

# Arif Solmaz, PhD

Assistant Professor | Computational Physicist | Scientific ML & Astrophysics

 arif.solmaz@istun.edu.tr

 arifsolmaz.github.io

 (+90) 538 614 29 38

 Istanbul, Turkey

## PROFILE

I am an astronomer with strong expertise in data science and machine learning applied to real-world scientific problems. My background includes developing AI-based classification and signal-detection methods for large, complex datasets, with experience working on space telescope data from missions such as TESS and JWST. I regularly apply Bayesian inference and time-series analysis to extract actionable insights from noisy data. I am accustomed to working in international, interdisciplinary teams and value reproducible, well-documented workflows. I also have significant teaching experience in computational physics, machine learning, and scientific programming.

## RESEARCH EXCELLENCE & INNOVATION

- **Interdisciplinary Leadership:** Successfully bridging astrophysics, machine learning, and applied sciences through funded research projects including prestigious TÜBİTAK and EU programs
- **Data Science & AI Applications:** Advanced proficiency in Bayesian inference, MCMC methods, time-series analysis, and deep learning for scientific classification tasks
- **International Collaboration:** Active contributor to multi-national research teams including ExoClock Project (100+ observers, 50+ countries), Europlanet ML Working Group, and multi-site stellar occultation campaigns
- **Research Impact:** Publications in high-impact international journals (Astronomy & Astrophysics, MNRAS, ApJS) with focus on methodological innovation and large-scale collaborations
- **Grant Success:** Principal Investigator on multiple national research projects; Project Coordinator for EU-funded international education initiative

## CORE EXPERTISE

- **Time-Series Analysis:** Bayesian parameter estimation, MCMC sampling, Gaussian Processes; uncertainty quantification for astronomical observations with systematic noise
- **Exoplanet Science:** Transit photometry and timing analysis; stellar activity characterization; integration of ground-based and space telescope data (TESS, JWST)
- **Machine Learning Applications:** Deep learning for image classification, transfer learning, model validation; applications in astronomy and materials science
- **Scientific Computing:** Python-based research pipelines for data acquisition, reduction, modeling, and publication-quality visualization; emphasis on reproducible workflows
- **Observational Astronomy:** CCD imaging systems, photometric calibration, telescope operations; multi-site observing campaign coordination

## TECHNICAL SKILLS

- **Programming Languages:** Python (expert), C, Bash; Git/GitHub version control; Linux research environments
- **Scientific Computing:** NumPy, SciPy, Pandas, Matplotlib; Astropy ecosystem (Astropy, Photutils, Lightkurve)
- **Statistical Methods:** Bayesian modeling, MCMC (emcee, PyMC), time-series modeling (celerite), Gaussian processes

- **Machine Learning:** Scikit-learn, TensorFlow/Keras; CNNs for image classification; transfer learning techniques
- **Research Tools:** LaTeX scientific writing, Jupyter notebooks, reproducible computational environments
- **Languages:** Turkish (native), English (advanced: YÖKDİL 87.5/100, 2022)

## EDUCATION

---

**PhD in Physics** Jan 2023  
**Çukurova University, Institute of Science** Adana, Turkey

- Dissertation: *Effects of Starspot Occultations on Exoplanet Transit Mid-time Measurements*
- Developed novel methods for handling systematic errors in astronomical time-series data caused by stellar surface features
- Advisors: Prof. Dr. Aysun Akyüz & Prof. Dr. Özgür BaşTÜRK (Ankara University)

**MSc in Space Sciences and Technologies** Oct 2010  
**Çanakkale Onsekiz Mart University, Institute of Science** Çanakkale, Turkey

- Thesis: *Extrasolar Planetary Systems: a status review*
- Comprehensive review of exoplanet detection methods and characterization techniques
- Advisor: Prof. Dr. Mehmet Emin ÖZEL

**BSc in Physics** Jan 2008  
**Çanakkale Onsekiz Mart University, Faculty of Arts and Sciences** Çanakkale, Turkey

- Undergraduate thesis: *Large Telescopes and Observing Sites*
- Advisor: Prof. Dr. Faruk SOYDUGAN

## ACADEMIC APPOINTMENTS

---

**May 2024 – Present** *Istanbul Health and Technology University (İSTÜN), Faculty of Engineering & Natural Sciences* Istanbul, Turkey  
**Assistant Professor**

Department of Mechatronics Engineering

- Teaching programming, robotics, and machine learning courses in English and Turkish
- Developing curriculum integrating computational physics, data science, and engineering applications
- Leading research projects in astrophysics and applied machine learning
- Supervising undergraduate research projects and thesis work

**Sep 2015 – Jun 2023** *Çağ University, Faculty of Arts and Sciences*  
**Lecturer** Mersin, Turkey

- Delivered quantitative and computational courses including Statistics and Computer Programming
- Developed digital learning materials and blended teaching approaches
- Supervised student projects emphasizing data analysis and computational thinking

**Feb 2011 – Sep 2015** *Çağ University, Faculty of Arts and Sciences*  
**Research Assistant** Mersin, Turkey

- Supported teaching and research activities with emphasis on computational methods
- Assisted in course development and student mentoring

## RESEARCH LEADERSHIP & FUNDED PROJECTS

---

### As Principal Investigator / Project Coordinator:

- **MILAGE: Technology Use in Mathematics Education** — EU Funded Project (Erasmus+ Programme). Sep 2015 – Sep 2018.  
International collaboration on digital tools and gamification in mathematics learning; coordinated multi-country partnership.
- **Geometric Modeling and Analysis of Exoplanet Transit Observations** — Scientific Research Project, Higher Education Institutions. Sep 2019 – 2020.  
Advanced Bayesian methods for parameter estimation from space telescope data; robust handling of stellar activity systematics.
- **Turkey Meteor Monitoring Systems and Network (Continuation Project)** — Scientific Research Project, Higher Education Institutions. Sep 2019 – 2020.  
Establishing automated detection systems and coordinating national observation network infrastructure.
- **Light Pollution Measurement Studies** — Scientific Research Project, Higher Education Institutions. Sep 2019 – 2020.  
Systematic monitoring and assessment of light pollution levels; developing measurement protocols and public awareness programs.

### As Research Fellow / Team Member:

- **Machine Learning-Based Microscopic Wood Species Identification System: An Image-Based Literature-Supported Approach** — TÜBİTAK-1002 (National Scientific Research Support Program). *Ongoing*.  
Developing deep learning models for automated wood species classification from microscopic images; applications in forestry and materials science.
- **Turkey Meteor Monitoring Systems and Network: Creation of National Impact Craters and Meteorites Database** — TÜBİTAK-1001 (Scientific and Technological Research Projects). *Jan 2014 – Jul 2017*.  
National network infrastructure and comprehensive database development.
- **Multi-faceted Analyses of Binary and Multiple Star Systems to Determine Star Formation Region Properties** — TÜBİTAK-1010 EVRENA (International Research Fellowship Programme). *2010 – 2013*.  
Observational and theoretical studies of stellar populations in star-forming regions.
- **Çukurova University UZAYMER Observatory: New CCD Project** — Funded Research Project, Çukurova University. *Jul – Sep 2020*.
- **Doğa Dostu Matematik** — TÜBİTAK Science Communication Project (Instructor). *Jul 2018 – Feb 2019*.
- **Science Outreach Projects** — Multiple TÜBİTAK science popularization projects (Instructor). *Various periods 2018–2021*.

## SELECTED PUBLICATIONS

---

Representative publications demonstrating research impact and international collaboration. Complete list available at [arifsolmaz.github.io](https://arifsolmaz.github.io)

### High-Impact Peer-Reviewed Publications:

- A high geometric albedo and small size for the Haumea cluster member (24835) 1995 SM55 determined from a stellar occultation and photometric observations  
*Astronomy & Astrophysics*, 703, A147, 2025 · Multi-site international observing campaign
- Testing the performance of cross-correlation techniques to search for molecular features in JWST NIRSpec G395H observations of transiting exoplanets  
*Monthly Notices of the Royal Astronomical Society*, 543, 3456, 2025 · Advanced data analysis methodology

- ExoClock Project IV: A homogeneous catalogue of 620 updated exoplanet ephemerides  
*arXiv preprint*, arXiv:2511.14407, 2025 · Large-scale international collaboration (100+ authors)
- ExoClock Project III: 450 New Exoplanet Ephemerides from Ground and Space Observations  
*The Astrophysical Journal Supplement Series*, 265, 4, 2023 · Contributing author (60+ coauthors)
- Leke Örtülmelerinin Ötegezegen Geçiş Ortası Zaman Ölçümlerine Etkisi (Effects of Starspot Occultations on Exoplanet Transit Mid-Time Measurements)  
*Turkish Journal of Astronomy and Astrophysics*, 4, 147, 2023 · PhD dissertation summary
- Physical properties of the trans-Neptunian object (38628) Huya from a multi-chord stellar occultation  
*Astronomy & Astrophysics*, 664, A130, 2022 · International coordinated observations
- BO Ari Light Curve Analysis using Ground-Based and TESS Data  
*New Astronomy*, 86, 101571, 2021 · Ground-space data integration
- The First Light Curve Solutions and Period Study of BQ Ari  
*Astronomy Letters*, 47, 402, 2021

#### **Conference Proceedings & Community Contributions:**

- Artificial Intelligence in Planetary Science and Astronomy: Applications and Research Potential  
EPSC-DPS Joint Meeting 2025, EPSC-DPS2025-1467 · Invited presentation
- Europlanet Machine Learning Working Group: a year of progress  
EPSC-DPS Joint Meeting 2025, EPSC-DPS2025-1815 · Working group coordination
- Breaking Free of the Classroom: Implementing Digital Media to Enhance Students' Involvement in Learning Mathematics  
ICERI2016 Proceedings, 2016 · Educational innovation

## **INTERNATIONAL COLLABORATION & ACADEMIC SERVICE**

---

- **ExoClock Collaboration:** Contributing member coordinating ground-based observations and ephemeris refinement for transiting exoplanets; part of international network spanning 100+ observers across 50+ countries
- **Europlanet Machine Learning Working Group:** Active participant fostering AI/ML applications in planetary science; presenting research findings and coordinating community efforts
- **Multi-Site Stellar Occultation Campaigns:** Coordinating international observations for physical characterization of trans-Neptunian objects; managing data analysis and collaborative publications
- **Peer Review Service:** Reviewer for international astronomy and planetary science journals
- **Scientific Community Engagement:** Regular presenter at international conferences (EPSC-DPS, ICERI); active participant in astronomical research networks

## **TEACHING EXPERIENCE**

---

#### **Current Teaching (2024–2025 Academic Year):**

- Computer Programming I (English & Turkish) — Introduction to programming, algorithms, Python fundamentals
- Computer Programming II (English & Turkish) — Advanced programming concepts, data structures
- Object-Oriented Programming (English & Turkish) — OOP principles, design patterns, software engineering
- Robotics (Turkish) — Control systems, sensor integration, autonomous systems
- Machine Learning (Turkish) — Supervised/unsupervised learning, neural networks, practical applications

#### **Previous Teaching Experience:**

- Statistics — Descriptive and inferential methods, applied statistical computing, data visualization
- Quantitative Methods — Mathematical foundations for data analysis and modeling
- Programming Courses — Multiple levels from introductory to advanced topics

#### **Teaching Philosophy & Innovations:**

- Developed project-based learning modules integrating real-world datasets and problems
- Emphasis on reproducible research practices and version control (Git/GitHub)
- Created computational physics and astronomy data analysis course materials
- Supervised undergraduate research projects in data science and astronomy applications
- Extensive experience in English-medium instruction across technical disciplines

## **LEADERSHIP & ADMINISTRATIVE SERVICE**

---

#### **• Coordinator, Scientific Research Projects Coordination Unit (BAP)**

Çağ University Rectorate 2020–2021  
Managed university research project administration, budget oversight, and reporting

#### **• Executive Board Member**

Çağ University Space Observation Application and Research Center (UZAYMER) 2012–2023  
Contributed to strategic planning and research direction for university observatory

## **SCIENCE OUTREACH & PUBLIC ENGAGEMENT**

---

#### **• Science Outreach Network Turkey Contact Point**

European Southern Observatory (ESO) 2010–2022  
Coordinated science communication activities and educational resource distribution

#### **• Turkey Representative**

Universe Awareness (UNAWE) International Program 2011–2015  
Led astronomy education programs for underprivileged children

#### **• Science Communication Projects**

Multiple TÜBİTAK-funded public engagement initiatives 2018–2021  
Developed and delivered astronomy and mathematics outreach programs

## **PROFESSIONAL MEMBERSHIPS**

---

- **International Astronomical Union (IAU)** — Member 2024 – Present
- **European Astronomical Society (EAS)** — Member 2021 – Present
- **Turkish Astronomical Society (TAD)** — Member 2009 – Present
- **European Association for Astronomy Education (EAAE)** — Board Member 2009 – Present
- **American Association of Variable Star Observers (AAVSO)** — Member 2008 – 2020
- **Astronomy Without Borders (AWB)** — Advisor 2009 – 2015
- **International Dark-Sky Association (IDA)** — Advisor 2009 – 2020
- **NASA Museum Alliance** — Member 2008 – 2020