Arif Solmaz, PhD

Assistant Professor | Computational Physicist | Scientific ML & Astrophysics

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📍 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*
Assistant Professor   Istanbul, Turkey
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

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*

Complete publication list, research code, and teaching materials available at arifsolmaz.github.io
References available upon request