Sam de Regt

PhD Candidate in Astronomy

Einsteinweg 55, 2333 CC Leiden, NL
regt@strw.leidenuniv.nl | samderegt.github.io

Education

PhD in Astronomy, Leiden Observatory, NL **Sep 2022 - Present**

- Thesis: *Isotope ratios of exoplanets and brown dwarfs*
  Advisor: Prof. Dr. Ignas Snellen

MSc Astronomy, Leiden Observatory, NL **Sep 2020 - Aug 2022**

- 2nd Thesis: *Polarimetric differential imaging with VLT/NACO* Grade: 9.5/10
  Advisors: Dr. Matthew Kenworthy & Dr. Christian Ginski
- 1st Thesis: *An assessment of the VO line list & a non-detection of VO in the atmosphere of WASP-121b* Grade: 9.0/10
  Advisors: Prof. Dr. Ignas Snellen & Dr. Aurora Kesseli

BSc Astronomy, Leiden Observatory, NL **Sep 2017 - Aug 2020**

- Thesis: *Colour-magnitude diagrams of the Magellanic Clouds* Grade: 8.5/10
  Advisor: Dr. Anthony Brown

Publications

Major Contributions

1. González Picos, D., **de Regt, S.**, Gandhi, S., Grasser, N., Snellen, I. A. G. (Accepted in A&A). *Disentangling disc and atmospheric signatures of young brown dwarfs with JWST/NIRSpec*.
2. **de Regt, S.**, Snellen, I. A. G., Allard, N. F., González Picos, D., Gandhi, S., Grasser, N., Landman, R., Mollière, P., Nasedkin, E., Stolker, T., Zhang, Y. (2025). *The ESO SupJup Survey. VII. Clouds and line asymmetries in CRIRES$^+$ J-band spectra of the Luhman 16 binary*. A&A, 696, A225.
3. Mulder, W., **de Regt, S.**, Landman, R., Picos, D. González, Snellen, I. A. G., Zhang, Y., Gandhi, S., Ginski, C., Kesseli, A. Y., Nasedkin, E., Stolker, T. (2025). *The ESO SupJup Survey. VI. $^{12}C/^{13}C$ isotope ratio comparison of three L-type brown dwarfs*. A&A, 694, A164.
4. Gandhi, S., **de Regt, S.**, Snellen, I. A. G., Palma-Bifani, P., Abdoulwahab, I., Chauvin, G., González Picos, D., Zhang, Y., Landman, R., Stolker, T., Kesseli, A. Y., Mulder, W., Chomez, A., Lagrange, A. M., Zurlo, A. (2025). *The ESO SupJup Survey. V. Exploring Atmospheric Variability and Orbit of the Super-Jupiter AB Pictoris b with CRIRES+*. MNRAS, 537, 134.
5. **de Regt, S.**, Gandhi, S., Snellen, I. A. G., Zhang, Y., Ginski, C., González Picos, D., Kesseli, A. Y., Landman, R., Mollière, P., Nasedkin, E., Sánchez-López, A., Stolker, T. (2024). *The ESO SupJup Survey. I. Chemical and isotopic characterisation of the late L-dwarf DENIS J0255-4700 with CRIRES$^+$*. A&A, 688, A116.

6. **de Regt, S.**, Ginski, C., Kenworthy, M. A., Caceres, C., Garufi, A., Gledhill, T. M., Hales, A. S., Huelamo, N., Kóspál, Á., Millar-Blanchaer, M. A., Pérez, S., Schreiber, M. R. (2024) *Polarimetric differential imaging with VLT/NACO. A comprehensive PDI pipeline for NACO data (PIPPIN)*. A&A, 684, A73.
7. Gandhi, S., **de Regt, S.**, Snellen, I. A. G., Zhang, Y., Rugers, B., van Leur, N., Bosschaart, Q. (2023). *JWST Measurements of ^{13}C, ^{18}O, and ^{17}O in the Atmosphere of Super-Jupiter VHS 1256 b*. ApJ, 957, L36.
8. **de Regt, S.**, Kesseli, A. Y., Snellen, I. A. G., Merritt, S. R., Chubb, K. L. (2022). *A quantitative assessment of the VO line list: Inaccuracies hamper high-resolution VO detections in exoplanet atmospheres*. A&A, 661, A109.

Minor Contributions

1. González Picos, D., Snellen, I. A. G., **de Regt, S.** (2025). *Chemical evolution imprints in the rare isotopes of nearby M dwarfs*. Nature Astronomy.
2. Grasser, N., Snellen, I. A. G., **de Regt, S.**, González Picos, D., Zhang, Y., Stolker, T., Gandhi, S., Nasedkin, E., Landman, R., Kesseli, A. Y., Mulder, W. (2025). *The ESO SupJup Survey: VIII. Chemical fingerprints of young L dwarf twins*. A&A, 698, A252.
3. Siebenaler, L., Miguel, Y., **de Regt, S.**, Guillot, T. (2025). *Conditions for radiative zones in the molecular hydrogen envelope of Jupiter and Saturn: The role of alkali metals*. A&A, 693, A308.
4. González Picos, D., Snellen, I. A. G., **de Regt, S.**, Landman, R., Zhang, Y., Gandhi, S., Sánchez-López, A. (2025). *The ESO SupJup Survey. IV. Unveiling the carbon isotope ratio of GQ Lup B and its host star*. A&A, 693, A298.
5. Zhang, Y., González Picos, D., **de Regt, S.**, Snellen, I. A. G., Gandhi, S., Ginski, C., Kesseli, A. Y., Landman, R., Mollière, P., Nasedkin, E., Sánchez-López, A., Stolker, T., Inglis, J., Knutson, H. A., Mawet, D., Wallack, N., Xuan, J. W. (2024). *The ESO SupJup Survey. III. Confirmation of ^{13}CO in YSES 1 b and Atmospheric Detection of YSES 1 c with CRIRES$^+$*. AJ, 168, 246.
6. González Picos, D., Snellen, I. A. G., **de Regt, S.**, Landman, R., Zhang, Y., Gandhi, S., Ginski, C., Kesseli, A. Y., Mollière, P., Stolker, T. (2024). *The ESO SupJup Survey: II. The $^{12}C/^{13}C$ isotope ratios of three young brown dwarfs with CRIRES$^+$*. A&A, 689, A212.
7. Landman, R., Stolker, T., Snellen, I. A. G., Costes, J., **de Regt, S.**, Zhang, Y., Gandhi, S., Molliere, P., Kesseli, A., Vigan, A., Sanchez-López, A. (2024). *β Pictoris b through the eyes of the upgraded CRIRES+. Atmospheric composition, spin rotation, and radial velocity*. A&A, 682, A48.

In Review

1. **de Regt, S.**, Gandhi, S., Siebenaler, L., González Picos, D. (Submitted to JOSS). *pyROX: Rapid Opacity X-sections*.

Presentations

Invited Talks

1. MPIA/ExoCoffee: Heidelberg, DE (June 2025). *The ESO SupJup Survey: VII. Clouds and line asymmetries in CRIRES+ J-band spectra of the Luhman 16 binary*

Contributed Talks

1. NAC 2025: Berg en Dal, NL (May 2025). *A View of Chemistry, Clouds and Gravity through High-Resolution Spectra of Brown Dwarfs*
2. Two HoRSEs: Berlin, DE (July 2024). *Double delight: CRIRES+ insights into the nearest brown dwarf binary*
3. Exoplanets 5: Leiden, NL (June 2024). *Double delight: CRIRES+ exploration of Luhman 16's binary atmospheres*
4. petitRADTRANS workshop: Heidelberg, DE (Nov 2023). *Characterising the atmosphere of a late L-dwarf with CRIRES+*
5. NOVA fall school: Dwingeloo, NL (Nov 2023). *Characterising the atmosphere of a late L-dwarf with CRIRES+*
6. Exoplanets by the Lake: Starnberg, DE (Aug 2023). *Characterising a brown dwarf's atmosphere with CRIRES+*

Posters

1. EAS 2025: Cork, IE (June 2025). *High-resolution view of chemistry, clouds and gravity*
2. ExoClimes VII: Montreal, CA (July 2025). *High-resolution view of chemistry, clouds and gravity*
3. Sagan Workshop: Pasadena, US (July 2023). *First results from the ESO SupJup Survey: Detection of chemical dis-equilibrium in brown dwarf DENIS J0255's atmosphere*

Awards & Honors

- Nominated for the Leiden University Thesis Prize 2023
- Nominated for the KNCV Golden Master Award 2023

Observing Experience

Accepted Proposals

- **Principal Investigator (PI)**, VLT/CRIRES+ (3.4h, 2025): *Methane along the meridians: tracing cloud break-up in a brown dwarf atmosphere*.
- Co-Investigator (co-I), CFHT/SPIRou (29.7h): *Latitudinal and temporal variability of SIMP J013656.5+093347.3*.

Observations

- 4 nights (Nov 2022), VLT/CRIRES+, observing brown dwarfs and exoplanets as part of the ESO SupJup Survey.
- 8 nights (2023 & 2024), Isaac Newton Telescope/WFC, assisting students with their observing projects and operating the telescope.

Tools & Software

- **pyROX (Rapid Opacity X-sections)**: Python package for computing opacity cross-sections and collision-induced absorption coefficients for (exo)-planetary and sub-stellar atmosphere models.

- **PIPPIN** (**P**olarimetric Differential **I**maging **pip**e**l**ine for **N**ACO): Python data reduction pipeline for VLT/NACO PDI observations (see de Regt et al. 2024).
- Development contributions to **petitRADTRANS** and **excalibuhr**.

Teaching & Supervision

Teaching Assistant

- *Astronomy Lab & Observing Project* Sep 2022 - June 2025
  2nd-year BSc. course, where I assisted in problem classes, the supervision of student research projects and their observations.

Research Supervision

- MSc. Christos Thomopoulos Sep 2025 - July 2026
  2nd Thesis: *From Gas to Clouds: Investigating FeH in Brown Dwarf Atmospheres*
- MSc. Dion Cobelens Feb 2024 - Dec 2024
  1st Thesis: *A Tale of Two Carbons: Exploring Isotopic Ratios, Atmospheric Composition, and the Formation Environment of PZ Tel B*
- MSc. Charlotte Coone Oct 2023 - July 2024
  1st Thesis: *Probing the Atmosphere of mid-L dwarf LSPM J0036+1821 using multi-wavelength CRIRES$^+$ spectra*
- MSc. Quincy Bosschaart Oct 2022 - July 2023
  1st Thesis: *The $^{12}CO/^{13}CO$ isotopologue ratio of VHS 1256-1257b*

Professional Service & Outreach

Exoplanet Group Meeting: Co-organising Leiden's weekly meeting since 2022.

Peer Review: Refereed papers for AJ, ApJ, and RASTI.

Science communication

- NOVA press release (Aug 2025): *Rare isotopes in our neighbouring stars provide new insights in the origin of carbon and oxygen*
- Student article in Nederlands Tijdschrift voor Natuurkunde (Aug 2024): *Planeetvormende schijven in beeld*
- NOVA press release (Apr 2024): *Student cleans up archival data and uncovers two stellar cocoons*

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