

THE SEARCH FOR PROTONATED WATER CLUSTERS: THZ LASER SPECTRUM OF A PULSED SUPERSONIC SLIT DISCHARGE: D₂O⁺, D₃O⁺, OD

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Protonated water clusters have been the focus of theoretical interest for two decades, but few results on their spectra have been reported so far ^a. Research on neutral water clusters in the last few years has shown that a pulsed supersonic slit expansion source allows observation of spectra up to the hexamer ^b. Because of the stronger ion-dipole interaction and the expected higher binding energy of protonated water clusters (30 kcal/mol H₂O), these might also be observable by using a pulsed slit source with a high current (high ionization degree) discharge ^c.

We present very dense THz laser absorption spectra obtained with a NeHe/D₂O-operated discharge expansion in the range of 1000-2500 GHz (30-75 cm⁻¹), using an advanced pulsed discharge slit source. We present assignments of lines of the species OD, D₂O⁺ and D₃O⁺ and their hot band rotational lines, and discuss progress in assigning the many unassigned features.

^aL. I. Yeh, Y. T. Lee, J. T. Hougen

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