Leindert Boogaard

Title

Cold gas in distant galaxies

Abstract

Cold gas is the fuel for star formation and mapping the evolution of the cosmic molecular gas content is therefore key to our understanding of the build-up of galaxies over cosmic time. The advent of large millimeter interferometers now makes it possible to map the cold gas content of the universe in unprecedented detail. In this talk, I will present the latest results from the ALMA Spectroscopic Survey of the Hubble Ultra Deep Field (ASPECS), an ALMA large program that performed the largest three dimensional spectral-scan survey for cold gas and dust through cosmic time. I will discuss the resulting physical properties and conditions inside the cold interstellar medium of star-forming galaxies at cosmic noon, and the implications of ASPECS for the cosmic molecular gas density and the baryon cycle. I will close by discussing key steps we are working on to further refine our knowledge of cold gas in distant galaxies.

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Astronomer

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Research Interests

Galaxy formation and evolution; Physics of the interstellar medium, star formation and stellar populations across cosmic time; Galaxy scaling relations; Radio/(sub)millimeter Interferometry; Optical/infrared Spectroscopy

Career & Education

2021-Present **Postdoc**, *Max Planck Institute for Astronomy*, Heidelberg, Germany

2016-2021 **Doctorate (PhD)**, *Leiden University*, Leiden, The Netherlands
- Thesis: Cold gas in distant galaxies
  Promotores: prof. P. P. van der Werf & dr. R. Bouwens

2014-2016 **Master of Science in Astronomy (Cum Laude)**, *Leiden University*, The Netherlands

2011-2014 **Bachelor of Science in Astronomy**, *Leiden University*, The Netherlands

First Author Publications

48 peer-reviewed publications in scientific journals (🔭) of which 4 as first author (🔭)

[4] **L.A. Boogaard**, R.J. Bouwens, D. Riechers, P. van der Werf, *et al.*, *Measuring the Average Molecular Gas Content of Star-forming Galaxies at* $z = 3 - 4$, 2021, ApJ, 916, 12

[3] **L.A. Boogaard**, P. van der Werf, A. Weiss, G. Popping, R. Decarli, F. Walter, *et al.*, *The ALMA Spectroscopic Survey in the Hubble Ultra Deep Field: CO Excitation and Atomic Carbon in Star-forming Galaxies at* $z = 1 - 3$, 2020, ApJ 902, 109

[2] **L.A. Boogaard**, R. Decarli, J. González-López, P. van der Werf, F. Walter, R. Bouwens, M. Aravena, C. Carilli, *et al.*, *The ALMA Spectroscopic Survey in the HUDF: Nature and physical properties of gas-mass selected galaxies using MUSE spectroscopy*, 2019, ApJ, 882, 140

[1] **L.A. Boogaard**, J. Brinchmann, N. Bouché, M. Paalvast, *et al.*, *The MUSE Hubble Ultra Deep Field Survey. XI. Constraining the low-mass end of the stellar mass - star formation rate relation at* $z < 1$, 2018, A&A, 619, A27

Conference Proceedings **L.A. Boogaard**, *Nature and physical properties of ALMA selected galaxies using MUSE spectroscopy*, 2020, in IAU Symp. 352, *Uncovering early galaxy evolution in the ALMA and JWST era*

References

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