

# Elyar Sedaghati

ASTRONOMER · ASTROPHYSICIST

European Southern Observatory - Alonso de Córdova 3107, Vitacura, Santiago de Chile

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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 software, Computer hardware
- **2nd year:** Physics Ib, Advanced Physics II, Mathematics Ib.
- **3rd year:** Part II Astronomy 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

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<b>Research interests</b>	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.
<b>Programming Languages</b>	Python [preferred], bash, html/css, IDL [basic], JavaScript [basic]
<b>Data handling/reduction</b>	IRAF, PyRAF, Esoflex/Esores, Gasgano, Skycat, FIMS, Molecfit, MySQL
<b>Web interface &amp; misc.</b>	HTML/CSS, Django with Python, LaTeX
<b>Analysis techniques</b>	Bayesian inference with MCMC & MultiNest, Machine Learning, Gaussian Processes, Cross Correlation analysis
<b>Python interests</b>	Multi-threading, multi-processing, GPU acceleration, vectorization, OOP

## Publications & Conferences (selected)

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### 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., Pallé 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., Jeřábková 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](http://ui.adsabs.harvard.edu) (peer-reviewed) – [ui.adsabs.harvard.edu](http://ui.adsabs.harvard.edu) (all)

### Conferences & Workshops

- 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)
- 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

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### Courses & Lectures

- **Lecture series Universidad 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** Universidad 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.

## Students

- **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

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### 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](https://orcid.org/0000-0002-7444-5315)

### Paranal Science Operations

- **Short Term Scheduling**: simulations testing the performance of ML seeing predictions, on Paranal operations efficiency ([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.

### 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.