

ROTATIONAL ANALYSIS OF SEVERAL VIBRATIONAL BANDS OF THE [7.7] $Y\ ^2\Sigma^+ - X\ ^2\Pi_i$ TRANSITION OF ^{63}CuO

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The [7.7] $Y\ ^2\Sigma^+ - X\ ^2\Pi_i$ transition of CuO was observed in emission from a Cu hollow cathode recorded with the FT-spectrometer associated with the McMath-Pierce Solar Telescope at Kitt Peak in 1994. In 1996, a rotational analysis of the (0,0) band of the $Y - X$ transition was reported by O'Brien *et al.* In a recent analysis of the (0,0) and (1,1) bands of the [16.4] $A\ ^2\Sigma^- - X\ ^2\Pi_i$ transition of CuO performed by the authors, improved centrifugal distortion constants for the $X\ ^2\Pi_i$ state were obtained. Line positions from the millimeter wave spectrum of CuO reported by Steimle *et al.* were successfully incorporated into the fit of the $A - X$ transition, however, a fit including the line positions of the $Y - X$ transition reported by O'Brien *et al.* showed small, yet significant, deviations in the residuals of the fit. In this study, the FTS data from 1994 was accessed from the FTP archive available from the National Solar Observatory website to investigate these deviations. The calibration of the data was verified to $\pm 0.001\ \text{cm}^{-1}$ using Ne reference lines from Sansonetti *et al.* Using PGOPHER simulations and the improved rotational constants for the $X\ ^2\Pi_i$ ground state, over 1000 additional line positions belonging to the (0,0) band of the $Y - X$ transition were identified in the FTS data. Several previously unidentified vibrational bands were also observed and rotationally analyzed using PGOPHER, specifically the (2,0), (2,1), (2,2), (2,3), (1,0), (1,1), (1,2), (1,3), (0,0), (0,1), and (0,2) bands. A comprehensive fit of the data containing more than 10,000 line positions has been conducted using PGOPHER. The fit successfully incorporated the millimeter wave data for the $X\ ^2\Pi_i$ state from Steimle *et al.* and the intracavity laser absorption data for the $A - X$ state from the authors. Results of this analysis will be presented.