MILLIMETER-WAVE SPECTROSCOPY OF KO: ESTABLISHING THE ELECTRONIC GROUND STATE

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The ground electronic state of potassium monoxide (KO) has yet to be conclusively assigned, despite both experimental and theoretical investigations of this species. The ground state is either $^2\Pi_i$ (as for LiO and NaO) or $^2\Sigma^+$ (as for RbO and CsO), both of which are predicted to lie close in energy for KO. To solve this problem, we have conducted millimeter-wave direct absorption spectroscopy of KO. This species was synthesized via the reaction of potassium vapor, generated by a Broida-type oven, with nitrous oxide. We have found patterns that we have identified as the Ω = 3/2 and 1/2 ladders of a $^2\Pi_i$ state, as well as a $^2\Sigma^+$ state. Rotational and fine structure constants have been accurately determined assuming the $^2\Pi_i$ and $^2\Sigma^+$ assignments.