

High-sensitivity laser heterodyne radiometer developed for remote sensing of atmospheric water vapor, isotopes

September 2 2024



Credit: CC0 Public Domain

A research team led by Prof. Gao Xiaoming from the Hefei Institutes of Physical Science of the Chinese Academy of Sciences developed a near-infrared laser heterodyne radiometer (LHR), that could greatly improve water vapor measurements in the atmosphere and reduce unwanted noise

during measurements.

The findings were [published](#) in *Sensors and Actuators B: Chemical*.

The LHR is small, portable, and has high spectral resolution, making it a great candidate for use on future satellites. However, noise from its local oscillator affects its accuracy and therefore limits its usable spectral range.

To solve this problem, the researchers introduced a semiconductor optical amplifier (SOA) to reduce the noise from the local oscillator. This greatly improved the LHR's accuracy and thus expands the device's range.

By using a [tunable laser](#) as the local oscillator and operating the SOA in dynamic gain saturation, they stabilized the laser power and significantly lowered the noise of the device.

"With this improvement, the LHR can better measure [water vapor](#) and its isotopes in the [atmosphere](#), which is important for understanding [climate change](#) and the environment," said Dr. Li Jun, a member of the team.

It also helps provide valuable data for studying the Earth's water cycle and atmospheric transport, said Li.

More information: Jun Li et al, Remote sensing of H₂O/HDO in the atmospheric column based on a near-infrared laser heterodyne radiometer suppressing local oscillator relative intensity noise, *Sensors and Actuators B: Chemical* (2024). [DOI: 10.1016/j.snb.2024.136405](https://doi.org/10.1016/j.snb.2024.136405)

Provided by Chinese Academy of Sciences

Citation: High-sensitivity laser heterodyne radiometer developed for remote sensing of atmospheric water vapor, isotopes (2024, September 2) retrieved 2 September 2024 from <https://phys.org/news/2024-09-high-sensitivity-laser-heterodyne-radiometer.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.