TORSIONAL, VIBRATIONAL AND VIBRATION-TORSIONAL LEVELS IN THE S_1 AND GROUND CATIONIC D_0^+ STATES OF PARA-XYLENE

ADRIAN M. GARDNER, WILLIAM DUNCAN TUTTLE, *School of Chemistry, University of Nottingham, Nottingham, United Kingdom*; PETER GRONER, *Department of Chemistry, University of Missouri - Kansas City, Kansas City, MO, USA*; TIMOTHY G. WRIGHT, *School of Chemistry, University of Nottingham, Nottingham, United Kingdom*.

Insight gained from examining the "pure" torsional, vibrational and vibration-torsional (vibtor) levels of the single rotor molecules: toluene (methylbenzene)[a] and *para*-fluorotoluene (*p*FT),[b] is applied to the double rotor *para*-xylene (*p*-dimethylbenzene) molecule .[c] Resonance-enhanced multiphoton ionization (REMPI) spectroscopy and zero-kinetic-energy (ZEKE) spectroscopy are employed in order to investigate the S_1 and ground cationic states of para-xylene. Observed transitions are assigned in the full molecular symmetry group (G_{72}) for the first time.

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[a] J. R. Gascooke, E. A. Virgo, and W. D. Lawrance, *J. Chem. Phys.*, **143**, 044313 (2015).

[b] A. M. Gardner, W. D. Tuttle, L. Whalley, A. Claydon, J. H. Carter and T. G. Wright, *J. Chem. Phys.*, **145**, 124307 (2016).

[c] A. M. Gardner, W. D. Tuttle, P. Groner and T. G. Wright, *J. Chem. Phys.*, (2017, in press).