ROTATIONAL PERTURBATIONS IN THE SCHUMANN-RUNGE BANDS NEAR THE DISSOCIATION LIMIT

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Predissociation in the Schumann-Runge bands of molecular oxygen plays an important role in the production of atmospheric ozone[a]. However, the region of the Schumann-Runge bands near the dissociation limit ($v' = 18 - 22$) has only been partially analysed in the past. This has been due to the difficulties associated with obtaining accurate intensity and width measurements with spectrographic techniques, and the presence of "main" and "extra" lines associated with rotational perturbations[b].

Our use of the non-linear optical technique of four-wave difference-frequency mixing (FWDFM) has enabled this region of the Schumann-Runge bands (from 175-178 nm) to be studied in unprecedented detail, with sub-Doppler resolution in absorption. Recent measurements using FWDFM have enabled analysis of the $v' = 16 - 18$ bands, with interpretation of the perturbations present in this region[c]. The current investigation involves the study of those lines from $v' = 19 - 22$. Preliminary analysis of the $v' = 19$ band rotational lines confirms the presence of perturbations in the F_3 levels, possibly caused by interactions with the $C'\,^3\Pi_u$ state. Results will be presented here on the recent findings in this region.

[a] M. Nicolet, J. Geophys. Res. **89**, 2573 (1984)
[b] P. Brix and G. Herzberg, Can. J. Phys. **32**, 110, (1954)
[c] B. R. Lewis, P. M. Dooley, J. P. England, K. Waring, S. T. Gibson, K. G. H. Baldwin and H. Partridge, Phys. Rev. A **54**, 3923, (1996)