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Action spectroscopic study of $(\text{H}_2\text{O-X})^+$ complexes in the overtone range

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H_2O^+ plays a role in the ion chemistry of the lower atmosphere and acts as a nucleation center [1]. In this contribution we present new results concerning $(\text{H}_2\text{O-X})^+$ complexes, with $X = \text{Ar}, \text{CO}_2, \text{N}_2, \text{N}_2\text{O}$ or H_2O . These cationic complexes are produced using a supersonic expansion and an electron beam. Photo-fragmentation spectroscopy is performed with an OPO laser in the near-IR (1000-2100 nm) and by monitoring the signal of H_2O^+ fragments as a function of the laser wavelength. New vibrational bands are reported. The results concerning $(\text{H}_2\text{O-Ar})^+$ will be compared with previous results obtained in the literature [2]. Tentative assignment of the observed bands will be performed by a careful comparison between the different complexes. Finally, we present the status of our efforts in the production of very large ionic clusters, with pure $(\text{Ar})_n^+$ and mixed clusters $(\text{H}_2\text{O}_m\text{-Ar}_n)^+$ containing up to thousands of units.

[1]: Shuman, N. S., Hunton, D. E., & Viggiano, A. A. (2015), Chemical reviews, 115(10), 4542-4570.

[2]: Wagner, J. P., McDonald, D. C., & Duncan, M. A. (2017), The Journal of chemical physics, 147(10), 104302.

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