**CRDS data analysis breakdown**

**1)** Fit raw ringdown traces

-try to maintain range over which fit is performed to five time constants (perhaps using tau determined from last shot to determine range for subsequent shot?)

**2)** Subtract Rayleigh scattering component from all taus to account for differences in Rayleigh scattering between sample and zero measurements.



*where:*

 (number density in CRDS cell)

 (number density at standard conditions)

c speed of light = 2.998E4 cm/s

k Boltzmann constant

Ray\_air  Rayleigh scattering cross section of air. This is a function of wavelength and temperature. Rough values are 1.6E-26 cm2 @ 405nm , 5.22E-27 cm2 @ 532nm and 2.12E-27 cm2 @ 664nm.

**3)** Calculate CRDS extinction (cm-1) for each of the 8 channels:



where RL is the length correction factors which need to be measured for each cell.

**4)** Apply mirror purge dilution corrections, assuming that total purge flow is equally split between the 16 mirrors.

Cell 1 (green) correction: 

Cell 2 (green) correction: 

Cell 3 (green) correction: 

Cell 4 (red) correction: 

Cell 5 (blue) correction: 

Cell 6 (green) correction: 

Cell 7 (red) correction: 

Cell 8 (blue) correction: 

*where:*  y total mirror purge flow (800 slpm)

z total flow through RH channels (2-3 slpm)

z’ total flow through dry channels (2-3 slpm)

z’’ total flow through gas ref channels (2-3 slpm)

**5)** Subtract gas reference extinction from dry and RH channels

**6)** Correct extinction to standard conditions