THE ROTATIONAL SPECTRUM OF CHLORINE NITRATE ($ClONO_2$) IN THE THREE LOWEST $n\nu_9$ POLYADS

Z. KISIEL, E. BIAŁKOWSKA-JAWORSKA, *Institute of Physics, Polish Academy of Sciences, Al. Lotników 32/46, 02-668 Warszawa, Poland*; R. A. H. BUTLER, *Department of Physics, Pittsburg State University, Pittsburg, KS 66726*; D. T. PETKIE, *Department of Physics, Wright State University, Dayton, OH 45435*; P. HELMINGER, *Department of Physics, University of South Alabama, Mobile, AL 36688*; F. C. DE LUCIA, *Department of Physics, The Ohio State University, Columbus, OH 43210*.

The rotational spectrum of the stratospherically important $ClONO_2$ molecule has recently been subjected to an extended analysis,[a] which covered four states ranging from the ground state to the $\nu_5/\nu_6\nu_9$ dyad at $\approx$560 cm^{-1}. The analysis was based on a newly recorded broadband FASSST spectrum with an almost complete coverage of the 118-378 GHz region.

The remaining vibrational states below 560 cm^{-1} are the three polyads associated with successively higher excitation of the ν_9 mode. These are the $(2\nu_9/\nu_7)$ dyad, the $(3\nu_9/\nu_7\nu_9)$ dyad, and the $(4\nu_9/\nu_7 2\nu_9/2\nu_7)$ triad. Rotational transitions in the triad were assigned for the first time and data sets for the two dyads were considerably improved over those obtained previously.[b] Transition frequencies in all three polyads, for both $^{35}ClONO_2$ and $^{37}ClONO_2$, were fitted to within experimental accuracy by using a new coupling scheme which accounted in a unified manner for the pertinent Fermi and Coriolis interactions. Various tests used to ensure that the 'true' solution has been reached are discussed.

[a] R.A.H.Butler et al., *J. Mol. Spectrosc.*, **243**, 1-9 (2007); **244**, 113-116 (2007).
[b] R.A.H.Butler et al., *J. Mol. Spectrosc.*, **213**, 8-14 (2002); **220**, 150-152 (2003).