A Sub-mm perspective on massive galaxies in the early universe

Schouws; S.T.M.

Publications

First-author publications

- *Detection of [O III]$_{88\mu m}$ in JADES-GS-z14-0 at z = 14.1793*
  Schouws, Sander, Bouwens, Rychard J., Ormerod, Katherine, Smit, Renske, Algera, Hiddo, Sommovigo, Laura, Hodge, Jacqueline, Ferrara, Andrea, Oesch, Pascal A., Rowland, Lucie E., van Leeuwen, Ivana, Stefanon, Mauro, Herard-Demanche, Thomas, Fudamoto, Yoshinobu, Röttgering, Huub, and van der Werf, Paul
  2025, ApJ, 988, 19
- *Deep Constraints on [CII]158μm in JADES-GS-z14-0: Further Evidence for a Galaxy with Low Gas Content at z=14.2*
  Schouws, Sander, Bouwens, Rychard J., Algera, Hiddo, Smit, Renske, Kumari, Nimisha, Rowland, Lucie E., van Leeuwen, Ivana, Sommovigo, Laura, Ferrara, Andrea, Oesch, Pascal A., Ormerod, Katherine, Stefanon, Mauro, Herard-Demanche, Thomas, Hodge, Jacqueline, Fudamoto, Yoshinobu, Röttgering, Huub, and van der Werf, Paul
  2025, arXiv, arXiv:2502.01610
- *ALMA as a Redshift Machine: Using [C II] to Efficiently Confirm Galaxies in the Epoch of Reionization*
  Schouws, Sander, Bouwens, Rychard, Smit, Renske, Hodge, Jacqueline, Stefanon, Mauro, Witstok, Joris, Hilhorst, Juliëtte, Labbé, Ivo, Algera, Hiddo, Boogaard, Leindert, Maseda, Michael, Oesch, Pascal, Röttgering, Huub, and van der Werf, Paul
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- *Significant Dust-obscured Star Formation in Luminous Lyman-break Galaxies at z∼7-8*
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Co-authored publications

- *Direct detection of cool molecular gas in a star-forming galaxy at z=7.31*
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- *A first systematic study of [OIII] 88 μ m at $z > 8$: two luminous oxygen lines and a powerful ionized outflow in the first 600 million years*
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- *REBELS-MOSFIRE: Weak C III] Emission Is Typical among Extremely UV-bright, Massive Galaxies at $z \sim 7$*

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- *The ALMA REBELS survey: [O III]$_{88\mu m}$ line scans of UV-bright $z \gtrsim 7.6$ galaxies*
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- *The ALMA REBELS survey: obscured star formation in massive Lyman-break galaxies at z= 4-8 revealed by the IRX-β and $M_\star$ relations*
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- *Spectroscopic confirmation of a gravitationally lensed Lyman-break galaxy at $z_{[CII]}$ = 6.827 using NOEMA*
Molyneux, S. J., Smit, R., Schaerer, D., Bouwens, R. J., Bradley, L., Hodge, J. A., Longmore, S. N., Schouws, S., van der Werf, P., Zitrin, A., and Phillips, S.
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- *The ALMA Spectroscopic Survey in the HUDF: Nature and Physical Properties of Gas-mass Selected Galaxies Using MUSE Spectroscopy*
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Curriculum Vitae

I was born on the 12 March 1994 in Heemskerk, as the eldest child of Nico and Jolanda Schouws. I grew up in the nearby village of Limmen together with my younger sister, Mandy, and brother, Simon. I attended primary education there and completed my secondary education at the Jac. P. Thijsse College in Castricum, where I obtained my VWO diploma.

During my high school years, I had the opportunity to participate in the LAPP-Top programme for astronomy and the Dutch Astronomy Olympiad, both hosted at Leiden University. This early familiarity with the observatory made Leiden the obvious choice for my university studies, and I enrolled in a double bachelor's programme in Astronomy and Physics. I participated in the honours programme and conducted my bachelor's research project under the supervision of Huub Röttgering, who would later become my promotor. Working with LOFAR data to search for radio haloes and relics in galaxy clusters ignited a lasting passion for radio astronomy.

I continued my studies in Leiden, starting my master's degree Research in Astronomy. I was fortunate to be Jacqueline Hodge's first master's student, working on a project involving the stacking of submillimeter observations, which taught me the power of using the sub-mm regime to study galaxy formation and evolution. For my second research project, I worked with Marijn Franx on the deep LEGA-C survey. This project was my first substantial experience with rest-frame optical spectroscopy and the impact of kinematics on these spectra—concepts that I would continue to build upon later in my research.

After completing my master's degree, I started my PhD research at Leiden Observatory under the supervision of Rychard Bouwens. Shortly before my PhD officially commenced, together with Rychard, we submitted an ALMA proposal that was awarded observing time. The resulting data, together with observations generously shared by Mauro Stefanon, formed the foundation for the first two chapters of this thesis. This early work also helped lay the groundwork for the ambitious REBELS ALMA Large Programme, for which I later had the opportunity to lead the ALMA data reduction efforts.

Building on my growing familiarity with spectral scans and FIR emission lines, I applied for Director's Discretionary Time (DDT) to observe what had recently been identified as the most distant known galaxy. These observations successfully yielded a robust [OIII] detection, leading to the third paper of this thesis. This exciting result ultimately became the basis for the PHOENIX ALMA Large Programme, which I am currently leading.

During my PhD, I enjoyed contributing to the academic community by acting as a teaching assistant for the Computational Astrophysics and Observational Cosmology courses. I also had the pleasure of supervising several bachelor's and master's students during their research projects.

Following the completion of my PhD, I moved to Valencia to take up a postdoctoral position at the University of Valencia, where I will continue my research into the physical processes governing early galaxy evolution.

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We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time.

— T. S. Eliot, *Four Quartets*