ISOTOPICALLY INVARIANT DUNHAM FIT FOR THE $X^3\Sigma_g^-$, $a^1\Delta_g$, AND $b^1\Sigma_g^+$ STATES OF OXYGEN

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At the last meeting, we reported the preliminary results on an isotopically invariant Dunham-type fit of the six oxygen isotopologues including experimental data for $v = 0 - 18$ in $X^3\Sigma_g^-$, $v = 0 - 10$ in $a^1\Delta_g$, $v = 0 - 12$ in $b^1\Sigma_g^+$. At this meeting we report the the results of our complete fit, with additional experimental data for $v = 7 - 23$ and $26 - 31$ in $X^3\Sigma_g^-$. A total of 11879 transitions were collected and fitted with a reduced RMS near unity. We made empirical adjustments to remove apparent offsets between datasets by adding/subtracting individual values based on comparison of repeated measurements and/or our model prediction. It was found that the parameters describing the breakdown of the Born-Oppenheimer approximation were of the expected order of magnitude and showed little variation among the electronic states. Dunham potentials were derived and will be presented. To the best of our knowledge, this is the first analysis that simultaneously fits spectra from all six oxygen isotopologues.