

Two-level system:
effect of changing the line width

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Static case:

Unfortunately, the results presented in my previous document “Test of Jonas Zmuidzinas’ ALI code” dated 1998 November 19th were computed for a different line width than that adopted in the package that Floris subsequently distributed. I assumed a linewidth of $\Delta v_1 = 1$ km/s FWHM, whereas Floris adopted a thermal line width $\Delta v_2 = 0.32$ km/s FWHM.

Fortunately, a simple scaling allows the results to be compared, because the optical depths scale exactly as $x/\Delta v$, where x is the water abundance.

If Δv is changed from Δv_1 to Δv_2 , the changes required to the figures are as follows:

- 1) Figure 1, page 5: abundance values labeling the curves should be multiplied by a factor $\Delta v_2 / \Delta v_1 = 0.32$
- 2) Figure 2, page 6: points move to the left by $|\log(0.32)| = 0.496$ in the \log_{10}
- 3) Figure 3, page 7: abundance values labeling the curves should be multiplied by a factor $\Delta v_2 / \Delta v_1 = 0.32$, as should the velocity scale on the horizontal axis
- 4) Figure 4, page 8: points should be displaced both leftwards and downwards by $|\log(0.32)| = 0.496$ in the \log_{10} . Because, the points are moved in a downward and leftward direction at a 45 degree angle to the horizontal, results for the low abundance limit continue to lie on the line of unit slope, in accord with the expression near the bottom of page 4 of the text.

LVG case

The results in the LVG limit are independent of the assumed thermal/microturbulent line width.