ROTATIONAL AND HYPERFINE STRUCTURE IN THE [17.6]2.5−X2.5 AND [23.3]2.5−X2.5 TRANSITIONS OF IRIDIUM MONOXIDE

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Laser induced fluorescence spectra of two electronic transitions, [17.6]2.5 - X2.5 and [23.3]2.5 - X2.5, of IrO have been obtained at high resolution by using a single mode ring dye laser to excite IrO molecules in a laser-ablation molecular beam source. From spectra taken at the University of New Brunswick at a linewidth of 180 MHz, the ^{193}IrO - ^{191}IrO isotope shifts in the rotational lines established the vibrational assignment of the [23.3]2.5 - X2.5 band as 1 - 0 and confirmed previous 0 - 0 assignments of the [17.6]2.5 - X2.5 band. The higher J rotational lines of both transitions are observed to split into closely spaced doublets resulting from quadrupole hyperfine structure caused by the I = 3/2 nuclear spin on both Ir isotopes. Higher resolution [17.6]2.5 - X2.5 spectra with an approximate linewidth of 30 MHz, were taken at Arizona State University and showed clearly resolved hyperfine structure in the low J lines. The results of the hyperfine structure analysis will be discussed as well as (hopefully) Stark and Zeeman effect experiments to determine the permanent electric and the magnetic dipole moments of IrO.