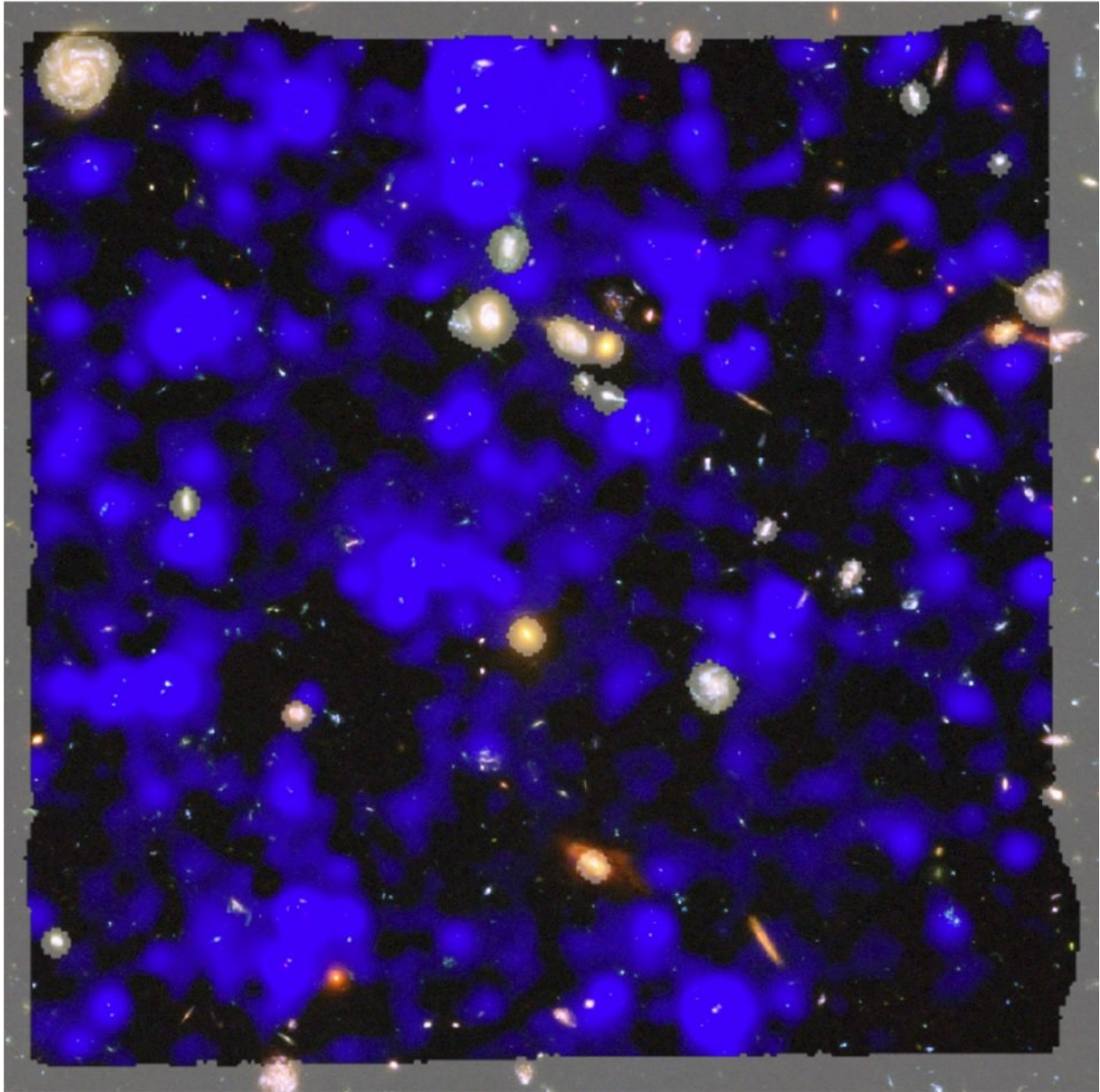


# The faint glow of cosmic hydrogen

October 3 2018

---



Deep observations made with the MUSE spectrograph on ESO's Very Large

Telescope have uncovered vast cosmic reservoirs of atomic hydrogen surrounding distant galaxies. The exquisite sensitivity of MUSE allowed for direct observations of dim clouds of hydrogen glowing with Lyman-alpha emission in the early Universe?--?revealing that almost the whole night sky is invisibly aglow. Credit: ESA/Hubble & NASA, ESO/ Lutz Wisotzki et al.

A study published recently in *Nature* has revealed the presence of a hitherto undetected component of the universe—large masses of gas surrounding distant galaxies. An international team from some 10 scientific institutions has shown that almost the whole of the early universe shows a faint glow in the Lyman-alpha line. This line is one of the key "fingerprints" of hydrogen. This detection reveals the existence of extensive masses of gas around primitive galaxies. The results of this study are based on observations made with the MUSE spectrograph on the Very Large Telescope (VLT) of the European Southern Observatory, Cerro Paranal, Chile.

The principal investigator of the research, Lutz Wisotzki, of the Leibniz Institute of Astrophysics in Potsdam, Germany, recalls that when he presented this image for the first time at a conference a year ago, a colleague exclaimed, "Twenty years ago there was no Lyman-alpha anywhere, but now it's everywhere!" The high sensitivity of MUSE has revealed that Lyman-alpha emission covers the whole sky, including the apparently empty spaces between the galaxies.

The article published in *Nature* provides a link between several lines of astrophysical research. Its unprecedented sensitivity offers new knowledge about the gas in the environments of the galaxies, particularly during their infancy. It also offers a basis for speculation about the sources of energy for all the Lyman-alpha emissions; the results will be of use for the next generation of theoretical models for the formation of

galaxies.

Astronomical research is concerned with obtaining the most complete possible picture of the universe and its components. The results of this work have supplied new information about physical processes in the universe that had not been visible until now. This phenomenon is not associated with a single interesting object, instead offering a new view of the entire cosmos through a representative window. It shows that the sky looks quite different depending on what type of instruments researchers use to observe it, just as the sky at radio or X-ray wavelengths looks quite different from the visible sky.

"While the Hubble Space Telescope shows us light only where there are galaxies, and between them we do not see anything, only empty sky, MUSE in Lyman-alpha shows light wherever we look," explains Ana Monreal-Ibero, an IAC researcher and a co-author of the publication. This instrument has also allowed researchers to obtain information about some of the faintest [galaxies](#) known, too faint to be observed with the Hubble.

"In the future, we plan to make even more sensitive measurements," concludes Lutz Wisotzki. "We want to know the details about how these immense cosmic reservoirs of atomic hydrogen are distributed in space."

**More information:** L. Wisotzki et al, Nearly all the sky is covered by Lyman- $\alpha$  emission around high-redshift galaxies, *Nature* (2018). [DOI: 10.1038/s41586-018-0564-6](https://doi.org/10.1038/s41586-018-0564-6)

Provided by Instituto de Astrofísica de Canarias

Citation: The faint glow of cosmic hydrogen (2018, October 3) retrieved 26 April 2024 from

<https://phys.org/news/2018-10-faint-cosmic-hydrogen.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.