BENGISU KOC

BSc Physics with Astrophysics
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PROFILE

Second-year Physics with Astrophysics student at the University of Leicester, with practical experience in experimental physics, electronics and data analysis. Alongside university laboratory work, have developed independent projects exploring vehicle telemetry, control systems, vibration analysis and aircraft flight dynamics. Looking to apply the technical knowledge and skills in the industry within the aerospace, aerodynamics, automotive or engineering sectors.

EDUCATION

BSc Physics with Astrophysics | *University of Leicester* **Sep 2025 – Jun 2028 (expected)**

- Relevant modules: experimental physics; mechanics; electricity and magnetism; electromagnetic fields; relativity, quantum physics and particles; mathematical physics; waves and optics; thermal and statistical physics; condensed matter physics; astrophysics and space science.

A Levels: Physics, Mathematics and Chemistry | *Reading College* **Sep 2022 – May 2024**

TECHNICAL SKILLS

Programming and analysis: Python (NumPy, pandas, SciPy, Matplotlib), R/RStudio, numerical modelling, statistical analysis, Git/GitHub.
Experimental & research methods: experimental design, equipment calibration, uncertainty analysis, least-squares regression, data interpretation and technical reporting.
Electronics: KiCad 9.0, SPICE simulation, analogue and digital circuits, operational amplifiers, potential dividers, RC filters and circuit testing.
Instrumentation: oscilloscopes, function generators, digital multimeters, DC power supplies, Michelson interferometer and Helmholtz coils.

UNIVERSITY LABORATORY EXPERIENCE

Michelson Interferometer and Sodium D-Line Analysis | *Individual laboratory report* **Oct 2026**

- Calibrated a Michelson interferometer and analysed interference fringes using linear regression in R.
- Measured the sodium D-line separation as 0.59 ± 0.10 nm, consistent with the accepted 0.597 nm; assessed calibration scatter, fringe instability and evaluated experimental uncertainties.

LCR Resonance and Dielectric Investigation | *Four-person group experiment* **2025 – 2026**

- Built an LCR circuit and swept voltage against frequency to find resonance, bandwidth and Q factor; measured resonance at 56.2 ± 0.5 kHz against a theoretical 55.9 kHz.
- Compared theoretical and measured component and dielectric behaviour, explained discrepancies and co-wrote a 24-page technical report.

Electron Charge-to-Mass Ratio | *Experimental Physics 1* **Nov 2025**

- Investigated electron motion in a magnetic field using a cathode-ray tube and Helmholtz coils.
- Applied regression and uncertainty analysis to experimental measurements, identifying beam-radius measurements as the main source of uncertainty.

Electronics Simulation and Practical Workshop | *University of Leicester* **2026**

- Designed and simulated logic gates, potential dividers and RC filters in KiCad and SPICE, including truth-table, power and frequency-response analysis.
- Built and tested inverting, non-inverting and summing amplifiers and a 4-bit digital-to-analogue converter using an oscilloscope, signal generator and multimeter.

Scientific Research and Communication | *Astrophysics and space science* **2025 – 2026**

- Prepared a space mission proposal and critical reviews and presented research on an astrophysics topic.

Core Experimental Programme | *Experimental Physics 1* **2025 – 2026**

- Completed experiments involving vibrations, projectile motion, pendulums, temperature measurements and friction, including data and uncertainty analysis.

INDEPENDENT TECHNICAL PROJECTS (github.com/bengisukoc)

Formula 1 Telemetry Performance Analysis | *Python, pandas, Matplotlib, OpenF1 API* **2026**

- Built a data analysis pipeline using real Formula 1 telemetry to compare speed, throttle and braking performance. Analysed lap-time differences and identified where time was gained or lost, using data visualisation and automated tests.

DC Motor Modelling and PID Speed Control | *Python, NumPy, control-system simulation* **2026**

- Modelled the electrical and mechanical behaviour of a DC motor using fourth-order Runge-Kutta integration. Compared P, PI and PID controllers, reducing simulated overshoot from 7.07% (PI) to 5.68% (PID), while evaluating speed tracking and load-disturbance response.

Vibration-Based Machinery Fault Detection | *Python, SciPy, signal processing* **2026**

- Implemented a fault detection system using simulated machinery vibration signals, FFT and Hilbert envelope analysis. Extracted vibration features to distinguish normal operation, rotor imbalance and bearing faults, successfully classifying all three conditions.

Aircraft Flight Dynamics and Trajectory Simulation | *Python, numerical modelling* **2026**

- Created a 2D aircraft simulation incorporating atmospheric conditions, lift, drag, thrust and feedback control. Investigated the effects of increased aircraft mass and headwinds on climb performance, trajectory and thrust requirements.

EMPLOYMENT

GCSE Combined Science and Mathematics Tutor | *Access Tuition* **Jan 2024 – Aug 2024**

- Tutor GCSE students in Mathematics and Combined Science, adapting lessons to suit individual learning needs.
- Help students understand challenging concepts, develop problem-solving skills and prepare for exams.

ADDITIONAL INFORMATION

Volunteer: Lashbrook House Care Home (2023 – 24)
Languages: English, Turkish