MINGHAN CHEN, PH.D.

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EDUCATION

University of California, Santa Barbara Sept 2018 - Sept 2024
Ph.D. in Physics

Carnegie Mellon University Sept 2014 - May 2018
B.Sc. Physics, Dean's List High Honors, Science and Humanities Scholars Program, GPA 3.97/4.00

EXPERIENCE

Staff Research Associate Nov 2024 - Present
University of California, Santa Barbara *Santa Barbara, CA*

- Currently leading the data analysis and modeling of a high dimensional spectral imaging dataset from the Subaru Telescope, leveraging **the open-source Python pipeline I developed during my Ph.D. to perform regression and modeling**.
- Developed a novel data processing algorithm for the beam-steering mode of the Subaru Telescope to achieve a **measurement precision of** ~ 0.1 **pixel, a factor of** ~ 10 **better than standard pipeline**.
- Optimized the forward modeling and signal extraction of the imaging data and **improved precision by** $\sim 30\%$**, signal-to-noise ratio (SNR) by** $\sim 50\%$**, and reduced bias by a factor of 2**.

Doctoral Researcher Sept 2018 - June 2024
University of California, Santa Barbara *Santa Barbara, CA*

- Led the development of the CHARIS-pyKLIP Post-Processing Pipeline using **Bitbucket and Git workflow**. It is an **open-source Python data processing pipeline** for the **259-million-dollar Subaru Telescope** in Hawaii. The pipeline achieves a spatial measurement **precision of** $\sim 0.5\%$ and a contrast higher than **one million**.
- Implemented **asynchronous parallel processing** for the pipeline, which can perform data cleaning, regression, and signal modeling on gigabytes of high dimensional data in minutes.
- Designed and developed algorithms for image registration, calibration, and distortion correction for the pipeline. Achieved a detector scale calibration **precision of** $\sim$ **1%**.
- Implemented a novel Expectation Maximization Principal Component Analysis (EM-PCA) algorithm for the pipeline that achieves **zero self-contamination** of the image signal, **improving the signal-to-noise ratio (SNR) by** $20\% - 50\%$ **in data-constrained environments**.
- Developed a **maximum likelihood algorithm** to fit for accurate positions of blended sources to **1%**. Performed **time-series and periodogram analyses on 11 years of flux data under sparse sampling conditions** and achieved the strongest evidence for the null hypothesis. Applied **Markov-Chain Monte Carlo** to fit the orbit of a planetary system, which produced **the most precise mass measurements ever (**$\sim$ **0.5% precision)** at the time of publication for all imaged brown dwarfs.

Assistant Researcher Oct 2015 - April 2018
Carnegie Mellon University *Pittsburgh, PA*

- Trained and tested a **computer vision deep learning model** on a simulation database, queried using **SQL**, and applied it on a real galaxy cluster to yield a precise mass ($\sim$ **1%**) **published in Nature Astronomy**.

SKILLS

Languages	Python (pandas, scipy, numpy; object-oriented), SQL, C
Tools	Git, Emacs, Linux, Azure, Jupyter, Bitbucket, Mathematica, LaTeX, Docker
Skills	Signal processing, Machine Learning, Bayesian Inference, MCMC, Statistical Modeling PCA, A/B testing