

We thank the reviewers for their thoughtful remarks, which allow us to improve our manuscript. In the following we address the remarks in detail.

## Responses to reviewer 1

General technical comment: The overall quality of the graphics should be improved, especially Fig.2-7 something is always missing or not properly shown

**Answer:** Figs. 2-8 have been revised according to the comments of reviewer 2 and also to correct some small calculation inconsistencies detected after the submission.

### Detailed comments:

**Comment 1.** Page 1 Line 22 add a space before the bracket.

**Answer:** Done.

**Comment 2.** Page 1 line 28: “the backscatter cross section corresponding to the Raman lines...”

**Answer:** Done.

**Comment 3.** Page 2 Line 41: do the author mean the thermal coefficient of the interference filter? Shouldn't be "ppm/°C"

**Answer:** We mean the thermal dependence of the central wavelength in picometers (pm)/°C.

**Comment 4.** Page 2 Line 47-50: something is missing, please check and consider rephrasing this paragraph.

**Answer:** We think that the paragraph is complete. However, it is true that it is too long. We have broken it into shorter sentences with some rephrasing. Now it reads:

“In this paper we assume that the receiver is in a well-controlled environment, such that the wavelength drift of the filters can be neglected. We focus henceforth on the wavelength stability requirements for a Nd:YAG non-seeded laser to be used in a lidar measuring atmospheric temperature profiles using the pure rotational Raman spectra of N<sub>2</sub> and O<sub>2</sub> under the excitation by the third harmonic of the laser fundamental frequency”.

**Comment 5.** Line 65 and 67: remove brackets from Hammann's citation.

**Answer:** Done.

**Comment 6.** all over through the text: replace atmosphere temperature with atmospheric temperature.

**Answer:** Done.

**Comment 7.** Figures 2 and 3 are not very useful in the way they are shown. A plot showing the difference-curve of “widened-unwidened”, in y-log scale and with a legend would surely help.

**Answer:** Fig. 2 has been modified adding a right y-axis showing the difference between the “unwidened” and “widened” curves. Likewise, a right y-axis has also been added to fig. 3 to show the ratio between “widened” and “unwidened” Qs.

**Comment 8.** Line 96: in spite of.

**Answer:** Done.

6. Line 112 (and all over through the text): remove brackets around the authors' names.

**Answer:** Done.