# LAU Albert Wai Kit

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**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,

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|---|---|
| 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