Elyar **Sedaghati**

Astronomer · Astrophysicist

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Education

DLR & ESO (German Space Agency, European Southern Observatory)

Berlin, Germany & Santiago, Chile

PhD in Astronomy & Astrophysics — *Oct. 2014 - Jun. 2017*

- **Thesis**: Exploring Alien Skies: *Detection & Characterisation of Exoplanetary Atmospheres with Groundbased Transmission Spectroscopy*
- **Defence**: 30. Jun. 2017. **Summa Cum Laude**
- **Advisors**: Prof. Heike Rauer (DLR) & Dr. Henri Boffin (ESO)

Freie Universität Berlin

Berlin, Germany

Master's in Physics & Astronomy — *2012 - 2014*

- **Thesis**: 1-year research project of exoplanet transmission spectroscopy with FORS2/VLT. **Grade 1.0**
- **Grade**: 120 ECTS (European Credit Transfer System) credits. **Overall grade 1.5 (Scale 1.0 to 5.0)**

Clare College, Cambridge University

Cambridge, United Kingdom

Master's of Arts, Natural Sciences — *2008*

- Awarded automatically to all graduates of Cambridge University.

Clare College, Cambridge University

Cambridge, United Kingdom

Bachelor's of Arts, Natural Sciences — *2001 - 2004*

- **1st year:** Physics Ia, Mathematics Ia, Computer sofware, Computer hardware
- **2nd year:** Physics Ib, Advanced Physics II, Mathematics Ib.
- **3rd year:** Part II Astrononmy at the IoA.

Vocational Experience

European Southern Observatory

Santiago, Chile

Faculty Staff Astronomer — *Jul. 2022*

- FORS2 instrument scientist
- ESPRESSO instrument scientist (#2)
- ELT-ANDES contact point (future instrument scientist)
- Chair of the ESO-ALMA colloquium team

Universidad Adolfo Ibáñez – Instituto Milenio de Astrofísica

Santiago, Chile

Post-doctoral Research Fellow — *Sep. 2021 - Jul. 2022*

- Membership of ACCESS collaboration, exoplanet transmission spectroscopy survey.

Instituto de Astrofísica de Andalucía

Granada, Spain

Post-doctoral Research Fellow — *Oct. 2020 - Sep. 2021*

- CARMENES consortium, atmospheric working group.
- ELT-ANDES Scientific Technical Committee (was offered to lead the group at IAA).

European Southern Observatory

Santiago, Chile

VLT support astronomer (UT1 & UT3), Post-doctoral Fellow — *Aug. 2017 - Oct. 2020*

- Support astronomer for UT1 & UT3 at Paranal observatory.
- Operational certifications for FORS2, KMOS, NACO, ESPRESSO, SPHERE instruments.
- Instrument follow for FORS2 & ESPRESSO instruments, with training certification.

Internationale Schule Frankfurt Rhein–Main

Frankfurt am Main, Germany

Head of Science Department — *2006 - 2012*

- Teacher of Physics and Mathematics at the school, as well as head of science responsible for some 10 teachers in the department.

CVC Capital Partners

London, United Kingdom

Financial risk analyst at the proprietary desk — *2004 - 2006*

- Management of financial accounts and assessment of risk for a variety of portfolios.

Professional Skills

Research interests	Exoplanet atmospheres [observations & modelling], Low-resolution multi-object spectrophotometry, High-resolution spectroscopy, non-LTE, non-/equilibrium chemistry, 1D/2D/3D atmosphere models, Atmospheric retrieval algorithms for low & high resolution spectra, Planet formation theories through observations of the Rossiter-McLaughlin effect, Telluric correction of high resolution spectra. Astronomical instrumentation.
Programming Languages	Python [preferred], bash, html/css, IDL [basic], JavaScript [basic]
Data handling/reduction	IRAF, PyRAF, Esoreflex/Esorex, Gasgano, Skycat, FIMS, Molecfit, PySQL
Web interface & misc.	HTML/CSS, Django with Python, LaTeX
Analysis techniques	Bayesian inference with MCMC & MultiNest, Machine Learning, Gaussian Processes, Cross Correlation analysis
Python interests	Multi-threading, multi-processing, GPU acceleration, vectorization, OOP
Python modules	ARoMEpy: theoretical Rossiter-McLaughlin effect translated from a C library and added orbit functions **Github repo.**

Publications & Conferences (selected)

Main author Peer-Reviewed (>337 citations)

- **Sedaghati E.**, Jordán A., Brahm R., Muñoz D., Petrovich C., Hobson M., (2023). *Orbital alignment of eccentric warm Jupiter TOI-677 b* **AJ**, 163, 3, 130, 12. [3 citations]
- **Sedaghati E.**, Sánchez-López A., Czesla S., López-Puertas M., Amado P., Palle E., et al., (2022). *Moderately misaligned orbit of the warm sub-Saturn HD 332231 b* **A&A**, 659, A44 [8 citations]
- **Sedaghati E.**, MacDonald R. J., Casasayas-Barris N., Hoeijmakers H. J., Boffin H. M. J., Rodler F., Brahm R., et al., (2021). *A Spectral Survey of WASP-19b with ESPRESSO.* **MNRAS**, 505, 1, 435-458 [25 citations]
- **Sedaghati E.**, Boffin, H. M. J., MacDonald, R. J., Gandhi, S., Madhusadhan, N., Gibson, N. P., Oshagh, M., Claret, A. & Rauer, H. (2017). *Detection of titanium oxide in the atmosphere of a hot Jupiter.* **Nature**, 549, 238-241 [181 citations]
- **Sedaghati E.**, Boffin, H. M. J., Delrez, L., Gillon, M., Csizmadia, Sz., Smith, A. M., & Rauer, H. (2017). *Probing the atmosphere of a sub-Jovian planet orbiting a cool dwarf.* **MNRAS**, 468, 3123-3134 [21 citations]
- **Sedaghati E.**, Boffin H. M. J., Jeřabková T., Muñoz A. G., Grenfell J. L., Smette, A., ... & Rauer, H. (2016). *Potassium detection in the clear atmosphere of a hot-Jupiter: WASP-17b transmission spectroscopy.* **A&A**, 596, A47 [52 citations]
- **Sedaghati E.**, Boffin H. M. J., Csizmadia S., Gibson N., Kabath P., Mallonn M., & Van den Ancker M. E. (2015). *Regaining the FORS: optical ground-based transmission spectroscopy of the exoplanet WASP-19b with VLT+ FORS2.* **A&A**, 576, L11 [47 citations]
- Full list of publications at: ui.adsabs.harvard.edu (peer-reviewed) – ui.adsabs.harvard.edu (all)

Conferences & Workshops

- XVII Latin American Regional IAU Meeting, Montevideo, Uruguay (2023) – *poster*
- 4° Advanced School on Exoplanetary Science, Vietri sul Mare, Italy (2023) – *contributed talk*
- Thinkshop 2022: High-resolution spectroscopy for exoplanet atmospheres and biomarkers, Potsdam, Germany (2022) – *contributed talk*
- PFE-SPP1992 joint meeting, (Exo)planet diversity, formation and evolution, Berlin, Germany (2022)
- CARMENES science meeting, Online (2021) – *invited talk*
- CARMENES science meeting, Online (2020) – *contributed talk*
- Extreme Solar Systems, Reykjavik, Iceland (2019) – *poster*
- Diversis Mundi: The Solar System in an Exoplanetary context, Santiago, Chile (2018) – *contributed talk*
- Exoplanets II, Cambridge University (2018) – *poster*
- Astrobiology, Coyhaique, Chile (2017)
- European Week of Astronomy and Space Science, Prague, Czech Republic (2017) – *contributed talk*
- 2° Advanced School on Exoplanetary Science, Vietri sul Mare, Italy (2017)
- Astrophysics of planetary habitability, Vienna, Austria (2016) – *contributed talk*
- 1° Advanced School on Exoplanetary Science, Vietri sul Mare, Italy (2015) – *contributed talk*
- Pathways towards habitable planets, Bern, Switzerland (2015) – *poster*
- Astrobiology and Planetary Atmospheres, Santiago, Chile
- **Organization:** ExoLatam-22 JWST workshop, Santiago, Chile (2022)
- **Organization (main organizer):** Exoplanet atmospheres from the ground (2021), ESO online (ESO - Atmo2021)
- **Organization (main organizer):** Chilean exoplanet meeting (2019)
- **Organization:** Astrobiology and planetary atmospheres, ESO Santiago, Chile (2015)

Teaching

Courses & Lectures

- **Lecture series Univerisdad Católica del Norte**, Exoplanet transit modelling, Bayesian statistics & Gaussian Processes
- **Electivo Universidad Antofagasta**: exoplanet atmospheres for the Exoplanets Masters course; ref. Dr. Karla Peña Ramírez.
- **Molecfit Lecture** ESO Atmos2021 on telluric correction of high resolution spectra; Youtube
- **Transmission Spectroscopy Lecture** ESO Atmos2021 spectrophotometric transmission spectroscopy; Youtube
- **Lecture** Univerisdad Andrés Bello on spectrographs and spectroscopy; ref. Prof. Dante Minniti.
- **Observing School Tutor** ESO la Silla 2024 Observing School, one of 4 supervisors for the 2 week school.

Student supervision

- **Scarlett Royle**: PhD student University of Liverpool, UK, 2-year ESO studentship (primary supervisor) – 2024-2026
- **Larissa Antunes**: PSO short-term internship working on Short-Term Scheduling Simulations IOT project – 2023
- **Bibiana Prinoth**: PhD student Lund University, Sweden, 1-year ESO studentship (primary supervisor) – 2023-2024
- **Joana Wokittel**: Office for Science 3 months internship from AIP Germany – 2023
- **Cathal Maguire**: Office for Science 3 months internship from Trinity College Dublin – 2023
- **Bruno Medina**: PSO internship working on correlated noise analysis of ESPRESSO spectra – 2023
- **Alonso Guerrero**: OfS 2 months internship working neural network detection of exo-rings – 2023
- **Yared Reinarz**: UCN undergraduate, ESPRESSO QC0 and TCCD analysis Paranal projects (PSO internship) – 2019-2020
- **Bastian Olivares**: UCN undergraduate, thesis on archival HARPS exoplanet transmission spectroscopy – 2020
- **Dr. Mathis Houlle**: ESO PhD student, Marseille, co-supervision, spectroscopy of directly imaged planets and the HiRise project – 2019-2020
- **Dr. Raissa Estrela**: PhD student Universidade Presbiteriana Mackenzie (CRAAM) 3-months ESO studentship (post-doc at JPL) – 2018
- **Quentin Duchaufour**: Student Marseille, master's project supervision on exoplanetary atmospheres – 2017
- **Catalina Zamora**: Masters student Universidad de Valparaíso. 2 months studentship at ESO – 2017

Miscellaneous

Advisory Boards & Refereeing

- **Chilean National Telescope Allocation Committee (CNTAC)**. Served for 2 years (4 cycles) on the galactic panel.
- **HST** Exoplanet Atmospheres panel member for 4 semesters including mid-cycle reviews
- **Concurso Nacional, Comité Mixto ESO-Gobierno de Chile 2023** Project grant referee
- **Scientific Support Discretionary Fund (SSDF)** Project evaluation and selection board
- **ESO Scientific Visitor Programme** Member of the selection board
- **FONDECYT** Project grant referee
- **Nature, APJ, MNRAS, A&A & MDPI** >20 papers refereed. orcid.org/0000-0002-7444-5315

Paranal Science Operations

- **Short Term Scheduling**: simulations testing the performance of ML seeing predictions, on operations efficiency, a major Integrated Operations Programme (IOP) at Paranal Observatory (GitLab repository)
- **FORS2 QC**: Automated code performing in-situ quality assessment for all modes of the FORS2 instrument, written in python.
- **LHATPRO** software to obtain line of sight atmospheric profile measurements for *in-situ* telluric correction of spectra taken at Paranal, effort leading to 30% increase in time efficiency.
- **ESPRESSO & KMOS QC**: I successfully lead two student projects at Paranal (Yared Reinarz, UA, and Cristobal Moya, PUC) for automated codes analyzing in-situ observation quality. Both based on my FORS2 QC code.
- **FORS Absolute Photometry**: I wrote a code to determine sky transparency from FORS2 photometric standards zeropoints, which is currently in use at Paranal.

Telescope proposals

- **6** successful ESO proposals as **PI** all of which have been published, or are in the process of being published, in the last 5 years.
- Many more successful proposals as **Co-I** for a variety of instruments.

Observing experience

- **Over 300 nights** as support astronomer at the VLT, UT1, UT2 & UT3.
- **>40 nights** as visiting astronomer on HARPS/3.6m, CARMENES/3.5m, EFOSC/NTT, FEROS/MPG2.2m, 2m/TLS Tautenburg.

Extracurricular interests and activities

- **Spoken Languages**: English [native], Spanish [fluent], German [advanced], Persian [native].
- My main interest in life is **astronomy**.
- I also enjoy **free-style skiing** & **surfing**, as well as reading and travelling.