LINE MIXING MEASUREMENTS IN PURE CO_2

RICHARD BERMAN, PETER M. SINCLAIR, A. DAVID MAY, and JAMES R. DRUMMOND, *Department of Physics, University of Toronto, 60 St. George Street, Toronto, Ontario, M5S 1A7*.

We have studied line mixing in the 4.8m ($\nu_1+\nu_2$) CO_2 Q branch. The spectra were taken using a difference frequency infrared spectrometer with signal to noise ratios in excess of 2000:1 and a frequency resolution under 2MHz. The excellent data quality allowed the spectra to be fit on a line by line basis but required a line shape model that included line mixing, Dicke narrowing, and speed dependence. At pressures below 10kPa, the spectra were fit successfully using the Rosenkranz first order theory of line mixing. Direct measurements of the line mixing coefficients for lines Q(2) to Q(30) were determined. At greater pressures it was necessary to include higher order line mixing effects. We will discuss the results of this analysis and in particular we will present direct measurements of intensity transfer between the Q(2) and Q(4) lines. These experimental results will be compared to a model based on a relaxation matrix calculated using a simple exponential power gap law.