Dr. Julia Victoria Seidel

- ESO Research Fellow -

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Pronouns: she/her

European Southern Observatory (ESO)
Alonso de Córdova 3107
19001 Santiago de Chile
Chile

Scientific expertise

ATMOSPHERIC PHYSICS
Dynamics and wind patterns
Impact of Earth's climate on astronomical observations

ADVANCED DATA ANALYSIS
Bayesian statistics
Multinested-sampling retrieval
spectroscopic/spectropolarimetic data analysis

OBSERVATIONAL ASTROPHYSICS
Development of observational strategies
Exoplanet transmission and reflection spectroscopy

10/2021 - now — **ESO independent Research Fellow**, *European Southern Observatory, Chile*
50% Research (Exoplanet atmospheric characterisation), 40% Observation, 10% ESO community service
ESO duties include: simultaneous night astronomer for VLT UT1 and UT2 (FORS2, KMOS, UVES, FLAMES, VISIR, and ESPRESSO), ESPRESSO instrument fellow, study of long-term atmospheric conditions at Paranal, night shift coordinator

WORK EXPERIENCE

06-09/2021 — **Postdoctoral Researcher**, *University of Geneva, Geneva, Switzerland (4 months)*
PostDoc position with Prof. Dr. Ehrenreich

05/2017 - 05/2021 — **Teaching Assistant**, *Observatory of Geneva, Geneva, Switzerland*
Outreach and teaching activities aside from PhD research (15%)

02-09/2015 — **Technical Student**, *CERN, Geneva, Switzerland* (7 months)
Programmer in the Level-1 ATLAS Trigger working group

04-09/2014 — **Summer Student**, *CERN, Geneva, Switzerland* (6 months)
GUI interface development for the Level-1 ATLAS Trigger

01-06/2013 — **Undergraduate Researcher**, *École Normale Supérieure & LPNHE, Paris, France* (6 months)
Automatic error propagation for Higgs-boson decay channel

EDUCATION

05/2017 - 05/2021 — **PhD Astronomy and Astrophysics (Doctorat ès Science)**, *supervised by Prof. David Ehrenreich and Prof. Vincent Bourrier, University of Geneva, Switzerland*
Title: Modelling Atmospheric Dynamics from high-resolution spectroscopy observations
Grade: très bien (highest possible awarded, defended 21st May 2021)

10/2015 - 05/2017 — **Master of Science in Physics with Extended Research**, *Imperial College London, UK*
Thesis: Influence of charge on atmospheric particle propagation after dust explosions
Grade: with Distinction (A+)
- RESEARCH PROJECT (1 year): Universidad de los Andes, Bogotá D.C., Colombia

09/2011 - 01/2015 — **Bachelor of Science in Physics**, *Technische Universität Darmstadt, Darmstadt, Germany*
Thesis: Uncertainties in the Higgs-bb decay (CERN)
Grade: 1.0 (A+)
- EXCHANGE with scholarship (1 year): Ecole Normale Superièure (ENS), Paris, France

GRANTS & PRIZES

2023	**SSDF grant,** 5500 EUR, to fund Master student
	Office for Science funding, ESO, 3000 EUR, to fund 3 months Master internship
2022	**Edith Alice Müller Award, SSAA**, Best PhD thesis in Switzerland - 1000 CHF
	ExoExplorers cohort, NASA, most promising early career researchers in Exoplanet sciences - 1000 USD
2021	**ESO Research Fellowship**, 3+1 years, 3 years at ESO, 1 year transferable funding
2018 - 2020	**Travel Grants**, approx. 4000 EUR - PlanetS EQUAL Grant - MERAC Travel Grant - SSAA Travel Grant
2011 - 2017	**Universal Scholarship of the German People**, Studienstiftung des Deutschen Volkes Full stipend Bachelor and Master, study abroad stipend, and short-term research stipend, ~160'000 EUR

PUBLICATIONS & COMMUNICATIONS

✦ 42 peer-reviewed articles, among which:
10 first author articles, 7 major contributions, 24 minor contributions, and 2 review articles, 1137 citations (H-index=19)
The full list of peer-reviewed publications can be found in the section Publications, a sortable list of all publications, including proceedings, is available on ADS
Five publications of importance are marked with a *

✦ 28 oral presentations, among which:
7 invited talks, 11 contributed talks, 10 seminars, and additionally 5 posters
The full list of conferences and seminars can be found in the section Communications

INTERNATIONAL COLLABORATIONS

2020 - now	**ESPRESSO consortium** - member of science committee - member of WG2: exoplanet atmospheres - ESPRESSO instrument fellow at ESO
2018 - 2020	**NIRPS consortium** - deputy chair and member of WG3: exoplanet atmospheres
2017 - 2021	**PlanetS member**, member of the Swiss network of exoplanet scientists
2023	**Principal investigator, Prog. 111.24J8, ESO**, 1.2 nights, ESPRESSO: "The winds of WASP-121b seen with ESPRESSO's 4UT mode" (data successfully acquired)
2022	**Principal investigator, Prog. 108.21X7, ESO**, 1.0 night, ESPRESSO: "The warm Jupiter HD39474b: a rare window into planet migration" (rain on Paranal)
2020	**Principal investigator, Prog. 106.20ZN, ESO**, 1.5 nights, ESPRESSO: "The ultra Hot Jupiters KELT-17b and WASP-76b, fraternal or identical twins? - a search for sodium and heavy metals" (instrument issues - under investigation)

SUPERVISION

2023 - 2025	**ESO PhD studentship of S. Royle**, with E. Sedaghati
2023 - 2024	**ESO PhD studentship of B. Prinoth**, with E. Sedaghati and H.J. Hoeijmakers
2023	**Master thesis of Y. Damasceno**, ESO, Santiago de Chile, University of Porto, Portugal - 2024 start as PhD student at University of Porto with N. Santos
2022	**Master thesis of Z. Fowler**, International University of Valencia, remote
2020	**Master thesis of M. Steiner**, Observatory of Geneva - now PhD student at the University of Geneva
2019 - 2020	**Supervisor 1st year Master Laboratory work**, University of Geneva, Astrophysics Lab I + II
2020	**Bachelor thesis of L. Grandjean**, University of Geneva
2019	**Bachelor thesis of T. Moretti**, University of Geneva
2018	**Bachelor thesis of J. Haefelin**, University of Geneva

TEACHING

2023	**Guest lecturer**, University of Valparaiso, Chile, Master level, “Theory of exoplanet atmospheres”
2022	**Guest lecturer**, University of Antofagasta, Chile, Master level, “High-dispersion transmission spectroscopy and instrumentation”
	ESO astronomy lectures, Santiago, Chile, PhD level, “Exoplanet atmosphere transmission spectroscopy”
2021	**Atmo2021 workshop**, online, Master level, “High-dispersion transmission spectroscopy for exoplanet resolved spectral line studies”
2020	**Guest lecturer**, online, University of Cape Town, South Africa, undergraduate level, “Earth seen as an exoplanet and its implications for climate change”
	Guest lecturer, online, University Sergio Arboleda, Colombia, undergraduate and public level, “Earth as an exoplanet: a perspective on climate change” (in Spanish)
2019 - 2021	**Teaching assistant**, University of Geneva, Switzerland, Master level course on “Exoplanet atmospheres”
2017 - 2021	**Public lectures**, University of Geneva, Switzerland, public lectures from elementary school to undergraduate levels for visitors

ORGANISATION

2023 - now	**IAU junior member,** Division F
2022	**IAU VLTI-HOW workshop**, member of the steering committee and LOC chair
2021	**Exoplanets III conference**, online, conference moderator
2020	**EPSC/DPS annual conference**, Geneva, Switzerland, conference assistant
2019	**JURA II conference**, Beatenberg, Switzerland, LOC and SOC member, PlanetS Young Scientists conference

COMMUNITY SERVICE

2021 -now	**Referee**, Nature, MNRAS, A&A, PASJ, Frontiers
	ESO’s student selection committee, member
2023	**Hubble Space Telescope (HST) Cycle 31**, Time Allocation Committee, external reviewer

2022	**ESO's Hypatia colloquium committee**, selection committee, and session chair
	ESO's visiting senior astronomer committee, member
	Scientific Assistant, ESO Time Allocation Committee
2021	**External Expert Reviewer**, Gemini Telescope Time Allocation Committee
2019 - 2021	**Sustainability Committee**, funding member, Observatory of Geneva, Switzerland
2012 - 2013	**Student representation**, technische Universität Darmstadt, students' women representative and student panel member on local scholarship selection panel

DEIA

2022 - now	**Mentor at the Supernova Foundation**, supporting women* students
	ESO student mentor, mentoring historically excluded PhD students
	Women in Science Day, ESO, events on the day and blog post
2019 - 2021	**DEIA committee**, Observatory of Geneva, co-creator and member
2019	**IAU358 symposium**, Diversity in Astronomy, Tokyo, Japan
2017 - 2019	**Diversity in Science lunches**, Observatory of Geneva, co-organiser

OUTREACH

2019 - now	**Salomé project**, Switzerland/Chile, middle school level, comic book outreach project to schools Swiss-wide with virtual classes to children by astronomers, currently expanding to Chile under my co-leadership
2023	**ESO's the Messenger**, contribution about my life as a research fellow at ESO (link)
	ESO open day, visit of public figures in Chile, e.g. ambassadors and mayors (in Spanish)
	Astronomy round table, Municipality of Cerro Navias, Chile, National week of astronomy (in Spanish)
	German Astronomy Day, Live event from Paranal observatory for the German Ministry of Research (in German)
2022	**Channel 4, UK television,** opinion piece from Paranal observatory regarding the search for exoplanets for the COP biodiversity conference
	Public seminar, Sociedad Astronómica Queretana, Mexico, National day of astronomy celebration (in Spanish)
	Podcast, Radio France, France Culture, un été dans les étoiles (in French)
	Skype a Scientist, local school in Valparaiso, Chile (in Spanish)
2021	**Panel discussion, Arts & Science: an intersection**, Pretoria, South Africa (online)
	Faszination Online, Haus der Astronomie, Germany (in German, online)
2020	**Public seminar**, Universidad Sergio Arboleda, Bogota, Colombia (in Spanish, online)
	Panel discussion, Jupiteres calientes, Planetarium of Bogota, Colombia (in Spanish, online)
	Twitter takeover, one-week content creation each: @astrotweeps, @people_of_space, @realSci_DE
2017 - COVID	**Public tours and observations**, University of Geneva, guided tours of the observatory with nighttime observations (in French)
2019	**Cité des métiers (canton-wide job fair)**, Geneva, Switzerland, highlighting the different possible career paths at observatories (in French)

	CHEOPS days, Geneva, Switzerland, one-week event on the main city square on the Swiss CHEOPS observational satellite (in French)

OTHER SKILLS

Programming	Python (formal education, Advanced Academic Python Programming Summer School), C++, C, Julia
Group Management	Project management for success in research (2-day workshop) Unconscious bias training Crucial conversations training
Languages	German: Native, English: Fluent, Spanish: Fluent , French: Fluent, Italian: A2

Publications

✦ 42 peer-reviewed articles, among which:

10 first-author articles, 7 major contributions, 24 minor contributions, and 2 review articles,
1137 citations (H-index=19)
A sortable list of all publications, including proceedings, is available on ADS

PEER-REVIEWED, FIRST AUTHOR

* 10. On the impact of ENSO and Climate Change on ESO telescope sites
Accepted for publication in Atmosphere, https://arxiv.org/abs/2309.14734

cited: -

Seidel, J. V., Otarola, A., and Theron, V. (**2023c**)
Summary: We provide a comprehensive analysis of the historic atmospheric conditions at various ESO observatories in northern Chile, especially PWV, ambient temperature, and seeing and show clear correlations with the ENSO cycle. We additionally confirm the impact of climate change on current and future observational sites. This paper provides a powerful tool for long-term predictions of observing conditions in the ELT era. Additionally, we highlight the use of astronomical sites to establish long-term baselines for climate studies of remote areas of the world - an important new intersection between Earth sciences and astronomy.

9. Atmospheric composition and dynamics of the bloated hot Jupiter WASP-172b with ESPRESSO
Accepted for publication in A&A, https://arxiv.org/abs/2308.13622

cited: -

Seidel, J. V.* and Prinoth, B.*, et al. (**2023b**)
*both authors contributed equally to this work
Summary: Joint lead author: We report the detections of Fe, Na, and H-alpha for the bloated hot Jupiter WASP-172b and discuss its atmospheric dynamics in the context of bloated hot exoplanets, as well as its strong potential as a JWST target. This target will most likely be one of the most studied bloated planets in the near future and we have submitted follow-up proposals to further study its composition with JWST and ESPRESSO.

* 8. Detection of a high-velocity sodium feature on the ultra-hot Jupiter WASP-121 b
A&A, 673, A125, https://arxiv.org/abs/2303.09376

cited: 4

Seidel, J. V., et al. (**2023a**)
Summary: I explore the observed blueshifted feature next to the sodium doublet of the ultra-hot Jupiter WASP-121b, using a partial transit obtained with the 4-UT mode of ESPRESSO. Its atmospheric dynamics are made visible across the terminator by splitting the data into mid-transit and egress. With my retrieval framework, I determine that the blueshifted high-velocity absorption component is generated only during the egress part of the transit when a larger fraction of the day side of the planet is visible. The equatorial day-to-night side wind over the evening terminator is due to a localised jet between the substellar point and up to 10 deg to the terminator in longitude, with an opening angle of the jet of at most 60 deg in latitude and a lower boundary in altitude between [1.08,1.15] planetary radii. This paper marks the first foray of narrow-band transmission spectroscopy into resolving atmospheric dynamics in time and is the cornerstone of my future research proposal.

7. The hot Neptune WASP-166 b with ESPRESSO II: confirmation of atmospheric sodium
MNRAS, 513, L15, https://arxiv.org/abs/2203.04494

cited: 11

Seidel, J. V., et al. (**2022**)

Summary: This work is part of a three-part series on the hot Neptune WASP-166b as a follow-up to my work in 2020. The ESPRESSO observations confirmed the sodium feature in its atmosphere, in the ramp-up to its observations with JWST next year. Once the resolved line shape is recovered, the sodium feature will be used to study the atmospheric dynamics of a planet within the elusive Neptune desert for the first time. WASP-166b has quickly become one of the most intriguing exoplanet targets to date with follow-up observations scheduled both from the ground and space to understand why this world has been able to keep its atmosphere, despite its location within the Neptune desert.

* 6. Into the storm: diving into the winds of the ultra-hot Jupiter WASP-76 b with HARPS and ESPRESSO

A&A, 653, A73, https://arxiv.org/abs/2107.09530

cited: 36

Seidel, J. V., et al. (**2021**)

Summary: As a follow-up work to Ehrenreich et al. (2020), Nature, on the ultra-hot Jupiter WASP-76 b, I combined the available HARPS and ESPRESSO datasets on this target. The increased signal-to-noise ratio allowed to resolve the line shape of the sodium doublet from the absorption well (probing the top of the atmosphere) all the way into the line wings (probing the lower layers of the atmosphere). I upgraded the atmospheric retrieval code MERC from Seidel et al. (2020) to include planetary rotation. With this addition, MERC constructs a 3D atmospheric structure and is able to recover both the atmospheric wind patterns and additionally also to precisely recover the wind speeds, instead of upper limits. I was able to retrieve the same wind pattern and wind speed as proposed by the 'toy model' from Ehrenreich et al. (2020), Nature, ruling out competing atmospheric structures as explanations. This work has been a key input to various other studies on magnetic fields, atmospheric dynamics, and atmospheric chemistry since WASP-76b with its easily accessible atmosphere and cloudless skies has become a benchmark system for testing new data analysis techniques and theoretical models.

5. Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS) VI. Non-detection of sodium with HARPS on the bloated super-Neptune WASP-127b

A&A, 643, A45, https://arxiv.org/abs/2009.13386

cited: 17

Seidel, J. V., et al. (**2020c**)

Summary: WASP-127b is one of the puffiest exoplanets found to date, with a mass of only 3.4 Neptune masses, but a radius larger than Jupiter. It is also located at the border of the Neptune desert, which describes the lack of highly irradiated Neptune-sized planets and remains poorly understood. I present combined EulerCam and TESS light curves to recalculate the system's parameters. Additionally, I conducted an in-depth search for sodium in four transit observations previously analysed by another team. Said work claims a detection of sodium incompatible with previous studies of data from both ground and space. I showed that this large sodium detection is actually due to contamination from telluric sodium emissions and the low S/N in the core of the deep stellar sodium lines. These effects will become more crucial in our push towards smaller and cooler planets. My results and the subsequent absorption depth of sodium in this atmosphere were later confirmed independently with the ESPRESSO spectrograph at higher resolution in Allart et al. (2021).

4. Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS) V. Detection of sodium on the bloated super-Neptune WASP-166b

A&A, 641, L7, https://arxiv.org/abs/2007.01783

cited: 22

Seidel, J. V., et al. (**2020b**)

Summary: I present the HARPS transmission spectrum of the bloated super-Neptune WASP-166b, located at the outer rim of the Neptune desert. The sodium detection, amongst the first at the edge of the Neptune desert, shows a tentative indication of line broadening, which could be caused by winds blowing sodium farther into space, a possible

manifestation of the bloated character of these highly irradiated worlds. I put this detection into context with previous work, claiming a non-detection of sodium in the same observations and showing that the high noise in the trace of the discarded stellar sodium lines was responsible for the non-detection. This work together with the publication 5. above is seminal in the study of the impact of this low signal-to-noise remnant on detections for exoplanets similar to WASP-166b.

* 3. Wind of change: retrieving exoplanet atmospheric winds from high-resolution spectroscopy

A&A, 633, A86, https://arxiv.org/abs/1912.02787

cited: 51

Seidel, J. V., et al. (**2020a**)

Summary: This paper is the first introduction of the atmospheric retrieval MERC code, where I use the highly studied hot Jupiter HD189733b as a benchmark case to show that it is possible to infer wind patterns from their Doppler-shift impact on the resolved spectral line shape. I streamlined 1D atmospheric models of exoplanet atmospheres for performance, added the different wind patterns as symmetrical 2D models and was able to combine this sophisticated 2D atmosphere with a Bayesian nested sampling retrieval package due to the superior performance of the code. This allowed for the first time to distinguish the best fit of different wind patterns instead of providing simple fit probabilities for each model separately from each other. As a result we found that the so far observationally unprobed region between the lower zonal winds as modeled with GCMs and the expanding exosphere probed by He and Lyman-alpha lines are connected with a radially outwards pushing wind region. This paper marks one of the most sophisticated observational methods to understand atmospheric winds and has been mentioned in various review papers since then.

* 2. Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS). II. A broadened sodium feature on the ultra-hot giant WASP-76b

A&A, 623, A166, https://arxiv.org/abs/1902.00001

cited: 89

Seidel, J. V., et al. (**2019b**)

Summary: I present the sodium doublet detection in the atmosphere of WASP-76b with the HARPS spectrograph. This marks the first detection of sodium in the atmosphere of an ultra-hot Jupiter and established WASP-76b as one of the benchmark ultra-hot Jupiter targets with dozens of follow-up publications. To establish the signal without a doubt, I also generated the relative absorption light curves which demonstrate that the sodium signal coincides with the exoplanet transit for all three transits - the confirmation that the sodium signature is planetary. Additionally, I studied the line broadening which is significantly broadened compared to the instrument resolution. This result, combined with the same observation for HD189733b in Wyttenbach et al. 2015 led to the creation of the MERC code to study resolved spectral line shapes.

1. Relative permittivity estimation of wheat starch: A critical property for understanding electrostatic hazards

Journal of Hazardous Materials, 368, 228-233, https://www.sciencedirect.com

cited: 8

Seidel, J. V., et al. (**2019a**)

Summary: Outcome of my Master thesis on “Influence of charge on atmospheric particle propagation after dust explosions” from 2017. The main components of dust explosions both in illegal mining or industrial settings behave similarly to wheat starch. How is a normally insulating grain charged and how is its ability to be polarized affected by environmental conditions? Here we investigate the dependence of temperature, humidity, and low frequency on the relative permittivity of wheat starch. The results show high values of permittivity (˜80) at the microscale (single starch grains) compared to low values (10–20) at the macroscale (20 mg of wheat starch). The differences are attributed to the Maxwell– Wagner–Sillars interfacial polarization process on individual grains and potential charge exchange between grains.

POPULAR REVIEW ARTICLES

2. News and Views: JWST opens a window on exoplanet skies
Nature, vol. 614, iss. 7949, p.632-633, https://www.nature.com/articles/d41586-023-00394-6

Seidel, J. V.*, Sarkar, S.*, and Nielsen, L. D.(**2023**)
*both authors contributed equally to this work

Summary: Invited article to introduce the special Nature issue on the JWST early release science results on exoplanet atmospheres.

1. Keeping Exoplanet Science Caffeinated with ESPRESSO
the Messenger, ESO, vol. 187, p. 8-11, https://arxiv.org/abs/2208.04323

Nielsen, L.* and **Seidel, J. V.*** (**2022**)
*both authors contributed equally to this work

Summary: Review article about the first years of results from the next-generation spectrograph ESPRESSO at ESO's VLT telescope with an outlook on future avenues.

PEER REVIEWED, MAIN CO-AUTHOR

7. HEARTS VIII. Non-detection of sodium in the atmosphere of the aligned planet KELT-10b
A&A, 672, A134, https://arxiv.org/abs/2303.05857

cited: -

Steiner, M., […], **Seidel, J. V.** et al. (**2023**)

Summary: This is the main outcome of M. Steiner's Master thesis and subsequent start of PhD work. It analyses the aligned planet KELT-10b and found a curiously featureless spectrum.

6. The hot Neptune WASP-166 b with ESPRESSO - III. A blue-shifted tentative water signal constrains the presence of clouds
MNRAS, 521, 1233-1252, https://arxiv.org/abs/2302.04794

cited: 2

Lafarga, M., […], **Seidel, J. V.**, et al. (**2023**)

Summary: This is the follow-up paper to the sodium detection on the same planet where I am the lead author (see above in section main author papers). Here, we explore the presence of other elements, most importantly water and put the detections in context with our current knowledge regarding this planet: the first fully studied exoplanet at the edge of the Neptune desert that retained its atmosphere and future JWST target.

5. Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS) VII. Detection of sodium on the long-transiting inflated sub-Saturn KELT-11 b
A&A, 668, A1, https://arxiv.org/abs/2209.00597

cited: 9

Mounzer, D., Lovis, C., **Seidel, J. V.**, […] et al. (**2022**)

Summary: KELT-11b is one of the first studied long transit planets, which means the data analysis requires a new approach with the baseline obtained on separate nights. In this work, I provided the atmospheric retrieval and

interpretation of the results. Curiously, the sodium doublet for this sub-Saturn indicates no significant atmospheric movement, in contrast to hot Jupiters. The theoretical exploration of that observation is ongoing.

4. Titanium oxide and chemical inhomogeneity in the atmosphere of the exoplanet WASP-189 b
Nature Astronomy, 6, 449, https://arxiv.org/abs/2111.12732

cited: 32

Prinoth, B., Hoeijmakers, H. J., Kitzmann, D., Sandvik, E., **Seidel, J. V.** et al. (**2022**)
Summary: This work pushes the boundaries of the cross-correlation technique and shows that, at first order, global zonal winds also have an impact on the Kp-vsys diagram. For this work, I provided the interpretation of the results in terms of atmospheric circulation and the resolved spectral lines, detecting sodium for WASP-189b.

3. TESS Reveals a Short-period Sub-Neptune Sibling (HD 86226c) to a Known Long-period Giant Planet
AJ, 160, 2, https://arxiv.org/abs/2007.13927

cited: 24

Teske, J., Díaz, M. R., Luque, R., Močnik, T., **Seidel, J. V.**, et al. (**2020**)
Summary: In this detection paper, I provided the outlook for atmospheric characterisation with the current space and ground-based facilities of the target.

2. Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS) IV. A spectral inventory of atoms and molecules in the high-resolution transmission spectrum of WASP-121 b
A&A, 641, A123, https://arxiv.org/abs/2006.11308

cited: 87

Hoeijmakers, H. J., **Seidel, J. V.**, et al. (**2020**)
Summary: We explore the atmosphere of the WASP-76b twin: WASP-121b, an ultra-hot Jupiter with a dataset obtained with the HARPS spectrograph. I provided the sodium transmission spectrum from which we spearheaded a study of possible interpretations of the signal. We show that the signal is best explained by an optically thin sodium torus, originating from a planetary companion, like a debris field accreting on the planet. Additionally, I was instrumental in the development of a new bootstrapping method for the cross-correlation technique, making future detections more robust against false positives.

1. A spectral survey of an ultra-hot Jupiter. Detection of metals in the transmission spectrum of KELT-9 b
A&A, 627, A165, https://arxiv.org/abs/1905.02096

cited: 147

Hoeijmakers, H. J., […], **Seidel, J. V.**, et al. (**2019**)
Summary: KELT-9b is the archetype of ultra-hot Jupiters and a class of its own as the hottest known exoplanet by far. This work explores the different atomic and molecular species in its atmosphere via the cross-correlation technique and provides a first full catalog which was then used for a wide range of follow-up work on this unique target. I spearheaded the analysis of the resolved spectral lines, providing resolved profiles for a wide range of elements not resolved in cooler atmospheres, e.g. iron and magnesium.

REVIEW ARTICLES, OTHER AUTHOR

24. Effects of the Hunga Tonga–Hunga Ha'apai Volcanic Eruption on Observations at Paranal Observatory
the Messenger, ESO, vol. 190, p. 58-61, https://arxiv.org/abs/2305.08620

De Rosa, R. J., […], **Seidel, J. V.** (**2023**)

Summary: The Hunga Tonga–Hunga Ha'apai volcano erupted on 15 January 2022 with an energy equivalent to around 61 megatons of TNT. We present the results of a preliminary study of the effects of the explosion on observations taken at Paranal Observatory using a range of instruments. These effects were not immediately transitory in nature, and a year later stunning sunsets are still being seen at Paranal.

PEER REVIEWED, OTHER AUTHOR

23. The Mantis Network IV: A titanium cold-trap on the ultra-hot Jupiter WASP-121 b
Accepted for publication in A&A, https://arxiv.org/abs/2210.12847

cited: 4

Hoeijmakers, H. J., […], **Seidel, J. V.**, et al. (**2023**)

22. DREAM. I. Orbital architecture orrery
A&A, 669, A63, https://arxiv.org/abs/2301.07727

cited: 5

Bourrier, V., […], **Seidel, J. V.**, et al. (**2023**)

21. Detection of barium in the atmospheres of the ultra-hot gas giants WASP-76b and WASP-121b
A&A, 666, L10, https://arxiv.org/abs/2210.06892

cited: 4

Azevedo Silva, T., […], **Seidel, J. V.**, et al. (**2022**)

20. The Hot Neptune WASP-166 b with ESPRESSO - I. Refining the planetary architecture and stellar variability
MNRAS, 516, 298-315, https://arxiv.org/abs/2207.10127

cited: 4

Doyle, L., […], **Seidel, J. V.**, et al. (**2022**)

19. Transmission spectroscopy of the ultra-hot Jupiter MASCARA-4 b: Disentangling the hydrostatic and exospheric regimes of ultra-hot Jupiters
A&A, 666, A47, https://arxiv.org/abs/2208.11427

cited: 9

Zhang, Y., […], **J. V. Seidel**, et al. (**2022**)

18. Transmission spectroscopy of MASCARA-1b with ESPRESSO: Challenges of overlapping orbital and Doppler tracks
A&A, 664, A121, https://arxiv.org/abs/2206.09443

cited: 7

Casasayas-Barris, N., Borsa, F., Palle, E., […], **Seidel, J. V.,** et al. (**2022)**

17. The polar orbit of the warm Neptune GJ436b seen with VLT/ESPRESSO
A&A, 663, A160, https://arxiv.org/abs/2203.06109

cited: 11

Bourrier, V., Zapatero Osorio, M. R., […], **Seidel, J. V.,** et al. (**2022**)

16. CaRM: Exploring the chromatic Rossiter-McLaughlin effect. The cases of HD 189733b and WASP-127b
A&A, 660, A52, https://arxiv.org/abs/2201.06531

cited: 1

Cristo, E., Santos, N. C., Demangeon, O., […], **Seidel, J. V.,** et al. (**2022**)

15. p-winds: An open-source Python code to model planetary outflows and upper atmospheres
A&A, 659, A62, https://arxiv.org/abs/2111.11370

cited: 22

Dos Santos, L. A., Vidotto, A. A., Vissapragada, S., […], **Seidel, J. V.,** et al. (**2022**)

14. Retrieving the transmission spectrum of HD 209458b using CHOCOLATE: a new chromatic Doppler tomography technique
A&A, 657, A23, https://arxiv.org/abs/2110.02028

cited: 3

Esparza-Borges, E., […] , **Seidel, J. V.**, et al. (**2022**)

13. The Rossiter-McLaughlin effect revolutions: an ultra-short period planet and a warm mini-Neptune on perpendicular orbits
A&A, 654, A152, https://arxiv.org/abs/2110.14214

cited: 18

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7. Search for helium in the upper atmosphere of the hot Jupiter WASP-127 b using Gemini/Phoenix
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dos Santos, L. A., Ehrenreich, D., Bourrier, V., […], **Seidel, J. V.,** et al. (**2020**)

6. Mass-loss rate and local thermodynamic state of the KELT-9 b thermosphere from the hydrogen Balmer series
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5. Nightside condensation of iron in an ultrahot giant exoplanet
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2. Two intermediate-mass transiting brown dwarfs from the TESS mission
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1. The CORALIE survey for southern extrasolar planets. XVIII. Three new massive planets and two low-mass brown dwarfs at greater than 5 AU separation
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Rickman, E. L., […], **Seidel, J. V.,** et al. (**2019**)

SUBMITTED FOR PEER-REVIEW

3. Sodium haze orbiting near the tidal disintegration limit of a rocky exomoon
Under 2nd review at A&A, available upon request

Oza, A., **Seidel, J. V.**, et al. (**2023**)

Summary: Second author: We explore a new technique to search for exoplanetary companions, such as rings or debris fields from the relative light curves generated from the transmission spectroscopy signal of accreting metals such as sodium or potassium. I co-developed the technique and prepared the datasets for the study.

2. HEARTS IX: Atmospheric signature of WASP94A b with HARPS
In prep, submission forseen in 2023, available upon request

Ahrer, E., **Seidel, J. V.** et al. (**2023/24**)

Summary: Second Author: this paper is part of the HEARTs series and the base for a successful JWST follow-up proposal (PI Ahrer). WASP-94A b is an outstanding target with a detected atmosphere by HST. We supplement those findings with narrow-band atmospheric detections and interpretations from the ground.

2. Time-resolved narrow-band spectroscopy of Ca+ for WASP-189 b with MAROON-X
Under 1st review at A&A, available upon request

Prinoth, B., […], **Seidel, J. V.** et al. (**2023/24**)

Summary: This paper is led by my Ph.D. student B. Prinoth, as a follow-up to her paper in Nature Astronomy (main co-author section entry 4.). Here we provide additional high-resolution data in narrow-band and provide a time-resolved dataset. This effort is part of my strategy to build an array of time-resolved narrow-band observations to benchmark the PyZepherus project (see science rationale).

Communications

INVITED TALKS

2022	7. Disks and Planets across ESO facilities, review talk Garching by Munich, Germany
	6. Invited Seminar, API, Amsterdam, the Netherlands
	5. Swiss Society for Astronomy and Astrophysics, PhD Prize talk, Bern, Switzerland
	4. ThinkShop, Potsdam, Germany, review talk
	3. NASA's ExoExplorers seminar series, online
2021	2. Atmo2021 workshop, online, review talk
	1. ESO's Hypathia colloquium, online

CONTRIBUTED TALKS

2023	12. Exoclimes VI, Exeter, UK
2022	11. EAS annual conference, Valencia, Spain
	10. Exoplanets IV, Las Vegas, USA - retracted talk due to COVID infection
2021	9. EAS annual conference, online
2020	8. Physikerinnentagung, Hamburg, Germany, online
	7. Eclipsing Exoplanets, canceled - COVID
	6. Towards other Earths, canceled - COVID
	5. EPSC annual conference, online
2019	4. RESCEU symposium, Okinawa, Japan
	3. EPSC/DPS joint annual conference, Geneva, Switzerland
	2. ExoJC conference, Bordeaux, France
	1. PlanetS general assembly, Beatenberg, Switzerland

SEMINARS

2023	15. Seminar, University Andres Bello, Santiago, Chile
	14. Visiting Scholar Seminar, University of Porto, Porto, Portugal
	13. Visiting Scholar Seminar, Astronomy Laboratory Marseille (LAM), Marseille, France
	12. Seminar, ESO Headquarters, Garching by Munich, Germany
	11. Seminar, University Adolfo Ibañez, Santiago, Chile
2022	10. Visiting Scholar Seminar, INAF Arcetri, Florence, Italy
	9. International Commission on Planetary Atmospheres and their Evolution (ICPAE) - online
	8. Visiting Scholar Seminar, JPL/Caltech, USA
2021	7. Seminar, University of Concepcion, Chile - online
	6. ESO exoplanet seminar, Santiago, Chile
	5. Seminar, University of Lisbon, Portugal - online
2020	4. Seminar, Observatorio do Valongo, Brazil - online
	3. Seminar, University of Amsterdam, the Netherlands - online
	2. Seminar, IAC, Canary Islands - online
	1. Seminar, Chalmer's University, Sweden - online

POSTERS

2023	6. Towards other Earths III, Porto, Portugal
2020	5. Exoplanets III, online, poster + mini talk
2019	4. Extreme Solar Systems IV, Reykjavik, Iceland
	3. Exoclimes V, Oxford, UK
2018	2. Exoplanets II, Cambridge, UK
	1. Recontres du Vietnam II on exoplanetary science, Vietnam