Carol Yan-Yan Chan

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SUMMARY

Highly analytical and results-driven Astrophysics PhD Candidate with 3+ years of hands-on expertise in complex scientific instrument designs, 3D/2D CAD, FEA, thermal/structural simulation, DFM/DFA, and data analysis with Python. Seeking a Mechanical Engineering role to leverage rigorous problem-solving skills and contribute to innovative hardware solutions.

SKILLS

Engineering Design: 3D/2D CAD (SolidWorks), Assembly design, DFM/DFA, GD&T, CMM (FaroArm)
Simulation & Analysis: FEA (SolidWorks, COMSOL Multiphysics), Thermal/Structural Analysis, Root cause analysis, Data analysis and visualization
Fabrication: 3D Printing, Manual machining (mill, lathe, band saw, drill press), Soldering, Welding
Programming: Python (NumPy, SciPy, Pandas), MATLAB, C/C++, Arduino, LabVIEW, Linux, Git, Slurm, HTML
Languages: English (Fluent), Mandarin (Fluent), Cantonese (Native)

EDUCATION

PhD in Physics and Astronomy (Astronomical Instrumentation) 2022 – 2027 (expected)
Johns Hopkins University, Baltimore, MD

BSc. in Physics, Minor in Robotics, Astrophysics and Cosmology 2018 – 2022
Hong Kong University of Science and Technology, Hong Kong S.A.R.

EXPERIENCE

Astronomical Instrumentation PhD Researcher | Advisor: Prof. Tobias Marriage Aug 2022 – Present
The Cosmology Large Angular Scale Surveyor (CLASS) Collaboration, JHU, US

- Engineered and modeled mounting structures and astronomical instruments (200+ parts) for the CLASS telescopes using SolidWorks following DFM/DFA principles
- Performed structural and thermal FEA using SolidWorks and COMSOL Multiphysics to validate instrument designs under operational loads and optimize thermal efficiency
- Managed the production lifecycle of 100+ custom parts (CNC, weldment, laser cut) by liaising directly with 4 different manufacturers internationally, reducing production cost by over 30%
- Fabricated custom parts for CLASS telescopes using 3D printing and manual machining (milling and drilling), achieving over 50% cost savings
- Led a team (7 graduate students + scientists) for the field deployment, assembly and commissioning of the fourth CLASS telescope in the highly challenging Atacama Desert environment
- Analyzed large observational datasets (3+ years $\times$ 320 detectors) from CLASS using Python to identify and characterize instrument systematic effects, improving data quality for scientific analysis

Astronomical Instrumentation Researcher | Advisor: Prof. George Smoot Nov 2019 – May 2022
Department of Physics, HKUST, Hong Kong

- Designed a 3D printed enclosure for the cooling system of an astronomical detector using SolidWorks, improving cooling efficiency by over 50%
- Automated detector temperature measurement, data acquisition and visualization using LabVIEW and Arduino

Summer Engineering Intern | GP Electronics, Hong Kong Jun 2020 – Aug 2020

- Designed and modeled a light indicator for acoustic speakers using SolidWorks and ray-tracing software to improve light uniformity

Robotics Team Mechanical Engineer | HKUST, Hong Kong Sep 2018 – Aug 2019

- Designed and assembled 400+ custom mechanical parts and actuators for a quadruped robot using SolidWorks
- Collaborated closely with a multi-disciplinary team of 20+ students (mechanical, electrical and software) to integrate complex mechatronic systems
- Awarded Hong Kong Robocon Best Design Award and Second-runner-up (2019)

SELECTED PUBLICATIONS

1. Shi, R., Brewer, M. K., **Chan, C. Y. Y.**, Chuss, D. T., et al. (2024). **Design and characterization of a 60-cm reflective half-wave plate for the CLASS 90 GHz band telescope**. In Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy XII (Vol. 13102, pp. 688-710). SPIE.
2. Barlis, A., Guo, H., Helson, K., Bennett, C., **Chan, C. Y. Y.**, et al. (2024). Fabrication and characterization of optical filters from polymeric aerogels loaded with diamond scattering particles. Applied Optics, 63(22), 6036-6051.
3. Lau, A. W. K., **Chan, C. Y. Y.**, Shafiee, M., Smoot, G. F., & Grossan, B. (2022). Development of a position-sensitive photon-counting imager for ultra-fast astronomy. In X-Ray, Optical, and Infrared Detectors for Astronomy X (Vol. 12191, pp. 312-329). SPIE.