Sam de Regt

PhD Candidate in Astronomy

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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. **de Regt, S.**, Gandhi, S., Siebenaler, L., González Picos, D.. *pyROX: Rapid Opacity X-sections*. *Submitted to JOSS*.
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. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.

Presentations

Contributed Talks

1. ExoCoffee: Heidelberg, DE (June 2025). *The ESO SupJup Survey: VII. Clouds and line asymmetries in CRIRES+ J-band spectra of the Luhman 16 binary*
2. NAC 2025: Berg en Dal, NL (May 2025). *A View of Chemistry, Clouds and Gravity through High-Resolution Spectra of Brown Dwarfs*
3. Two HoRSEs: Berlin, DE (July 2024). *Double delight: CRIRES+ insights into the nearest brown dwarf binary*
4. Exoplanets 5: Leiden, NL (June 2024). *Double delight: CRIRES+ exploration of Luhman 16's binary atmospheres*
5. petitRADTRANS workshop: Heidelberg, DE (Nov 2023). *Characterising the atmosphere of a late L-dwarf with CRIRES+*

6. NOVA fall school: Dwingeloo, NL (Nov 2023). *Characterising the atmosphere of a late L-dwarf with CRIRES+*
7. 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*

Teaching & Supervision

Teaching Assistant

– *Astronomy Lab & Observing Project* Sep 2022 - June 2025
A 2nd-year BSc. course, where my tasks include assistance at problem classes, the supervision of student research projects and their observations.

Research Supervision

– MSc. Quincy Bosschaart Oct 2022 - July 2023
1st Thesis: *The $^{12}CO/^{13}CO$ isotopologue ratio of VHS 1256-1257b*

– 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. 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*

Tools & Software

– PIPPIN (**P**DI **pip**eli**n**e for **N**ACO data): A Python data reduction pipeline to apply the Polarimetric Differential Imaging (PDI) technique to VLT/NACO observations, as described in de Regt et al. (2024). The package can be found on (PyPi | GitHub) and reduced data products are available on Zenodo.

– pyROX (**R**apid **O**pacity **X**-sections): A Python package for computing opacity cross-sections and collision-induced absorption coefficients for applications in models of (exo)-planetary and (sub)-stellar atmospheres.

Other Experience

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

Observing Proposals & Experience

- PI of accepted proposal VLT/CRIRES+ (3.4h): *Methane along the meridians: tracing cloud break-up in a brown dwarf atmosphere*
- 4 nights (Nov 2022) at the Very Large Telescope, using CRIRES+ to observe brown dwarfs and exoplanets as part of the ESO SupJup Survey.
- 8 nights (2023, 2024) at the Isaac Newton Telescope (La Palma), using the Wide Field Camera. My tasks included assisting students with their observing projects and the telescope operation.

Other publications

- NOVA press release (Apr 2024): *Student cleans up archival data and uncovers two stellar cocoons*
- Student article in Nederlands Tijdschrift voor Natuurkunde (Aug 2024): *Planeetvormende schijven in beeld*

Last updated: July 30, 2025