ALEXANDER MICHAEL REAVES

amreaves120@gmail.com | alexander-reaves | +1 (480) 213 – 1323

Aerospace Engineering Ph.D. student with 5+ years of scientific research experience. Currently enrolled in the Future Propulsion and Power program at the Whittle Laboratory at the University of Cambridge. Strong technical expertise in turbomachinery design, engine design, and physics-based modeling. U.S. citizen with 5 years international education.

EDUCATION

University of Cambridge — Cambridge, U.K.
Ph.D. in Electric Aircraft Propulsor Design — October 2022 – Present

- Developed novel methodologies for the aerodynamic design of ducted fan and open-rotor propeller blades for electric aircraft.
- Retrofit an existing wind tunnel to be usable for testing of ducted fan and open-rotor propulsor designs.
- Developed expertise in producing aerospace-quality components using large-format 3D printers.

University of Cambridge — Cambridge, U.K.
M.Res. in Future Propulsion and Power (Aerospace Engineering) — October 2021 – August 2022

- Advanced course in the aero-thermal engineering of propulsion and power devices, with an emphasis on the gas turbine (compressors, combustors, and turbines).
- Courses on experimental methods, writing C.F.D. solvers, machine-learning techniques, C.F.D. post-processing, and turbomachinery blade design.

Yale-NUS College — Singapore
B.S. with Honours in Physical Sciences (Physics) — August 2017 – May 2021

University of Cambridge — Cambridge, U.K.
Visiting Student (Mathematics) — October 2019 – June 2020

Phoenix Country Day School — Arizona, U.S.A.
High School Diploma — August 2014 – June 2017

RESEARCH EXPERIENCE

Yale-NUS Physical Sciences Major — Yale-NUS College & University of Cambridge
Capstone Student — August 2020 – May 2021

- Conducted a yearlong research project modeling the interactions between granular flows and hydropower turbines.
- Met weekly with supervisors from the University of Cambridge and Yale-NUS College and have written a draft paper.

NASA Ames Research Center — National Aeronautics and Space Administration
Summer Intern - Remote — June – August 2020

- Designed 3D models of components for the International Space Station using `Creo Parametric`.
- 3D printed and tested over 20 iterations of a CO_2 sensor which could be manufactured in space.

Yale-NUS Sciences Department — Yale-NUS College
Research Assistant for Professor Chelsea Sharon — June – August 2019

- Awarded funding of over SGD $3,000 from the J.Y. Pillay Global-Asia Programme to research the feasibility of radio astronomy data collection in Singapore.
- Designed, constructed, and wrote code for a 1420 MHz horn radio telescope based off of the Bessie radio telescope design from Open Source Radio Telescopes.

Centre for Advanced 2D Materials National University of Singapore
Research Assistant May 2018 – August 2019

- Awarded full funding of over SGD $3,000 from J.Y. Pillay Global-Asia Programme to research superconductivity in twisted bilayer graphene.
- Coded and ran over 20 different simulations using `MATLAB` and `Python` to determine the electronic band properties of superconductive twisted bilayer graphene.
- Presented relevant papers and research findings in group meetings and weekly journal clubs.
- Published results of research in *Solid State Communications*. This work has received over 80 citations.

TEACHING EXPERIENCE

Cambridge University Engineering Department University of Cambridge
Student Supervisor (Teaching Assistant) October 2022 - March 2023

- Tutored 6 undergraduate students on the topics of 1D compressible flows, 2D compressible flows, numerical methods, and turbomachinery design.
- Supervised students in small groups (1-3 students) on problem sets and exam preparation questions.
- Assessed and recorded student progress and provided feedback to students and their academic advisors.

C.D.T. in Future Propulsion and Power University of Cambridge
Demonstrator February 2023

- Provided guidance and feedback for 18 masters students on the use of `ParaView` for visualization of 3D CFD results of a compressor stator row.
- Mentored students on the use of advanced manufacturing techniques, such as 3D printing and rapid prototyping, to produce aerospace components.

OTHER PROFESSIONAL EXPERIENCE

Open Ventilator System Initiative (OVSI) University of Cambridge
Engineer / Engineering Coordinator March 2020 – June 2020

- Collaborated on designing and prototyping 3 different versions of an affordable, hospital-quality, ventilator system that is manufacturable and maintainable in low and middle-income countries.
- Managed information sharing and co-development between engineering groups in the United Kingdom, Kenya, Uganda, and Ethiopia.
- Received Presidents Special Award for Pandemic Service from Royal Academy of Engineering for contributions to addressing the challenges of the COVID-19 pandemic.

United Nations Office for Outer Space Affairs United Nations
Online Volunteer December 2018 – March 2019

- Researched methodologies for wastewater recycling and water management and determined their feasibility to be applied toward UN Sustainable Development Goal 6: Sustainable Management of Water and Sanitation for All.
- Wrote scientific-communication articles which explain the potential applications of technologies developed for use in outer space for water management on Earth.

HONORS AND AWARDS

President's Special Award for Pandemic Service 2020

- Award given from the Royal Academy of Engineering to OVSI members for contributions to addressing the challenges of the COVID-19 pandemic.

JY Pillay Global-Asia Programme Research Award (×2) 2018 & 2019

- Received full funding of $5000 SGD to construct a radio telescope to test the suitability of Singapore's RF environment for radio astronomy observations during summer 2019.
- Received full funding of $5000 SGD to research superconductivity in twisted bilayer graphene during summer 2018.

TRAINING

Vertical Flight Society Mesa, Arizona, U.S.A.
Short Course on Electric VTOL Design Attendee January 2023

- Attendee to the VFS's 2023 Short Course on Electric VTOL Design taught by Dr. James Wang.
- Course topics included: initial design considerations and EVTOL architectures, battery and hybrid electric aircraft, electric motor design, weight and performance estimation, rotor design, stability & control, testing, rotor and vehicle performance analysis, benchmarking and cost estimation, and certification and vertiport design.

Rolls-Royce Plc. Derby, U.K.
Student Trainee June 2022

- Visits to the Rolls-Royce civil and defence sites in Bristol, Birmingham, and Derby.
- Seminars on combustion systems, turbine design, EVTOL fan aerodynamics, engine control and health monitoring, and electronic/hydromechanical sub-systems.

Dyson Ltd. Malmesbury, U.K.
Student Trainee June 2022

- One-day training focused on product design. Topics included small-scale radial turbomachinery, system integration, electrification, noise mitigation, and cost reduction.

Siemens Energy AG. Lincoln, U.K.
Student Trainee May 2022

- Three-week hands-on industrial training covering: mechanical integrity and metallurgical assessment for turbomachinery blades; lean manufacturing; installation, commissioning, and servicing of land-based gas turbine engines; gearbox design; control systems design; and wind turbine technology.
- Developed a safe and cost-effective method for transporting gas turbine engines within power plants.

University of Oxford Oxford, U.K.
Visiting Student March - April 2022

- Three-week course on heat transfer and high-speed aerodynamics at the Oxford Thermofluids Institute.
- Designed and compared 4 different supersonic nozzle designs using 2D and 3D method of characteristics approaches.
- Performed liquid crystal thermography on a ribbed channel to determine wall heat transfer measurements and compared results with CFD results and thermocouple and total pressure traverse data.
- Characterized the sensitivity to geometric perturbations of flow and heat transfer results using a single value decomposition (SVD) technique.

University of Loughborough Loughborough, U.K.
Visiting Student January 2022

- Three-week course on combustion system aerodynamics at the National Centre for Combustion and Aerothermal Technology (NCCAT) at the University of Loughborough.
- Lectures on combustion system technologies, advanced research methods, and data analysis techniques (e.g. conditional sampling/averaging, proper orthogonal decomposition, linear stochastic estimation).

- Trained in experimental techniques for characterizing a fuel-spray nozzle at different technology readiness levels: aerodynamics of a fuel injector using particle image velocimetry (PIV); fuel injector spray characteristic using shadowgraphy.

PUBLICATIONS AND PRESENTATIONS

Singlet superconductivity enhanced by charge order in nested twisted bilayer graphene Fermi surfaces Evan Laksono, Jia Ning Leaw, **Alexander Reaves**, Manraaj Singh, Xinyun Wang, Shaffique Adam, Xingyu Gu; Solid State Communications, Volume 282, Pages 38-44, October 2018
https://doi.org/10.1016/j.ssc.2018.07.013

Wastewater recycling on the ISS and in Singapore
Alexander Reaves; United Nations Office of Outer Space Affairs, Space4Water, February 2019
https://www.space4water.org/news/wastewater-recycling-iss-and-singapore

Magnetotransport properties in twisted bilayer graphene at magic angle
Evan Laksono, **Alexander Reaves**, Manraaj Singh, Xingyu Gu, Jia Ning Leaw, Nimisha Raghuvanshi, Shaffique Adam; American Physical Society, Abstract: S14.00010, March 2019
http://meetings.aps.org/Meeting/MAR19/Session/S14.10

TECHNICAL SKILLS

Computer Languages	`C, C++, MATLAB, Python`
Software & Tools	`Creo, LabVIEW, Mathematica, Microsoft Office, ParaView`
Operating Systems	`MacOS, Windows, Linux (Ubuntu, Rocky Linux)`
Experimental Techniques	hotwire measurements, three- and five-hole probe calibration and data collection, particle image velocimetry (PIV), liquid crystal thermography, shadography

REFERENCES

James Taylor | Assistant Professor, Department of Engineering | University of Cambridge
1 JJ Thomson Ave, Cambridge, United Kingdom, CB3 0DY
jvt24@cam.ac.uk | +44 7950-852578

Sam Grimshaw | Mitsubishi Heavy Industries Senior Research Fellow | University of Cambridge
1 JJ Thomson Ave, Cambridge, United Kingdom, CB3 0DY
sdg33@cam.ac.uk | +44 1223-337581

Christopher Clark | Assistant Professor, Department of Engineering | University of Cambridge
1 JJ Thomson Ave, Cambridge, United Kingdom, CB3 0DY
sdg33@cam.ac.uk | +44 1223-337581