

# Erdem Baha Topbas

Undergraduate Student at Columbia University, BA in Mathematics and Physics

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## **Education & Qualifications**

**Columbia University, New York** – September 2019 - May 2023

Enrolled in Columbia College, Pursuing a Double Major in Mathematics and Physics, GPA: 3.80

**The Koc School, Istanbul, Turkey** – September 2007 - June 2018

## **Research & Work Experience**

**Researcher at UCLA Institute of Pure and Applied Mathematics, at the Research in Industrial Projects for Students Program** – Summer 2022

Worked on a data privacy project sponsored by Google, working on differential privacy and machine learning, related to the constraints of training differentially private models on private data. My contribution involved generating differentially private synthetic data generation which aims to replicate the accuracy metrics of various models on real data. Used Python and cloud based computing, as well as CPU and GPU based machine learning libraries. We produced a final report and presentation, and we will be presenting our findings at JMM 2023 in a poster presentation entitled "Budget Conservation in the Training of Differentially Private Models".

**Mathematics Research (REU) at Columbia University** – Summer 2021

Worked on a project titled "Critical fluctuations of the one-dimensional Ising model" where we used stochastic calculus to observe the time evolution of the Ising-Kac model, and proved that with the correct scaling and given a fitting initial condition, the spin configuration of the system converges to the stochastic Cahn-Hilliard Equation.

**Teaching Assistant at Columbia University** – 2021-2022,

Working as a teaching assistant at the Departments of Mathematics and Physics for three semesters, with the responsibility of holding office hours and recitations as well as grading homework.

**Head of IT Security / Software Intern at Aplimax** – Summer 2020, Summer 2021

Was in charge of IT security and led the team during the process of acquiring ISO 27001 IT security certification. Also worked on various confidential projects that included visual user interface design, front-end programming, and web development. Worked with Python, JavaScript, HTML, and CSS.

**Content Developer at Twin Science & Robotics** – August 2018 - August 2019

Worked as a content developer in the R&D department, focusing on a scientific curriculum and the development of science kits that aim to make science accessible and fun.

## **Leadership & Extracurricular Activities**

**Columbia Space Initiative** – September 2019 - present

Club Co-President, Lead of High Altitude Balloons Mission. The largest student body organization at Columbia University, with partnerships with NASA and other large aerospace organizations.

**Columbia Turkish Student Association** – September 2019 - present

Club Co-President, Executive Board Member

**Senior Editor at Columbia Federalist, Columbia's Satire Newspaper** – January 2020 - present

**Volunteer at Young Guru Academy (YGA)** – September 2011 - present

Volunteered in scientific outreach programs to support students from underprivileged backgrounds, including children in rural areas, students with disabilities, and refugees. Mentored groups of high school and middle school students that are also volunteers at the organization.

## **Skills & Coursework**

Quantum Mechanics and Computing, Real and Complex Analysis, Group and Field Theory, Galois Theory, Partial Differential Equations, Analytic and Algebraic Number Theory, Electricity and Magnetism, General Relativity, Thermal and Statistical Physics, Python, Machine Learning, HTML, CSS, JavaScript, Astrophysics, Intermediate German