Achrène DYREK

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CURRENT POSITION

- Upcoming: **Space Telescope Science Institute** (STScI) **Fellow** in EXOPLANETOLOGY (Oct. 2024 – Oct. 2028)
  Space Telescope Science Institute (Baltimore, USA)
  50 % - Mission support on the JWST NIRCam instrument
  50 % - Independent research on exoplanetary science

- **Postdoctoral Research Fellow** in EXOPLANETOLOGY (Oct. 2023- Sept. 2024)
  French Alternative Energies and Atomic Energy Commission CEA (Saclay, FR)

  Leadership roles:
  Member of the JWST Early Release Science and Guaranteed Time Observation teams, and the Ariel European Consortium
  Project leader "Detection of SO_2, silicate clouds but no CH_4 in the atmosphere of the super-Neptune WASP-107b"
  Project leader "Detection of non-transiting companions orbiting a KOI and TOI F-type stars"
  Developer of the MIRISIM-TSO, ExoPhotometry and SIMRA simulation and modelling softwares
  Co-I of accepted proposals for **JWST Cycle 2**, Co-I of **HARPS-N** accepted proposal
  PI of a **JWST Cycle 3** accepted calibration proposal for exoplanetary science with MIRI

EDUCATION

- **Ph.D.** in ASTROPHYSICS (2020-Oct. 2023)
  French Alternative Energies and Atomic Energy Commission CEA (Saclay, FR)
  Title: Characterizing exoplanetary atmospheres with the James Webb Space Telescope – Supervisor: Prof. P.O. Lagage

- **Master's degree (MSc)** in Astronomical and Space-based Systems Engineering (2019-2020)
  Paris Observatory (FR) – ranked top 1% – head of class
- **Master's degree (MSc)** in Industrial Engineering (2016-2019)
  National Polytechnic Institute ENSIACET (FR) – ranked top 1% – grade: distinction
- **CPGE: Equivalent to Bachelor's degree** in Mathematics and Physics (2014-2016)
  Lycée Lakanal and Université Paris-Saclay (FR) – Grade: A

INTERNATIONAL COLLABORATIONS

- **University College London (UCL)** – London (UK): Collaboration with Prof. G. Tinetti as part of the ESA Ariel mission
- **Space Telescope Science Institute (STScI)** – Baltimore (USA): Collaboration with Dr S. Kendrew in the context of JWST MIRI Commissioning and with Dr Q. Changeat on atmospheric retrievals and phase-curve analysis
- **NASA Ames Research Center** – California (USA): Collaboration with Prof. T. Greene and Dr T. J. Bell on JWST data analysis
- **Max Planck Institute for Astronomy** – Heidelberg (GE): Collaboration with Dr J. Bouwman on JWST data reduction methods
- **Institute of Astrophysics of the Canary Islands (IAC)** – Tenerife (SP): Collaboration with Prof. E. Palle on ground-based atmospheric spectroscopy
- **Chalmers University of Technology** – Göteborg (SE): Collaboration with Dr G. Morello on Spitzer data reduction and JWST phase-curve observations
- **Catania Astrophysical Observatory** – Catania (IT): Collaboration with Dr S. Breton on star-planet interaction
- **Paris Observatory** – Paris (FR): Collaboration with Dr E. Ducrot on TRAPPIST-1 system characterisation

INVITED AND CONFERENCE TALKS

- **Conference talk** – French Society of Astronomy and Astrophysics, Marseille, France (June 2024)
- **Invited seminar** – Space Telescope Science Institute, Baltimore (Feb. 2024)
- **Invited seminar** – Institute of Astronomy of V. N. Karazin Kharkiv National University, Kharkiv, Ukraine (Jan. 2024)
- **Invited seminar** – Max Planck Institute for Astronomy, Heidelberg (Dec. 2023)
- **Invited seminar** – Dublin Institute for Advanced Studies, Dublin (Sept. 2023)
- **Invited seminar** – French Physical Society, Paris (March 2023)
- **Invited seminar** – Institute of Astrophysics of the Canary Islands (IAC), Tenerife, Spain (Sept. 2022 and April 2023)
- **Session convener and conference talk** – ExoSystemes III, Marseille, France (Jan. 2023)
- **Chair, Session convener and Conference talk** – Europlanet Science Congress, Granada, Spain (Sept. 2022)
- **Invited talk** – Ariel Consortium Meeting, Orsay, France (June 2022)
- **Conference talk** – French Society of Astronomy and Astrophysics, Besançon, France (May 2022)
- **Conference poster** – American Astronomical Society Exoplanet IV, Las Vegas, USA (March 2022)

*PEER-REVIEWED ARTICLES**

- **A. Dyrek**, E. Ducrot, P.O. Lagage, P. Tremblin, S. Kendrew, J. Bouwman, R. Bouffet, "Transiting exoplanets with JWST MIRI: from simulations to observations", A&A, accepted, 2024, https://doi.org/10.1051/0004-6361/202347127
- **A. Dyrek** et al., on behalf of the JWST MIRI Guaranteed Time Observation Team, "SO2, silicate clouds, but no CH4 detected in a warm Neptune", Nature, 2023, https://doi.org/10.1038/s41586-023-06849-0
- **A. Dyrek** & S. N. Breton et al., "A non-transiting companion around a hot solar-type pulsator? The puzzling case of KIC 9139163", A&A, in prep., 2024.

- Ducrot E., P-O. Lagage, M. Min, […], **A. Dyrek**, "Combined analysis of the 12.8 and 15 microns JWST/MIRI eclipse observations of TRAPPIST-1 b", Nature Astronomy, submitted, 2023
- L. Welbanks, T. J. Bell, T. G. Beatty […], **A. Dyrek**, "A high internal heat flux and large core in a warm neptune exoplanet", Nature, 2024, https://doi.org/10.1038/s41586-024-07514-w
- D. Powell et al., on behalf of the transiting exoplanet ERS team (DDT), "Detection of SO2 in the Mid-Infrared Transmission Spectrum of WASP-39b", Nature, 2024, https://doi.org/10.1038/s41586-024-07040-9
- T.J. Bell et al., on behalf of the transiting exoplanet **ERS MIRI team**, "Nightside clouds and disequilibrium chemistry on the hot Jupiter WASP-43b", Nature Astronomy, 2024, https://doi.org/10.1038/s41550-024-02230-x
- T. Greene, T. J. Bell, E. Ducrot, **A. Dyrek**, P.O. Lagage et al., "Discovery of Thermal Emission from the Earth-sized Exoplanet TRAPPIST-1 b using JWST", Nature, 2023, https://doi.org/10.1038/s41586-023-05951-7
- Q. Changeat, J. W. Skinner, A. F. Al-Refaie, J. Y-K. Cho, **A. Dyrek**, "Time variable weather on the exoplanet WASP-121b.", ApJ Letters, 2023, https://doi.org/10.48550/arXiv.2401.01465
- T. J. Bell, L. Kreidberg, S. Kendrew, […], **A. Dyrek**, P. Gao et al., on behalf of the Transiting Exoplanet Community Early Release Science Team, "A First Look at the JWST MIRI/LRS Phase Curve of WASP-43b", 2023, https://doi.org/10.48550/arXiv.2301.06350
- Eliza M.-R. Kempton, Michael Zhang, […], E. Ducrot, **A. Dyrek**, P.O. Lagage et al., "A thermal emission phase curve of the sub-Neptune exoplanet GJ 1214b", Nature, 2023, https://doi.org/10.1038/s41586-023-06159-5
- G. Morello, **A. Dyrek.**, Q. Changeat, P.O. Lagage, et al., "Spitzer thermal phase-curve of WASP-121b", A&A, 2023, https://doi.org/10.1051/0004-6361/202346643
- S. Kendrew, […], **A. Dyrek**, "Performances of the JWST MIRI Low Resolution Spectrometer", A&A, in prep., 2023
- G. Morello, **A. Dyrek**, Q. Changeat, "Is binning always sinning? The impact of time-averaging for exoplanet phase curves", MNRAS, 2022, https://doi.org/10.1093/mnras/stac2828
- P. Bouchet, P.O, Lagage, R. Gastaud, O. Bombardi, **A. Dyrek**, S. Ronayette, et al., "Characterization of the MIRIM double prism assembly: implications for transit observations of exoplanets", Proceedings in the SPIE, 2022, https://doi.org/10.1117/12.2629778
- O. Corpace, J.C. Barrière, A. Bounab, O. Cloué, **A. Dyrek**, J. Fontignié, et al., "A Cryogenic Actuator for the Image Derotator on ELT-METIS", Proceedings in the SPIE, Vol. 11451, 2020, https://doi.org/10.1117/12.2560259

*For articles under review, the most recent draft can be provided upon request.

- **Reviewer** for Astronomy&Astrophysics

TEACHING

- **"Hands-on" session leader** on JWST MIRI data reduction at ExoSystemes III conference (2023)
- **Teaching to about 40 PhDs/PostDocs** at "Les Houches" Physics School, The Alps, France (Sept. 2022) – ExoAtmsophere summer school on JWST, Ariel and ground-based Observatories, teaching JWST MIRI data reduction
- **Student supervising:** M. Rémi Bouffet (2022), Ms. Sofia Topsi Moutesidou (2023) and M. David Simonian (2023)
- **Undergraduate physics and computing teacher** at Paris Cité University (2021-2022): teaching bachelor's students (oscillating systems, wave propagation, electromagnetism and computing)

AWARDS and PRIZES

- French "**Elles en Seine - Remarkable Women**" **trophy winner,** March 2024
- **Medal of 2024 Merit award** received from hometown Massy, France
- **Award winner** of the **L'Oréal-UNESCO** Rising Talent "For women in science" program 2023

MANAGEMENT and LEADERSHIP

- **Member of the "Women and Science"** Association membership, France (started 2023)
- **Doctoral candidates' representative** at STEP'UP 560 doctoral school, Paris, France (2021-2023)
- **Co-founder and vice-president** of the "**Cadeau engagé**" French association membership (started 2020)
- **Mentor program founder** at the National Polytechnic Institute (INP) **International Club**, Toulouse, France (2016-2019)

OUTREACH, PRESS and MEDIA

- **Conference** on gender equity on the International Women's Rights Day at the Museum of Natural History in Paris (March 2024)
- **Outreach conference** as L'Oréal-UNESCO ambassador at the City of Science and Industry in Paris (Oct. 2023)
- **Outreach conference** in middle school classes in France (March and Jan. 2024, Dec. and Oct. 2023)
- **Interviews** for Le Parisien, The Guardian, Courrier International and The Earth & Space Science News (2023)
- **Invited seminar** at the City of Science and Industry in Paris (Jan. 2023)
- **Press conference** at the JWST Press conference organized by CEA-CNRS-CNES-Paris Observatory (July 2022)
- **Interview** on JWST for Arte-Twitch (July 2022) and **Outreach video** for the **"C'est toujours pas sorcier"** documentary (April 2022)
- **"Space Bus" Program** in Dieppe, France (March 2022)
- **General public conference** in Cayenne, French Guiana (Dec. 2021)
- **"Guiana to the stars" Program**, a three-week outreach program in French Guiana. We went to middle schools, and high schools and did general public conferences about Astronomy. We also promoted science among the youngest generations (Dec. 2021)

OTHER PROFESSIONAL EXPERIENCES

- CEA Paris, Institute of Research into the Fundamental Laws of the Universe, Saclay, France (March-August 2019 and 2020)
  Internship in Astrophysics: Optimizing transit observations in the era of JWST and Ariel - Infrared astronomy with ELT - METIS instrument model (in association with KU Leuven Institute of Astronomy)

- RENAULT Group, Curitiba, Brazil (May-August 2018)
  Internship in Industrial Engineering: Engine production from diecast aluminium to assembly
  Developed the engines' pressure test optimisation plan.

SKILLS

Digital: Microsoft Office / LateX / ProSim / Autocad / Simulink / Femm / Femap
Programming: Python / C++ / Matlab / R / SQL / Java
Language: French (mother tongue), English (fluent C2), Armenian (fluent C2), Spanish (advanced C1), Portuguese (beginner A2)

HOBBIES AND INTERESTS

Sports: Ballet (17 years of practice)
Music: Piano player (15 years of practice, advanced level)
Aerospace field: Application to the 2021 ESA astronaut recruitment campaign / Flying experience (light aircrafts and gliders) / Attended the JWST launch from the Europe's SpacePort (ESA) in French Guiana
Humanitarian project: Armenia (July 2020), renovated a school, coordinated activities with children and provided essential products to refugees