A GLOBAL FIT OF THE $X^2\Pi$, $A^2\Sigma^+$, $B^2\Sigma^+$ AND $C^2\Sigma^+$ STATES OF SIX OH ISOTOPOLOGUES

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We report the preliminary results on a global fit of six OH isotopologues, ^{16}OH, ^{17}OH, ^{18}OH, ^{16}OD, ^{17}OD and ^{18}OD, with the purpose to support the current and future astrophysical and atmospheric remote sensing missions. The primary goal of our project is to simultaneously fit the MW, THz, infrared, visible, and UV data of the six OH isotopologues using a global Dunham model and to predict all known and as yet unmeasured transitions for any of the six isotopologues within state-of-the-art experimental uncertainty. Within the framework of a Dunham fit, all isotopologues can be treated as the same molecule using well-known reduced mass relationships (see our similar work on O_2 in Yu *et al.*[a]). Experimental information from one isotopologue can be leveraged to accurately predict the spectra of any other isotopologue. All previously available experimental data from the following systems were collected and used in the analysis: the microwave transitions in the $X^2\Pi$ state, the mid- and near-infrared vibration-rotation transitions in the $X^2\Pi$ state, and the UV electronic transitions from the $A^2\Sigma^+ - X^2\Pi$, $B^2\Sigma^+ - X^2\Pi$, $B^2\Sigma^+ - A^2\Sigma^+$, $C^2\Sigma^+ - A^2\Sigma^+$ systems. For the main ^{16}OH isotopologue, experimental data are available for the following vibrational states: $v = 0 - 13$ for $X^2\Pi$, $v = 0 - 2, 4 - 9$ for $A^2\Sigma^+$, $v = 0 - 1$ for $B^2\Sigma^+$, $v = 0 - 1$ for $C^2\Sigma^+$. Band by band fits are first carried out for these ^{16}OH data to discover problematic measurements, e.g., misassigments and calibration problems. Then all these ^{16}OH data were fitted with a Dunham-type model. Band by band fits are in progress for each of the other five minor isotopologues. Eventually data from all the six isotopologues will be simultaneously fitted with an isotopically invariant Dunham-type model. We will present the most recent fitting results.

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[a]S. Yu, C. E. Miller, B. J. Drouin and H.S.P. Müller, High resolution spectral analysis of oxygen I. isotopically invariant Dunham fit for the $X^3\Sigma_g^-$, $a^1\Delta_g$, and $b^1\Sigma_g^+$ states, *J. Chem. Phys.* **137** (2012) 024304.