

ACCURATE LABORATORY MEASUREMENTS OF VIBRATION-ROTATION TRANSITIONS OF $^{36}\text{ArH}^+$ and $^{38}\text{ArH}^+$

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The protonated Ar ion $^{36}\text{ArH}^+$ has recently been identified in space,^a in the Crab Nebula, from Herschel spectra. Its R(0) and R(1) transitions lie at 617.5 and 1234.6 GHz, respectively, where atmospheric transmission is rather poor, even for a site as good as that of ALMA. As an alternative, especially after the end of the Herschel mission, rovibrational transitions of ArH^+ could be observed in absorption against bright background sources such as the galactic center, or other objects.

We report on accurate laboratory wavenumber measurements of 19 lines of the $v = 1-0$ band of $^{36}\text{ArH}^+$ and $^{38}\text{ArH}^+$, using a hollow cathode discharge cell, a difference frequency laser spectrometer and Ar with natural isotopic composition. Of those lines, only eight had been reported before and with much less accuracy.^b The data have also been used in a Dunham-type global fit of all published laboratory data (IR and sub-mm) of all isotopologues.^c

^aBarlow et al., *Science*, 342, 1343 (2013)

^bR.R. Filgueira and C.E. Blom, *J. Mol. Spectrosc.*, 127, 279 (1988)

^cM. Cueto et al, *Astrophys. J. Lett*, 783, L5 (2014)