

# CHARLES CONSTANT

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## EDUCATION

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- University College London** Sep. 2022 - Ongoing  
*PhD Space Flight Dynamics and Geodesy, University College London* London, United Kingdom
- Developed an operational near-real-time pipeline for atmospheric density inversion using POD data, currently running on the UCL Supercomputer cluster. | [link](#)
  - Leading the development of a physics-based, differentiable radiation force modelling tool in collaboration with Prof. Tobias Rietschel, currently undergoing validation.
  - Implemented orbit determination and high-precision orbit propagation methods, with experience in filtering and probability of collision simulations for LEO spacecraft using both cooperative and uncooperative tracking data.
  - Contributed to the ideation, bid writing, and development of the UK Space Agency funded UCL-NASA JPL collaboration, working on the interface between GipsyX and UCL's internal ray-tracing software | [link](#)
  - Aided in the supervision of Masters and undergraduate research projects
  - Peer reviewer for GPS Solutions journal
- Imperial College London** Sep. 2021 - Jun. 2022  
*MSc Environmental Data Science and Machine Learning, Grade: Merit* London, United Kingdom
- **Thesis:** Aerodynamic Drag Force Modelling for LEO Mega-Constellations
  - **Relevant Courses:** Computational Mathematics, Machine Learning, Advanced Programming.
- University College London** Sep. 2021 - Jun. 2024  
*BEng Engineering, Grade: First-Class* London, United Kingdom
- **Thesis:** Emotion Detection using Convolutional Neural Networks.
  - **Relevant Courses:** Modelling and Analysis, Materials and Fluid Mechanics, Structural Mechanics.
- University of Reading** Sep. 2015 - Jun. 2018  
*BSc Physical Geography, Grade: 2:1* London, United Kingdom
- **Thesis:** Linking Green Spaces to Stress Reduction via Remote Sensing.
  - **Relevant Courses:** Remote Sensing, Climatology, Advanced Research Skills

## WORK & RESEARCH EXPERIENCE

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- Researcher** Sep. 2023 – Jan. 2024  
*University College London Consultants Ltd* London, United Kingdom
- Research and production of a report for the UK General Lighthouse Authority on the future of LEO PNT technologies over the next 10 years.
- Navigation Training Course** Jun. 2023 – Jun. 2023  
*European Space Agency Academy* Belgium
- Training in GNSS and Galileo system architecture, signal processing, and hands-on navigation exercises.
- Researcher in Applied Machine Learning** Jun. 2021 – Sep. 2021  
*University College London* London, United Kingdom
- Awarded Departmental Grant to develop and validate methods developed in undergraduate thesis.
- Founder and Team Lead** Sep. 2020 – Sep. 2021  
*University College London Cubesat Design Team* London, United Kingdom
- Led a team of 11 doctoral and undergraduate students to the final round of the Airbus/UKSEDS CubeSat design competition.
- Undergraduate Researcher in Astrodynamics** Jun. 2020 – Oct. 2020  
*University College London Space Geodesy and Navigation Laboratory* London, United Kingdom
- Development of C++ and Python tools for astrodynamics. Characterization and analysis of solar radiation pressure time-series.
- Geomatic Engineering Intern** Aug. 2019 – Sep. 2019  
*Murphy Geospatial* London, United Kingdom
- Hydropower Engineering Intern** Nov. 2017 – Jan. 2018  
*Hallidays Hydropower* Abingdon, United Kingdom
- Led the write-up of a feasibility study for a 35kW Archimedes screw
- Semi-Professional Cyclist** Jun. 2015 – Jun. 2017  
*Various teams* France/Italy/UK
- Raced in 4 road cycling teams across Europe; Competed in two Ironman events

**Near-Real Time Thermospheric Density Retrieval from Precise Low Earth Orbit Spacecraft Ephemerides During Geomagnetic Storms**

**Charles Constant**, Santosh Bhattarai, Indigo Brownhall, Anasuya Aruliah, Marek Ziebart | [pre-print link](#)

Submitted to *Space Weather*

**Probing Thermospheric Response and Operational Impacts during the 2024 Mother's Day Geomagnetic Storm**

**Charles Constant**, Indigo Brownhall, Laura Aguilar, Eliot Dable, Marek Ziebart, Anasuya Aruliah, Santosh Bhattarai

Presentation at *European Space Weather Week 2024*. Paper In preparation for *Space Weather*

**An Evaluation of Physics Based Force Model Performance in LEO: Implications for Next Generation Space Traffic Management**

**Charles Constant**, Benjamin L. Hanson, Santosh Bhattarai, Indigo Brownhall, Marek Ziebart | [presentation link](#)

Presentation at *COSPAR 2024*. Paper in preparation for *Space Weather*

**Orbit Domain Calibration for Space Surveillance and Tracking**

Santosh Bhattarai, Indigo Brownhall, **Charles Constant**, Felicia Peto-Madew, Eugene Rotherham | [presentation link](#)

Presentation at *COSPAR 2024*. Paper in preparation for *Advances in Space Research*

**MOCAT-PYSSEM: An Open-Source Python Library and User Interface for Orbital Debris and Source Sink Environmental Modelling**

Indigo Brownhall, Miles Lifson, **Charles Constant**, Giovanni Lavezzi, Maya Felice Harris, Richard Linares, Marek Ziebart, Santosh Bhattarai | [presentation link](#)

Presentation at *COSPAR 2024*

**Limitations of Current Practices in Uncooperative Space Surveillance: Analysis of Mega-Constellation Data Time-Series**

**Charles Constant**, Santosh Bhattarai, Marek Ziebart | [paper link](#)

Paper and Poster at *AMOS 2023*

AWARDS

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**Best Student Paper Award** | *AMOS Conference* September 2023

- Awarded for the paper "Limitations of Current Practices in Uncooperative Space Surveillance: Analysis of Mega-Constellation Data Time-Series".

**Outstanding Research Project Award** | *Departmental Award for Dissertation* June 2021

- Award for best dissertation research project.

**Scholarship Committee 3rd Year Project Prize** | *Departmental Grant* June 2021

- Awarded a £5000 grant to further dissertation research over the summer.

**UCL ChangeMakers Award** | *University College London* March 2021

- Awarded £2000 for enhancing the learning experience of students at UCL.

SKILLS

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**Languages:**Bilingual in French and English. B1 certificate in German. Basic Italian.

**Software and Programming:** Python(advanced), C++(intermediate), C# (beginner); MATLAB(intermediate), Orekit, GMAT, STK, FreeFlyer