LAU Albert Wai Kit

awklau@connect.ust.hk +852 93315122

Research Interests

Astronomy and Astrophysics, especially in instrumental and observational area. Strength in experimental instruments construction, image data analysis.

Education

Hong Kong University of Science and Technology

Doctor of Philosophy in Physics — Sep, 2018 – present

- Current Project: Ultra Fast Astronomy
- Supervised by Prof. George Smoot

Bachelor of Science in,

Physics (First Major)	Sep, 2015 – Jun, 2018
Astrophysics and Cosmology (Minor)	Sep, 2016 – Jun, 2018
Computer Science (Second Major)	Sep, 2017 – Jun, 2018

- Graduation of year 2018.
- Graduation GPA: 3.7 out of 4.3, first class honor.

University of Waterloo

Exchange Program in Physics and Astronomy — Dec, 2016 – May, 2017

- Studied in observational astronomy using Gustav Bakos Observatory.

Research Experience

Ultra Fast Astronomy: Development of Silicon Photomultiplier Based Astronomical Single Photon Imaging Detector — Dec, 2018 – present
Supervisors: Prof. George Smoot

- Develop single photon counting and imaging detector for Astronomical usage
- Construction of Quantum Optics for Astrophysics and Cosmology Laboratory in HKUST
- Aiming for detection of Optical counter part of Fast Radio Burst
- Possible detection of other existing Ultra-Fast transient event in our Universe

Develop 2D Luminescence Imaging System — June, 2017 – Jun, 2018
Supervisor: Prof. K. S. Wong

- Final Year Research Project.
- A laser scanning microscope for luminescence imaging developed.
- An data acquisition and scanning control system was developed, together with the driver software and Graphical User Interface.
- Low cost optical system for microscopy with time and spectral resolution is designed and constructed.

Space Orbit Design Research Group — Sep, 2015 – Jun, 2018
Supervisors: Prof. K. Y. Michael Wong and Dr. C. H. Yam

- Develop Algorithm for fast estimating reachability problem of low thrust spacecraft.
- Computational cost reduced from $O(N^k)$ to $O(N * k)$.
- Algorithm implanted in MATLAB environment.

Publications

1. **Lau, A. W. K.**, Chan, Y.Y. , Shafiee, M., Smoot, G. F., Grossan, B. (2022). *A SiPM photon-counting readout system for Ultra-Fast Astronomy* The Open Journal of Astrophysics (2022), astro.2108.07526
2. **Lau, A. W. K.**, Mitra, A., Shafiee, M., Smoot, G. F.). *Constraining HeII reionization detection uncertainties via fast radio bursts.* New Astronomy(2021), 89: 101627.
3. **Lau, A. W. K.**, Shafiee, M., Smoot, G. F., Grossan, B., Zhanat M.(2020). *On-sky silicon photomultiplier detector performance measurements for millisecond to sub-microsecond optical source variability studies* Journal of Astronomical Telescopes, Instruments, and Systems 6.4 (2020): 046002
4. Li, S., Smoot, G. F., **Lau, A. W. K.**, Bekbalanova, M., Shafiee, M., Stezelberger, T. (2019). *Program objectives and specifications for the Ultra-Fast Astronomy observatory.* Proceedings Volume 11341, AOPC 2019: Space Optics, Telescopes, and Instrumentation; 113411Y (2019).
5. **Lau, A.W.K.**, Yam, C.H. and Ming, T.S. *Searching Reachable Region of Low-Thrust Trajectories by Superposition and Greedy Optimization*, IAC-17,C1,IP,33,x37794.
6. Ming, T.S., Yam, C.H. and **Lau, A.W.K.** *Approximate Two-Point Boundary Value Problem Solutions to Low Thrust Trajectory by Superposition*, ISTS2017

Presentation

- ECL19: Exploring the Energetic Universe 2019 Nazarbayev University, Jun, 2019
- 68^{th} International Astronautical Congress (IAC2017) Adelaide, Australia Oct, 2017

Awards and Honors

Student Awards — Physics Department, HKUST

- Best Teaching Assistant Award Sep 2019
- The Overseas Conference Travel Grant Nov, 2017
- Paul Ching Wu Chu Scholarship for Physics Students Nov, 2016
- Physics Major Entry Scholarship Nov, 2015

Student Awards — HKUST

- UROP Research Travel Sponsorship Oct, 2017
- HKUST Study Abroad Sponsorship Dec, 2016

HKSAR Government Scholarship Fund

- Reaching Out Award 2016/17 Jan, 2017

Extra-curricular Activities

Academic Secretary, Student Astronomy Club, HKUSTSU June, 2015 – June, 2016

- Control, Maintenance and Upgrade of society's telescopes.
- Hold popular science talks to promote Astronomy in HKUST.
- Collaborated with other committee members in event organization.

Helper in Hong Kong Astronomical Society June, 2016 – 2019

- Collaborated with other helpers to organize Summer Astronomical Camps for secondary students.
- Hold public talks about astrophotography.

Languages

English

- Fluent Speaker
- International English Language Testing System (IELTS) 7.5 out of 9
- Graduate Record Examinations (GRE) General:
  Verbal Reasoning 155 out of 170,
  Analytical Writing 3.5 out of 6,
  Quantitative Reasoning 170 out of 170

Chinese
- Native Speaker in Cantonese
- Proficient in Mandarin

Programming Languages and Computer Skills

Data and Image Analysis Languages
- Python 2 and 3
- MATLAB

General Programming Languages
- C and C++
- LabVIEW
- MIPS Assembly Language
- Verilog based FPGA programming (Xilinx Vivado Suite)

Computer Aided Design
- Autodesk Fusion 360 (3D CAD Drawing and Circuit Board Drawing)
- Google Sketchup Pro (3D CAD Drawing)
- Altium Designer (Circuit Board Drawing)

Text Processor and Related
- LaTeX
- Microsoft Office Suite