KAROLINA DZIADURA

Astronomer, Ph.D.

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CURRENT POSITION

Postdoctoral Researcher at Minor Planet Center
Center for Astrophysics | Harvard & Smithsonian

Astrophysicist and researcher with a strong background in asteroid orbit determination and data analysis. Focusing on asteroid dynamics and high-precision astrometry under Dr. Federica Spoto's supervision.

EDUCATION

Adam Mickiewicz University in Poznań
Astronomical Observatory Institute

- **PhD in Astronomy (2024)**
  Thesis: "Determination of physical and dynamical properties of asteroids observed by the Gaia mission."
  Supervisors: Prof. P. Bartczak, Dr. hab. D. Oszkiewicz
- **MSc in Astronomy (2019)**
  Thesis: "Determining the sizes of asteroids based on stellar occultations." Supervisor: Prof. P. Bartczak
- **BSc in Astronomy (2017)**
  Thesis: "Analysis of formal uncertainties in determining asteroid rotational periods using Fourier series." Supervisor: Dr. hab. D. Oszkiewicz

EXPERIENCE

Participated in 5 grants as a researcher and secured 2 grants as Principal Investigator (PI):

Principal Investigator at:
- **Improving Orbits of Potentially Hazardous Asteroids (pl. PRELUDIUM)**
  Funder: National Science Centre, Poland (2023-2024)
  Research focused on improving the accuracy of asteroid orbit determinations, with particular emphasis on the photocenter-barycenter effect.
- **Detection of the Yarkovsky Effect through Enhanced Astrometric Measurements (pl. Diamentowy Grant)**
  Funder: Ministry of Science and Higher Education, Poland (Young Researcher Grant) (2018-2022)
  Computing orbits of asteroids using Gaia asteroid astrometry along with observations from MPC.

Researcher at:
- **A statistically sound model for astrometric uncertainties to improve NEO orbit accuracy**
  Funder: NASA YORPD23 grant (2024-now)
  Developing a statistically robust model for astrometric uncertainties aimed at automatically improving the accuracy of near-Earth object orbits, PI Dr. Federica Spoto.
- **From Historical Plates to the Gaia Mission – A Deep Dive into NEOs**
  Funder: NAWA: Polonium – bilateral exchange between Poland and France
  Collaboration with Paris Observatory focused on developing calculations using NIMA and OrbFit to analyze the photocenter-barycenter effect in Gaia observations, PI Dr. Dagmara Oszkiewicz.

AWARDS & GRANTS

Important Achievements and Grants

🏆 **2023**
PRELUDIUM 21 Grant from National Science Centre, Poland for the project: Improving Orbits of Potentially Hazardous Asteroids.

🏆 **2018**
Diamond Grant 7th (pl. Diamentowy Grant VII) from the Ministry of Science and Higher Education, Poland.

🏆 **2017**
Ministerial Scholarship for outstanding academic achievements, Ministry of Science and Higher Education, Poland.

Conference Awards and Travel Scholarships

🏆 **2020**
Best Presentation Award at KSAKN Conference, University of Warsaw, Poland.

🏆 **2019**
NEON Observing School travel award funded by Rozhen Observatory, Bulgaria.

🏆 **2019**
Natural Space Risks 2019 travel award, Paris Observatory, France.

🏆 **2018**
Best Presentation Award at OSSA Conference, Nicolaus Copernicus University, Toruń, Poland.

🏆 **2018**
Travel award for the Workshop in Geology and Geophysics of the Solar System, Petnica, Serbia.

🏆 **2018**
Best Poster Award at KSAKN Conference, Jagiellonian University, Kraków, Poland.

🏆 **2017**
Best Presentation Award at KSAKN Conference, University of Warsaw, Poland.

Sports and Extracurricular Distinctions

🏆 **2018**
UAM Sports Scholarship for outstanding achievements, Poznań, Poland.

🏆 **2017**
UAM Rector's Award for best student-athletes at Adam Mickiewicz University, Poznań, Poland.

- **Service for Archival NEO Orbital and Rotational Data Analysis**
  Funder: European Space Agency (ESA) Project
  Participated in modifying software to improve the accuracy of asteroid rotation period determination - *Research Intern.*
- **Small Bodies: Near and Far**
  Funder: Horizon 2020: Small Bodies – Near and Far
  Collaborated on developing methods and software for analyzing asteroid occultation data to model asteroid shapes and spins - *Research Intern.*
- **Against the Observational Bias in Physics of Asteroids**
  Funder: National Science Centre, Poland
  Determined the sizes of a few asteroids based on stellar occultation data - *Research Intern.*

PEER-REVIEWED PUBLICATIONS

3 first-author publications and 4 co-authored publications:

- **Assessing the detection of the Yarkovsky effect using the Gaia DR3 and FPR catalogues**
  K. Dziadura, P. Bartczak, D. Oszkiewicz
  Astronomy & Astrophysics, 693, A31 (2025)
- **The Yarkovsky effect and bulk density of near-Earth asteroids from Gaia DR3**
  K. Dziadura, D. Oszkiewicz, F. Spoto, B. Carry, P. Tanga, P. Bartczak
  Astronomy & Astrophysics, 680, A77 (2023)
- **Investigating the most promising Yarkovsky candidates using Gaia DR2 astrometry**
  K. Dziadura, D. Oszkiewicz, P. Bartczak
  Icarus, 383, 115040 (2022)
- **The Interstellar Medium in the Environment of the Supernova-less Long-duration GRB 111005A**
  A. Leśniewska, M.J. Michałowski, P. Kamphuis, K. Dziadura, M. Baes, ...
  The Astrophysical Journal Supplement Series, 259 (2), 67 (2022)
- **Physical parameters of selected Gaia mass asteroids**
  E. Podlewska-Gaca, A. Marciniak, V. Alí-Lagoa, P. Bartczak, T.G. Müller, ...
  Astronomy & Astrophysics, 638, A11 (2020)
- **Photometric survey, modelling, and scaling of long-period and low-amplitude asteroids**
  A. Marciniak, P. Bartczak, T. Müller, J.J. Sanabria, V. Alí-Lagoa, ...
  Astronomy & Astrophysics, 610, A7 (2018)
- **VizieR Online Data Catalog: Photometry and models of long-period asteroids (Marciniak+, 2018)**
  A. Marciniak, P. Bartczak, T. Müller, J.J. Sanabria, V. Alí-Lagoa, ...
  VizieR Online Data Catalog, J/A+A/610/A7 (2017)

INTERNATIONAL CONFERENCES

14 presentations (4 invited talks) and 7 posters:

Talks
- Jan 2025 – 32nd Meeting of the NASA Small Bodies Assessment Group (SBAG) – Detection of the Yarkovsky Effect and Asteroid Density Determination Using Gaia Astrometric Data
- Jul 2023 – The Milky Way Revealed by Gaia: The Next Frontier – University of Barcelona, Spain – The Photocenter-Barycenter Effect in Gaia Astrometry and its Impact on Asteroid Orbit Determination
- Jul 2023 – European Astronomical Society Annual Meeting – Kraków, Poland – The Photocenter-Barycenter Offset of Near-Earth Objects: Insights from the Gaia Data Release 3
- Jun 2023 – Asteroids, Comets, Meteors Conference – Lowell Observatory, Northern Arizona University, Flagstaff, USA – Determining the Yarkovsky Effect A2 and Asteroid Density with Ultra-Precise Astrometry from Gaia DR3

2015–2019
UAM Rector's Scholarship for the best students, awarded annually for academic excellence.

TEACHING AND ADVISING

Teaching:
- Introduction to Python Programming (for beginners)
- Astronomy for Geoinformatics Students
- General Astronomy
- Astrodynamics (assisting with teaching)

Advising:
- Currently supervising a master's thesis focusing on asteroid dynamics and data analysis.

Leadership and Student Support:
- Organized a student conference during my term as president of the Astronomy Student Association.
- Secured multiple small grants from AMU to fund conference travel and other activities for students.

OUTREACH

Astro Comic: A Star is Born (2023)
Engages the public in space science through illustrative storytelling. Accessible online at: bluemoon.edu.pl.

Science Radio Show Host | Radio Afera
Weekly broadcasts covering astronomy topics, making science accessible to a broad audience.

Podcast Creator | Good Night Podcast
Discusses light pollution and other important astronomical topics.

Public Talks & Workshops
Delivered multiple popular science presentations and interactive workshops at the Cambridge Science Festival, as well as in Poland and the Czech Republic, including events such as European Researchers' Night, the Art and Science Festival, and the Anniversary of the Discovery of the Posnania Asteroid.

Co-founder | Good Night Collective (2017 – now)
An interdisciplinary group combining science and art, dedicated to popularizing astronomy and raising awareness about light pollution.
Key Achievements:
- Collaborated with Delta Optical, Skoda, Witchen and Solar and release a series of night-sky-inspired clothing, based on observations made during our expedition.

- Sep 2022 – 16th Europlanet Science Congress, Spain – Computing the Yarkovsky Effect for Asteroids in Gaia DR3
- Oct 2021 – AAS Division for Planetary Sciences Meeting #53 – Detection of the Yarkovsky Effect for the Most Promising Yarkovsky Candidates
- Oct 2021 – 15th European Planetary Science Congress, EPSC2021-132 – Yarkovsky Drift Detectability Using Gaia DR2 Asteroid Astrometry
- Aug 2021 – 40th European Symposium on Occultation Projects (ESOP) – Stellar Occultation Method of Asteroids Size and Orbit Determination
- Sep 2020 – 14th European Planetary Science Congress, EPSC2020-953 – Detecting the Yarkovsky Effect Using the Gaia DR2 Catalogue
- Sep 2019 – XL Congress of the Polish Astronomical Society, Szczecin, Poland
- Jan 2019 – Gaia School, University of Toruń, Poland – **Detection of the Yarkovsky Effect Based on Refined Astrometric Measurements (Invited Talk)**
- **Invited Seminars – Observatoire de la Côte d'Azur, Nice, France, University of Warsaw and University of Toruń**
- Multiple presentations at home institution seminars – Adam Mickiewicz University, Poznań, Poland

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Posters
- Sep 2023 – XLI Congress of the Polish Astronomical Society, Toruń, Poland
- Apr 2023 – Planetary Defence Conference, Vienna, Austria – Photocenter Offset: Case Study of Two NEAs
- Oct 2022 – AAS Division of Planetary Science Meeting #54, Canada – The Yarkovsky Effect Among Asteroids in Gaia DR3
- Apr 2019 – 53rd ESLAB Symposium: The Gaia Universe – Systematic Astrometric Biases in Stellar Catalogues Compared to Gaia DR2
- Oct 2018 – AAS Division for Planetary Sciences Meeting #50 – Star Occultations by Asteroids
- Sep 2019 – XXXIX Congress of the Polish Astronomical Society, Olsztyn, Poland – Determining the Sizes of Asteroids Based on Stellar Occultation Data
- Sep 2017 – XXXVIII Congress of the Polish Astronomical Society, Zielona Góra, Poland – Analysis of Formal Uncertainties in Determining Asteroid Rotational Periods Using Fourier Series

INTERNATIONAL COLLABORATIONS

Oct 2023 – IUFACyT, University of Alicante, Spain

March 2023 – Observatoire de la Côte d'Azur, Nice, France

July 2022 – Paris Observatory, IMCCE, Paris, France

April-May 2022 – Minor Planet Center, CFA, Harvard & Smithsonian, Cambridge, USA

Nov 2021 – Observatoire de la Côte d'Azur, Nice, France

- Organized an expedition to Chile for the total solar eclipse.
- Published articles in the magazine "Astronomia" and contributed to media outreach through radio interviews and features in "Życie Uniwersyteckie."

Mission: Promoting the beauty of the night sky and educating the public on the environmental impacts of artificial light pollution.

SKILLS

Technical Skills
- **Programming & Data Analysis:** Python (Pandas, NumPy, SciPy, Seaborn, Astropy, Astroquery, Matplotlib), Jupyter, Bash, Basic SQL, C/C++
- **Tools & Software:** Git, LaTeX, Photoshop, OrbFit

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Scientific Skills
- Writing and managing grant proposals (e.g., PRELUDIUM 21, Diamond Grant)
- Publishing scientific papers in peer-reviewed journals
- Delivering professional presentations at international conferences
- Organizing and leading educational workshops
- Telescope observations and data collection
- Orbital fitting and analysis (OrbFit)
- Handling large datasets and developing computational models
- Supervising and mentoring students
- Conference organisation

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Languages
- **Polish** ●●●●●
- **English** ●●●●●
- **Spanish** ●●●○○
- **Python** ●●●●◐

OTHER

Certifications
- 1 Dan Karate (Certified Instructor)
- PADI Divemaster (Scuba Diving up to 40m)

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Hobbies
- Extreme sports: scuba diving, moto trial
- Exploring health, wellness, and yoga
- Knitting and caring for plants
- Astronomy outreach and stargazing