



Observation of H₂O in a strongly lensed Herschel-ATLAS source at $z=2.3$

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The Herschel survey, H-ATLAS, with its large areal coverage, has recently discovered a number of bright, strongly lensed high- z submillimeter galaxies. The strong magnification makes it possible to study molecular species other than CO, which are otherwise difficult to observe in high- z galaxies. Among the lensed galaxies already identified by H-ATLAS, the source J090302.9-014127B (SDP.17b) at $z = 2.305$ is remarkable due to its excitation conditions and a tentative detection of the H₂O 202-111 emission line (Lupu et al. 2010). We report observations of this line in SDP.17b using the IRAM interferometer equipped with its new 277- 371GHz receivers. The H₂O line is detected at a redshift of $z = 2.3049 \pm 0.0006$, with a flux of 7.8 ± 0.5 Jy km s⁻¹ and a FWHM of 250 ± 60 km s⁻¹. The new flux is 2.4 times weaker than the previous tentative detection, although both remain marginally consistent within 1.6-sigma. The intrinsic line luminosity and ratio of H₂O(202-111)/CO8-7 seem comparable with those of the nearby starburst/enshrouded-AGN Mrk 231, suggesting that SDP.17b could also host a luminous AGN. The detection of a strong H₂O 202-111 line in SDP.17b implies an efficient excitation mechanism of the water levels that must occur in very dense and warm interstellar gas.

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