PROGRESS ON THE ASSIGNMENT AND FIT OF THE LOWEST FUNDAMENTAL BAND OF ACETALDEHYDE ν_{10}, BURIED IN THE TORSIONAL PRECONTINUUM AT 509 cm^{-1}

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The lowest fundamental band in acetaldehyde is important because it represents a completely isolated small-amplitude vibrational level embedded in a moderately dense bath of $v = 3$ and $v = 4$ torsional background states. Because of perturbations (up to at least 0.5 cm^{-1}) caused by the torsional bath, of the density of the spectrum, and of experimental limitations in the 500 cm^{-1}region, problems arise in both the assignment and the global fit phase of the analysis of this band. A part of the several hundred assigned lines available last year could be fit at that time to a standard deviation of 0.03 cm^{-1}. During the past year, the Ritz program has increased the number of assigned lines by a factor of ten. One-state global fits of this larger data set (i.e., fits not taking explicit account of levels of the torsional bath, now in progress) will be presented. Unfortunately, the Ritz program under its standard options could not locate any low-K ($|K| \leq 3$) subbands in the very crowded band center region. We plan to relax some of the acceptance criteria so that Ritz will output (hopefully not too) numerous, less reliable, proposed subbands, among which the most likely candidates will be selected by human intervention. Work is continuing on the development of a two-state global fitting program which would include torsional bath levels via inclusion of torsional overtone transitions in the fit, but this work is hampered by difficulties in assigning reliable quantum number labels to numerical eigenvectors above the top of the torsional barrier. Attempts are also underway in another laboratory to record a jet-cooled laser diode spectrum of the band center region.