Efe Öztaban

M.Sc. Physics (Sabancı University) | Computational Astrophysics, ML & HPC
efeoztaban@sabanciuniv.edu | +90 534 834 0931 | efeoztaban.com | Github | Scholar

Research Interests

High-energy astrophysics; radio/X-ray astronomy; ML for astrophysics(explainability, domain adaptation); HPC and simulations; Monte Carlo ray-tracing; large-scale surveys; AI/LLM agents for science.

Education

Sabancı University, Istanbul, Turkey **Sep 2023 – Jan 2026**
M.Sc. in Physics
Thesis: ML-driven determination of 3D structures of molecular clouds in high-resolution mm images
Advisor: Prof. Emrah Kalemci

Sabancı University, Istanbul, Turkey **Sep 2017 – Jun 2023**
B.Sc. in Electronics Engineering & Computer Science and Engineering (Double Major)
Minor: Physics GPA: 3.96/4.00 Ranked 1st in program Full Tuition Scholarship
Bachelor Thesis: Background Classification for X-ray Detectors with ML

Publications

- Kalemci, E.; Díaz Trigo, M.; **Öztaban, E.**; Abbasi, A.A.; et. al., *Dust scattering halo of 4U 1630–47: High-resolution X-ray and millimeter observations constrain source and molecular cloud distances. Monthly Notices of the Royal Astronomical Society 543.3 (2025): 3073-3088.* link arXiv
- **Öztaban, E.**; Kalemci, E. *Determination of 3D morphology of interstellar molecular clouds with machine learning. Proceedings of ML4Astro,*(2025). link, link
- Altıngün, A.M.; Kalemci, E.; **Öztaban, E.** *A simulation study for the expected performance of Sharjah-Sat-1 payload improved X-Ray Detector (iXRD) in the orbital background radiation. Experimental Astronomy* 56(1):117–140 (2023). arXiv link
- Kalemci, E.; Manousakis, A.; Fernini, I., ...; **Öztaban, E.**; et al. *Scientific contribution of Sharjah-Sat-1 to X-ray observations. International Astronautical Congress (IAC) Proceedings* (2021). link

Research Experience

HEALAB, Sabancı University, Istanbul, Turkey **Jul 2023 – Present**
Graduate Researcher (Advisor: Prof. Emrah Kalemci)

AI-based Detection of Dust-Scattering Halos in eROSITA **Jun 2025 – Present**
Developing CNN-based models with domain adaptation to detect dust-scattering halos in eROSITA survey images, trained on synthetic datasets with instrumental effects modeled using SIXTE.

RAPTOR: Photon Event Simulations **Mar 2025 – Present**
Contributed to the development & debugging of RAPTOR, a GRMHD ray-tracing code; implemented photon event recording with FITS I/O in C using OpenMP.

Multiwavelength Analysis of Dust-Scattering Halos using AI **Jul 2023 – Jun 2025**
Analyzed APEX, Chandra, and Swift data to infer 3D molecular cloud structure via ML methods; combined results with ray-tracing simulations runned parallel on HPC to constrain source distance. Work conitbuted my MSc thesis, presented at ML4Astro (2024) and published in MNRAS.

DTU Space, Lyngby, Denmark **Jun 2021 – Oct 2021**
Research Assistant (Advisors: Prof. Irfan Kuvvetli & Dr. Carol Anne Oxborrow)

Bootloader Design for ATHENA Wide Field Imager (ESA)
Contributed to control electronics for ESA's ATHENA Wide Field Imager; designed and documented a C/assembly bootloader with recovery features and tested it on the instrument's hardware.

Sabancı University, Istanbul, Turkey **2018 – 2022**
Undergraduate Research Assistant (Advisors: Profs. E. Kalemci, D. Demir, E. Göğüş, Y. Kaneko)

Background Classification for X-ray Detectors (Sharjah-Sat-1) **Sep 2020 – Jun 2022**
Developed ML/DL models for background classification using simulated datasets from GEANT4.

X-Ray Detector Development For Sharjah-Sat-1 **Sep 2020 – Jun 2022**
Conducted detector performance studies using Geant4 simulations and sensitivity calculations for X-ray detector of the cubesat payload. Co-authored 2 publications on detector performance

Vector Boson Scattering Analysis (OpenCMS) **Mar 2021 – Feb 2022**
Analyzed large-scale OpenCMS datasets using C++ and Python

Exoplanet Detection with TESS (Transit Method) **Jun 2018 – Sep 2020**
Applied transit photometry & FFT to TESS data; built Python tools for data analysis & visualization.

Conferences, Talks & Schools

- Attendee — IMPRS Heidelberg Summer School on AI in Astronomy (Heidelberg, Sep 2025) link.
- Talk — International Conference on Machine Learning for Astrophysics (Catania, Jul 2024) link, talk.
- Poster — Workshop on Advanced Techniques in Machine Learning (Foça, Aug 2024) link, poster.
- Attendee — Workshop on Spectral Analysis in X-ray Astrophysics (Istanbul, July 2023)link.
- Poster — Program for Undergraduate Research, Sabanci University (Istanbul, Aug 2020) link, poster.

Grants, Honors & Awards

- Sabancı University — Grant for International Conference Attendance (2024, 2025).
- TÜBİTAK — National MSc/MA Scholarship (2023–2025).
- Sabancı University — Full Scholarship for M.Sc. (2023).
- National HPC Competence Center — Winner in the EuroCC Computhon (2021).
- Erasmus+ Internship Mobility Grant (2021).
- Sabancı University — Award for Best Poster Presentation (2020).
- Sabanci University - National University Exam Achievement Scholarship (2017-2023).

Teaching

Instructor Assistant, Sabancı Digital Campus & Akbank, Istanbul, Turkey Mar 2025 – Present
Teaching support for professional education in Akbank and non-thesis master's programs, including courses in Cybersecurity, Data Analytics, Data Science, and Python. Responsibilities included teaching recitations, grading, and student support.

Teaching Assistant, Sabancı University, Istanbul, Turkey 2019 – Sep 2025
TA for 11 academic terms in core CS courses (Advanced Programming for Data Science, Data Structures, Algorithms, Advanced Programming, AI, Intro to Python) and Physics courses (Physics I, Oscillations/Waves/Optics). Led recitations, grading, prepared homework, and mentored projects.

Skills

Programming: Python, C/C++, MATLAB, SQL, UNIX; CUDA, OpenMP
Packages: PyTorch, scikit-learn, OpenCV, Matplotlib; JAX; HEASoft; Spark, Hadoop.
Design/Tools: SolidWorks Cadence, Verilog HDL; Git, LaTeX.
Languages: Turkish (native), English (fluent, IELTS 8), Spanish (beginner)

Industry Experience

Communications Team Member, Sabancı University June 2024 – Aug 2025
Consulted parents and candidate students about university preferences and organized campus tours and presentations

Data Scientist (OCR Team), John Snow Labs (remote) Sep 2022 – Mar 2023
Developed Python modules for Spark NLP OCR, data pipelines, and model evaluation.

Service & Outreach

- Member, Turkish Astronomical Society (2024–Present)
- Radio Broadcaster (2018–Present)
- Mentor, SistersLab, earthquake-affected regions project (2023–2024)
- Volunteer Programmer, Open Coding Network for Turkey earthquake (2023–2024)
- Founder & Chair, Science Club (2022–2024); Chair, Robotics Club (2021–2024)
- Instructor & Lab Assistant, Sabancı Küçükköy Creative Technologies Atelier (2019)
- Volunteer, Sabancı University, STEM in disadvantaged schools project (2017–2018)

References (available upon request)

Prof. Emrah Kalemci (Sabancı University, Istanbul, Turkey) — ekalemci@sabanciuniv.edu
Prof. İrfan Kuvvetli (DTU Space, Lyngby, Denmark) — irfan@space.dtu.dk
Prof. Ali Alpar (Sabancı University, Istanbul, Turkey) — ali.alpar@sabanciuniv.edu