A FRESH LOOK AT THE B1 - $X0^+$ and A1 - $X0^+$ TRANSITIONS IN TUNGSTEN OXIDE, WO: EVIDENCE OF AN AVOIDED CROSSING?

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The complex electronic structure of transition metal diatomic molecules, such as tungsten monoxide (WO), makes them intriguing targets for high level spectroscopic analysis. A plethora of electrons and accessible valence orbitals make WO a difficult molecule to model computationally due to the large number of possible electronic interactions. The (0,0) and (0,1) vibrational bands of the A1 - $X0^+$ and B1 - $X0^+$ transitions of WO were recorded in absorption at Doppler-limited resolution using intracavity laser spectroscopy integrated with a Fourier-transform spectrometer [for the (0,1) band] and a 1-m monochromator with CCD detector [for the (0,0) band]. The target WO molecules were produced in the plasma discharge of a tungsten-lined copper hollow cathode, using a gas mixture of approximately 70% Ar and 30% H_2 giving a reaction chamber pressure of about 1 torr total. All 4 stable WO isotopologues were observed and analyzed. Initial fits using mass-constained parameters based on the most abundant isotope were not successful, and hint at strong interactions between the two excited electronic states.