

# Henry H. Zheng

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## Education

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### Stanford University

*Physics Ph.D, Advisors: Leonardo Senatore, Eva Silverstein* Sep 2019 – Present **University of Chicago** Illinois, US

*B.A. Physics with Honors*

Sep 2015 – Jun 2019

## Technical Skills

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**Programming** Python, Rust,  $\text{\LaTeX}$ , C++, R, Mathematica, Tensorflow, Pytorch, JAX, MCMC, Cython, Git  
**Statistics & Modeling** Machine Learning, MCMC, Bayesian inference, Summary statistics

## Research Experience

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### Graduate Researcher, SITP and KIPAC

Sep 2019 – Present

- Developing an emulator of PyBird, a python code for computing one-loop EFT predictions of two and three point correlators with application to various JAX based samplers.
- Further developing the theoretical framework of a new Hamiltonian based optimizer (MCHMC) and benchmarking its capabilities to problems such as knowledge distillation.
- Forecasting next generation galaxy surveys DESI and MegaMapper's cosmological parameter constraints with Fisher methodology. Constructed theoretically motivated priors that improve constraints on hard-to-measure non-Gaussianities by a factor of 2.
- Developed an algorithm for solving generic one-loop QFT integrals with complex masses in 3d. Optimized in both Cython and in Rust to achieve  $\mathcal{O}(1000)$  times speedup compared to FFTLog when applied to the one-loop bispectrum in the EFTofLSS.
- Built python and mathematica pipeline for Fisher analysis to forecast cosmological parameter constraints using one-loop galaxy powerspectrum and bispectrum for future surveys such as DESI and Megamapper.
- Performed MCMC analysis on Stanford cluster Sherlock using a suite of data sets to constrain Rock N' Roll and Early Dark Energy models of the early universe.

### Undergraduate Researcher, University of Chicago

Jun 2017 – Jun 2019

- Worked on high voltage (HV) electronics design, serial communication design, physics data analysis in ROOT and detector simulations using GEANT4.

### SULI Summer Intern, SLAC SSRL

May – Sep 2017

- Modeled ion diffusion through epitaxial thin films using time series X-ray reflectivity data to measure the ion diffusion coefficient.

## Talks and Teaching

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- ETH QCD Group Meeting Informal Talk: Brief Introduction to Modern Cosmology
- ETH Cosmology Group Meeting Informal Talk: Loop Integrals in EFTofLSS
- Teaching Assistant for PHYS 16, PHYS 21, PHYS 23, PHYS 25, PHYS 43, PHYS 81, and PHYS 331

## Publications

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5 Publications with > 300 citations

[Google Scholar Profile](#)