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Recent progress in absorption oscillator strengths and predissociation rates for CO in the 925-1076 Å range

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Accurate modelling of the abundance and excitation of CO in interstellar clouds, circumstellar matter and planetary atmospheres requires basic quantitative spectroscopic data, especially oscillator strengths and predissociation probabilities. It has been almost 20 years since the Meudon group started combining such high resolution and synchrotron radiation techniques below 1200 Å. More recently we published a coherent set of f-values of the A-X bands [1] and a line by line atlas of the singlet-triplet intersystem bands [2].

Here we report on the recent efforts of the Meudon and Toledo teams to measure a consistent set of f-values and predissociation rates for Rydberg bands in the 925-1076 Å range. Modern techniques have been used in order to improve our earlier results. High resolution spectra have been obtained at the SuperACO Synchrotron facility using the SU5 beam line. The absorption spectra were analyzed with simulation-fitting codes leaving the band oscillator strengths and predissociation line widths as free parameters. The necessary simulated spectra were calculated with models taking into account the interactions between the different Rydberg or valence states using the tabulated line positions and the results of classic deperturbation studies [3], [4]. Oscillator strengths have been obtained for the 9 strongest Rydberg bands for $^{12}C^{16}O$, $^{13}C^{16}O$, $^{13}C^{18}O$ as well as predissociation rates for lines whose widths were big enough to be treated as free parameters. Combining the band ocillator strengths and the calculated synthetic spectra provides line oscillator strengths which can be used to calculate spectra at any temperature of interest.

These earlier data have been compiled in the MOLAT data base. The more recent results will be added in the form of lists of line positions and intensities useful for the calculation of synthetic spectra.

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