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.** and Snellen, I. A. G. and Allard, N. F. and González Picos, D. and Gandhi, S. and Grasser, N. and Landman, R. and Mollière, P. and Nasedkin, E. and Stolker, T. and 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.
2. Mulder, W., **de Regt, S.** and Landman, R., Picos, D. González and 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.
3. 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.
4. **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.
5. **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.

6. 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.
7. **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. Siebenaler, L., Miguel, Y., and **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.
2. 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.
3. 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.
4. 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.
5. 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. 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. 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**el**i**ne 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 Experience

– 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: June 11, 2025