SHASHPAL SINGH

Research Assistant (Applying for MSc)

@ shashpal130@gmail.com   Shashpal/Research_Codes

EXPERIENCE

Research Assistant II
Research Assistant

📅 Sept 2024 - Ongoing   📍 The University of Hong Kong

Gained strong practical skills necessary in coding to write academic journal articles. This included making technical research codes necessary to convey information and understand information, as well as making Python codes necessary for the writing of the paper which is in Latex format. This took my writing skills with Latex to the next level. In the process of writing the paper, my knowledge and ability to write scientific academic papers rose tremendously as I am working closely with a postdoctoral fellow to co-author the paper. I understood the gaps in my thinking, and realised how to think scientifically.

Conference Attendee
Dark Matter Under the Gravitational Lens Conference

📅 April 2025   📍 Hosted by HKU

Was an attendee at the Conference and was able to attend all of the talks. Had the privilege to speak with some of the speakers at the Conference. Gained a lot of insight from opportunity, particularly with my conversation with Dr. Benjamin Beauchesne from Durham, whereby he told me what I might be missing in my PSF models, that I had been creating to model the light morphology of a lensing galaxy using the imfit software.

Spain Experiential Learning
Experiential Learning Trip

📅 Jun 2024   📍 CEFCA Spain

Learnt the technical and practical domains of telescope usage to take scientific images of the night sky to a very high degree. Developed a strong understanding of astronomical image processing to use telescopic images to perform science, and applied these concepts to self-taken telescopic images.

Undergraduate Final Year Research Project
Research Project

📅 Sep 2023 - May 2024   📍 The University of Hong Kong

Cultivated strong skills in conducting research and writing academic papers by learning how to grasp concepts from academic journal articles, presenting information in a succinct and coherent manner through the use of LaTeX, and improving academic writing skills through continual feedback from professors and doctoral degree students. Demonstrated exceptional ability in utilising Python coding to express research data in an easily understood manner through the use of automated plots and gures, which were created by intelligently integrating the research-based lensing software with Python.

SKILLS

Python Coding
Data Analysis and Research-based Software Integration

📍 Codes: https://github.com/Shashpal/Research_Codes

- General codes created for Research-based data analysis - both for presentation and interpretation
- Glafic (Gravitational Lensing software) based codes include: MCMC, lensing anomaly plots, parity checking, lens centre offset and file-based automation codes
- Imfit (Galaxy Image fitting software) based codes include: masking, noise map, cropping and pixel subtraction codes
- Latex based codes include: automated latex parameter and lensing anomaly table codes for inputting model data from glafic

Glafic (Gravitational lensing software)
Strong Gravitational Lens Models

📍 Primary research software for Journal Article

- Can create strong gravitational lens models with different profiles (Singular Isothermal Elliptical (SIE), Elliptical Power Law, (PL), Navarro-Frenk-White and Shear profiles (NFW)) and constraints (image positions and flux ratios)
- Have created Python codes to study the flux ratios at the observed positions of the quasar images which requires reading the fits file created from the modelling process, and isn't directly available from the glafic software
- Markov chain Monte Carlo (MCMC) runs can be performed to test parameter tolerances, degeneracies and model performance
- Have created Python codes to study the parity of images for hundreds of models at once for analysis

Imfit (Galaxy Image Fitting software)
Light Morphology Modelling of Lensing Galaxy

📍 Research software for prospective 2nd Journal Article

- Capable of constructing Sérsic models to map the light morphology of the lensing galaxy, and study the resulting parameter values in detail to then create accurate gravitational lens models

Research Poster Presentation

CosPA 2023 Conference

📅 Nov 2023 📍 The Chinese University of Hong Kong

Had an invaluable experience of presenting a research poster at the CosPA 2023 conference. Practised presentation skills for the event and evaluated those skills by witnessing many experienced scientists present, ability to convey complex research ideas improved tremendously.

Learnt how to present and express academic concepts through a visual medium by creating a poster for the event, and receiving feedback from professional presenters and esteemed scientists in the conference.

PUBLICATIONS

📄 Journal Articles

- A. Amruth, S. Singh, J. Lim, I. He, and R. Lewis, "Smooth lens models for 7 lensed quasars using positions and narrow-line emission fluxes: The need for substructure," 2025 (In Writing).

- Able to build point-spread function (PSF) models and noise maps for more accurate light morphology modelling. The creation of the noise map requires the use of Python coding.
- General usage of Python to perform pixel subtraction, cropping and masking was also necessary to build light morphology models of the lensing galaxy using imfit

LaTeX Documentation

Documentation for Research Purposes

- Able to cleverly use Python to create codes that input research data in LaTeX format for convenient data representation
- Have cultivated a decent understanding of utilising LaTeX documentation to create necessary plots, tables and format changes to create documents independently (this CV was created using LaTeX).

  Most of the plots and tables seen in the Journal article publication titled "Smooth lens models for 7 lensed quasars using positions and narrow-line emission fluxes: The need for substructure" were created by me.

LANGUAGES

English | Native

Punjabi | Native

Cantonese | Conversational

Hindi | Near-Native

Japanese | Beginner

EDUCATION

B.Sc. of Science in Physics

The University of Hong Kong

📅 Sept 2020 - Aug 2024

REFEREES

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