

Yi Guo

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EDUCATION

University of California, San Diego

Ph.D. Physics

Physics Excellence Award

La Jolla, CA
Sep 2018 – Expected Sep 2023

University of California, Santa Barbara

B.S. Physics, Mathematics

Academic Honors, Worster Fellowship

Isla Vista, CA
Sep 2014 – Jun 2018

SKILLS

Languages and Tools Python, C/C++, Fortran, Mathematica, \LaTeX , PyTorch, TensorFlow, Git, Docker

Web Development JavaScript, HTML, CSS, React, React Native, Firebase, Gradio

Data Science and ML Data Visualization, Parallel/Distributed Computing, Monte Carlo Simulation
Classification, Regression, Natural Language Processing

SOFTWARE DEVELOPMENT PROJECTS

Auto-Transcribe (PyTorch, FFmpeg, Gradio)

May 2023 – Aug 2023

- Created a software to automatically transcribe videos, including stem separation and speech recognition. 30X real-time speed each GPU with 85% accuracy. No comparative products on the market.
- Implemented a front-end with Gradio to search, preview and export audios among 10M sentences within 1 sec.
- Designed for 24/7 robustness, with error handling and multi-GPU support. Transcribed 50TB within a month.
- Utilized to produce video content, resulting in a channel with 550K+ views and 1.2K+ engaged subscribers.

Voice Chatbot (PyTorch, LLM, Gradio)

Feb 2023 – Mar 2023

- Developed a chatbot using Whisper for speech recognition, GPT-J as language model, and VITS for text-to-speech. Prototyped a demo with Gradio.
- Improved the performance of the language model and allowed multiple personalities by few-shot learning.

Task Tracker App (JavaScript, React, SQL)

Apr 2022 – May 2022

- Developed a multi-user Task Tracker App from end to end. Deployed on Google Cloud Platform.
- Used by 10+ family members, friends and colleagues.

SELECTED RESEARCH PROJECTS

Cosmological Parameters Forecast (HPC, Python, Parallel, Distributed)

Jan. 2022 – Present

- Developed high performance code to predict f_{NL} for various surveys, guiding future LSS survey design.
- Optimized the performance to be 10X-100X faster than commonly used packages (e.g. FishLSS).
- Increased the sensitivity by $\sim 10\text{X}$ with cutting-edge physics techniques.

Standard Model with Axion (HPC, Python, Parallel, Distributed)

Dec 2020 – Jan. 2022

- Analyzed the thermal history between axions and Standard Model fermions using quantum field theory.
- Gained SOTA constraints by explicitly solving the Boltzmann equation with 6-dimensional integral.
- Speeded up native Python by 100X with Numba. Another 50X from distributed computing with Ray.

Spectroscopy and Photometry (ML, Python, C/C++, Fortran, Shell)

Sep 2015 – Jun 2017

- Developed a package for rapid spectrum fitting using least squares regression with LMA optimization.
- Combined a Python UI for graphics and automation, and a Fortran kernel. Sped up the workflow by $>10\text{X}$.
- Created C/C++ code and Shell scripts to locate galaxies from images and measure photometry automatically. Reduced time cost by 100X compared to using traditional DS9 software.

PUBLICATIONS

D. Green, **Y. Guo**, J. Han and B. Wallisch, (Forthcoming), “Light Fields during Inflation from Future Galaxy Surveys,”

D. Green, **Y. Guo** and B. Wallisch, “Cosmological Implications of Axion-Matter Couplings,” In: *JCAP* 02.02, p. 019 (2022) DOI: [10.1088/1475-7516/2022/02/019](https://doi.org/10.1088/1475-7516/2022/02/019) arXiv: [2109.12088](https://arxiv.org/abs/2109.12088) [astro-ph.CO].