KAI HOU (GORDON) YIP

DATA SCIENTIST / ASTROPHYSICS ENTHUSIAST

CONTACT

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RESEARCH INTEREST

Atmospheric Physics:
Develop atmospheric retrieval framework, TauREx 3; Atmospheric modelling

Machine Learning (ML) in Exoplanetary Science :
Accelerate atmospheric modelling with AI; Automate detection of directly imaged exoplanets; Differentiable atmospheric model

Explainable AI:
Develop physics constrained, interpretable AI models for exoplanet characterisation

Exoplanetary data analysis:
space/ground-based time-resolved spectroscopy; photometric time series; CCD photometry

TEACHING

ORBYTS Instructor

UCL   Nov 2020 – Dec 2020
- Responsible to deliver a series of courses on exoplanetary physics to 20 A-level students.
- Provided hands-on exercise and demonstration on TauREx 3 with real data.
- Provided guidance on writing research-level publication

Teaching Assistant

London Business School   April 2019 – Nov 2020
- Responsible to teach 50 postgraduate students Python language and its subsidiary data science and deep learning libraries
- Demonstrated applications of AI in business setting.

Laboratory Demonstrator

UCL Observatory   October 2016 – October 2018
- Provided training to 10 groups of 20 first year undergraduate students on telescope operation and technical support on a weekly basis over a university semester

EDUCATION

CDT in Data Intensive Science PhD Candidate

University College London   *2017- present*

Thesis title: Expect the Unexpected: Deciphering Exoplanetary Signals with Machine Learning Techniques

Supervisors: Prof. Giovanna Tinetti & Dr. Ingo Waldmann

MSci. Astrophysics (Dean's List)

University College London   *2013-2017*

INDUSTRY

Turing Internship Network

Transport Research Laboratory   Nov 2020 – Feb 2021
- Led the development of a prototype forecasting model for real-life road traffic.
- Developed unsupervised ML algorithm to indicate potential traffic incidents.
- Developed pipelines to systematically extract and transform heterogeneous time series data for ML application.

Data Study Group

The Alan Turing Institute   Sept 2020
- Built interpretable model to predict bakery sales using real life spatial-temporal data.
- Collaborated with a team of 10 people over the course of 4 weeks.

Placement student

The Alan Turing Institute   Jan 2020 – Jul 2020
- Constructed a data analysis framework to provide research insights for sensitive time series health data.
- Composed progress reports for funding and research agencies.
- Assisted in developing an interpretable A.I. healthcare system to assist health practitioners.

PROFILE

Programming: Python (Expert), C++ (basic)

Machine Learning: TensorFlow, Keras and sci-kit learn

Database: PostgreSQL

Container: Docker and Singularity (basic)

Utilities: Unix Commands, Git, LaTeX and tmux.

Languages: Cantonese, English and Mandarin

VISA Status: EU Settled Status

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PUBLICATION LIST

Yip, K. H., Changeat, Q., Nikolaou, N., Morvan, M., Edwards, B., Waldmann, I. P., Tinetti, G. (2021). Peeking inside the Black Box: Interpreting Deep Learning Models for Exoplanet Atmospheric Retrievals. *arXiv Preprint (under review)*: https://arxiv.org/abs/2011.11284

Nikolaou, N., Waldmann, I. P.,Tsiaras, A, Morvan, M., Edwards, B., **Yip, K. H.**, . . . Morik, K. (2021). Lessons Learned from the 1st ARIEL Machine Learning Challenge: Correcting Transiting Exoplanet Light Curves for Stellar Spots. *arXiv Preprint (under review)*: https://arxiv.org/abs/2010.15996

Edwards, B., Changeat, Q., Mori, M., Anisman, L. O., Morvan, M., **Yip, K. H.**, . . . Tinetti, G. (2021). Hubble WFC3 Spectroscopy of the Habitable-zone Super-Earth LHS 1140 b. *The Astronomical Journal*, *161*(1), 44. doi:10.3847/1538-3881/abc6a5

Yip, K. H., Changeat, Q., Edwards, B., Morvan, M., Chubb, K. L., Tsiaras, A., . . . Tinetti, G. (2020). On the Compatibility of Ground-based and Space-based Data: WASP-96 b, an Example. *The Astronomical Journal*, *161*(1), 4. doi:10.3847/1538-3881/abc179

Yip, K. H., Tsiaras, A., Waldmann, I. P., & Tinetti, G. (2020). Integrating Light Curve and Atmospheric Modeling of Transiting Exoplanets. *The Astronomical Journal*, *160*(4), 171. doi:10.3847/1538-3881/abaabc

Pluriel, W., Whiteford, N., Edwards, B., Changeat, Q., **Yip, K. H.**, Baeyens, R., . . . Beaulieu, J. -P. (2020). ARES. III. Unveiling the Two Faces of KELT-7 b with HST WFC3. *The Astronomical Journal*, *160*(3), 112. doi:10.3847/1538-3881/aba000

Edwards, B., Changeat, Q., **Yip, K. H.**, Tsiaras, A., Taylor, J., & Akhtar, B. (2020). Original Research By Young Twinkle Students (ORBYTS): Ephemeris Refinement of Transiting Exoplanets. *Monthly Notices of the Royal Astronomical Society*. doi:10.1093/mnras/staa1245

Yip, K. H., Nikolaou, N., Coronica, P., Tsiaras, A., Edwards, B., Changeat, Q., . . . Waldmann, I. P. (2020). Pushing the Limits of Exoplanet Discovery via Direct Imaging with Deep Learning. In *ECML*. Würzburg, Germany: Springer. doi:10.1007/978-3-030-46133-1_20

AWARDS

- **Early Career Researcher (ECR) Bursary**
  The European Planetary Science Congress 2018
- **STFC STUDENTSHIP**
  Science and Technology Facilities Council, 2017-2021
- **HERSCHEL AWARD, UCL**
  Best performance in 4th Year Astrophysics, 2017

- **BEST PERFORMANCE IN 3RD YEAR ASTROPHYSICS AWARD**
  UCL, 2016
- **MACAO FOUNDATION SCHOLARSHIP**
  Macao SAR, 2014-2016