoperation**
  - Pioneered the interoperation of exascale software-defined networking (SENSE) with the data management software (Rucio) used at the LHC.
  - Prototyped keystone software in Python for Rucio-SENSE interoperation.
  - Deployed project testbed via Kubernetes.
- **XRootD HTTPS Benchmarking**
  - Helped benchmark XRootD file-transfer performance when using HTTPS in order to show that it can provide the 500 Gb/s transfer speeds needed for the HL-LHC.

Google Summer of Code — San Diego, CA
Student Developer — *Summer 2019*

- **CMS Data Access**
  - Produced a set of tools for ingressing and analyzing US-CMS cache access data

Campagnari Group Santa Barbara, CA
Undergraduate Student Researcher *2016 - 2019*
- **Rare Higgs decay analysis**
  - Rare Higgs decays measurement, where anomalous rates would imply new physics.
- **MIP Timing Detector (MTD)**
  - Developed a tunable OpenSCAD 3D model of the MTD for optimizing its design, cost, and efficiency towards its construction for the HL-LHC.
- **AutoDQM**
  - Conceptualized, designed, and implemented a statistical tool for data quality management with an online graphical interface for ease of use.
- **MilliQan**
  - Characterized the single-photoelectron (SPE) response of photomultiplier tubes used in the "MilliQan" experiment demonstrator.
  - Developed software for simulating SPE responses.

Projects
- **RAPIDO** [github]
  - C++ framework for performing LHC data analysis.
- **NBC 7 Investigates** [article]
  - Analyzed police employment data for the entire state of California for an *NBC 7 Investigates* article reporting on the outflux of San Diego police officers.
- **Radiology ML** [github]
  - Completed preliminary work towards developing convolutional deep-learning algorithms for analyzing CT scans of Covid-19 pneumonia and lung cancer towards clinical utility in collaboration with UCSD radiologists.
- **Integratable** [github][website]
  - A public tool that provides useful integrals on an interactive, modern platform.
  - Uses a React-based frontend, evaluates known definite integrals and plots solutions.
- **Personal website** [github][website]
  - Simple website built using React and deployed on github pages.
  - Used Font Awesome/Bootstrap assets and react-pose animations.
- **ChompChap** [github][website]
  - Made for the SB Hacks V Hackathon and selected as one of the top six projects.
  - Made intelligent restaurant suggestions based on subconscious user preference.

Community
- **EXPAND Co-founder/Coordinator** [website]
  - Co-founded a novel fusion of a mentorship program and undergrad research experience targeted specifically at students with little-to-no prior experience.
  - Grew program from inception to being one of the main mentorship efforts for the UCSD Student Success Center.
- **ENLACE Mentor** [website]
  - Mentored two high school students (2022) and two undergrads (2023) from Mexico.
  - Program aims to encourage the participation of high school students, university students, and researchers/teachers, in research in the sciences and engineering.
- **Physics Graduate Council Representative**
  - Served as a 2020-21 volunteer representative.
  - Worked with PGC chairpersons to better organize an ongoing graduate student diversity initiative. Sat on the department's Climate Committee.

Mentorship
- **Alejandro Dennis Hernandez:** ML for particle tracking (ENLACE 2023-24)
- **Abraham Flores Azcona:** ML for particle tracking (ENLACE 2023-24)

- **Yuntong (Joy) Zhou:** VBS VVH analysis (2022-23) → *now at Carnegie Mellon*
- **Diego Tristan Flores King:** Rucio-SENSE simulation (ENLACE 2021-22)
- **Victor Vázquez Espinoza:** Rucio-SENSE simulation (ENLACE 2021-22) → *now at UPenn*
- **Henry Timmerman:** Rucio-SENSE simulation (Summer, 2021-22) → *now at UChicago*
- **Daniela Garcia:** Characterizing NanoAOD read latency (EXPAND 2020-21)
- **David Rovira:** Characterizing NanoAOD read latency (EXPAND 2020-21)
- **Aashay Arora:** VBS WWH same-sign analysis for senior thesis (2020-21) → *now at UCSD*

Teaching
- **PHYS 12:** TA for non-major course on energy and the environment. (Fall, 2019-20)
- **PHYS 1AL:** TA for introductory mechanics laboratory. (Winter, 2019-20)

Honors and Awards
- Alfred P. Sloan Minority Ph.D. Scholar (2019)
- UCSB Research Excellence Award (2019)
- UCSB Distinction in the Major (2019)
- UCSB Highest Academic Honors (2019)

Publications
- F. Wurthwein, J. Guiang, et. al., *Managed network services for exascale data movement across large global scientific collaborations*, in *2022 4th Annual Workshop on Extreme-scale Experiment-in-the-Loop Computing (XLOOP)*, (Los Alamitos, CA, USA), pp. 16–19, IEEE Computer Society, November, 2022.
- J. Guiang et. al., *Integrating end-to-end exascale SDN into the LHC data distribution cyberinfrastructure*, in *Practice and Experience in Advanced Research Computing*, PEARC '22, (New York, NY, USA), Association for Computing Machinery, 2022.
- E. Fajardo et. al., *Moving the California distributed CMS XCache from bare metal into containers using Kubernetes*, *EPJ Web Conf.* **245** (2020) 04042.
- A. Ball et. al., *Search for millicharged particles in proton-proton collisions at √13 TeV*, *Physical Review D* **102** (Aug, 2020).

Presentations
- *Improving Tracking Algorithms with ML: A case for Line Segment Tracking*, Connecting the Dots. Toulouse, FR, October 2023.
- *Successful Mentorship and Being an Engaged Mentee*. Sloan Day #4: Mentorship and Finances. UC San Diego, La Jolla, CA, August 2023.
- *Search for Anomalous Higgs Boson Couplings in the Production of WH via Vector Boson Scattering*, APS April Meeting. Minneapolis, MN, April 2023.
- *Learn How Graduate Students Go Above and Beyond Research,* Changemaker Kickoff Week. UC San Diego, La Jolla, CA, January 2023.
- *Successful Mentorship*, Sloan Scholar Mentorship Workshops. UC San Diego, La Jolla, CA, August 2022.
- *Managed Network Services for Exascale Data Movement across Large Global Scientific Collaborations*, The 4th Annual XLOOP Workshop (Supercomputing 2022). Dallas, TX, November 2022.
- *Integrating End-to-End Exascale SDN into the LHC Data Distribution Cyberinfrastructure*, Practice and Experience in Advanced Research Computing. Boston, MA, November 2022.
- *Testing the Standard Model at the LHC/Pioneering Cyberinfrastructure at the Exascale*, Lab Expo. UC San Diego, La Jolla, CA, January 2022.