LASER SPECTROSCOPY OF BaOH AND BaOD: ANOMALOUS SPIN-ORBIT COUPLING IN THE $\tilde{A}^2\Pi$ STATE

J. D. TANDY, J.-G. WANG, and P. F. BERNATH, *Department of Chemistry, University of York, Heslington, York, YO10 5DD, UK.*

The $\tilde{A}^2\Pi - \tilde{X}^2\Sigma^+$ transition of BaOD has been rotationally analyzed using high-resolution laser excitation spectroscopy. BaOD molecules were synthesized in a Broida-type oven and detected using a single mode Ti:Sapphire laser. Measured rotational lines have been assigned, and rotational and fine structure parameters determined through a combined least-squares fit with the millimeter-wave pure rotational data of the $\tilde{X}^2\Sigma^+$ state. A significantly different spin-orbit coupling constant from the corresponding value for BaOH was observed and attributed to global and local perturbations arising from vibrationally excited bands of the $\tilde{A}'^2\Delta$ state. Λ-doubling constants for the $\tilde{A}^2\Pi$ state also showed poor agreement with the predictions of the pure precession model. To further understand the nature of the interactions between the $\tilde{B}^2\Sigma^+$, $\tilde{A}^2\Pi$ and $\tilde{A}'^2\Delta$ states of BaOH, a V-type optical-optical double resonance spectroscopy experiment was prepared to locate the lower-lying excited state levels. Preliminary results have yielded a band in close proximity on the lower wavenumber side of the $\tilde{A}^2\Pi_{1/2}$ spin component of BaOH with a relatively large p value. Further results of this ongoing experiment will be presented.