Suggestions for revision or reasons for rejection (will be published if the paper is accepted for final publication)

This manuscript by Simonsen and colleagues has much improved. I accept most answers and rebuttals to my first comments. I am not yet convinced about a few aspects that should still be addressed, though and recommend minor revisions at this stage.

Minor Comments:

1. **At the end of section 3.1 you state that the Abakus, after calibration does not measure particles smaller than 1.8 um. This may be misunderstood. As I understand it, the Abakus can indeed measure particles below 1.8 um, but your calibration is not capable of going that small, possibly due to your choice of the smallest polystyrene sphere standard diameter of 1.5 um. If you had smaller standards could the calibration resolve smaller particles?**

The lowest diameter given by the uncalibrated Abakus is 1 um. In Figure 2 it is seen that the diameter ascribed by the Abakus of a polystyrene sphere of 1.5 um is only 1.1 um. The smallest measurable polystyrene sphere is therefore around 1.45 um. From the solid line in Figure 2 it is seen that the extinction diameter of a 1.45 um particle is 1.8 um. The minimal measurable extinction diameter is therefore 1.8 um.

Dust particles have variable shape, which means that the Mie oscillations average out (Figure 3). For particles of variable morphology (variable shape with constant aspect ratio) but an aspect ratio of 1, the extinction diameter is equal to the volumetric diameter. For a different aspect ratio, the extinction diameter is larger than the volumetric diameter. It is therefore possible to measure smaller volumetric diameters for elongated particles. We have now specified that it is extinction diameter in the manuscript (Page 5, Line 18).

2. In its present state, section 3.5 is just some copy-pasted text from other sections and absolutely useless for anyone wanting to apply your calibration to their data. These instructions don't need to be in the main text either. I suggest to put step-by-step instructions in the supplementary with both Abakus and CC data, and only Abakus data. You can use your data as an example.

We have shortened the section and added step-by-step instructions to Supplement H.

3. Let's go back to that factor 10 in the counting efficiency. I understand that if the calibration moves some counts to other bins, there may be a shift in the Abakus/CC ratio in certain bins. But not in the total counts. Your new figure 5d shows that in the raw data, the Abakus counts less small particles than the CC. This makes sense to me, as coincidence loss should be more probable for small particles than for large ones. Still, considering what we know about CC and Abakus detection limits, as well as coincidence loss, in my opinion the total Abakus count (summed over all bins) should to be lower than the total CC count. Could you add something about these two values in the discussion?

The number size distribution is a decreasing function even for the smallest detectable diameters (See figure 15). This means that there are most likely many more particles below the detection limit than above. The total counts therefore depends heavily on where the lower cutoff is. For the same size range, the Coulter Counter and the calibrated Abakus do give the same total number of particles. We have changed the first paragraph of the Discussion and added Supplement I to describe this.

Also, in Appendix F you state "If two small particles coincide in the Abakus detector, their combined shadow will make them look like a larger particle". You then compare small and large particle concentrations to total concentrations to conclude that coincidence loss is negligible. Your assumption is incorrect. The problem is not that two small particles combine to form one large. Loss occurs when one particle crosses the beam, and any smaller particle crossing at the same time (on either side of the large particle) will not be counted. Your method to show that coincidence loss in negligible is therefore incorrect or at least insufficient.

The flow cell is 250 um wide. The laser light covers the whole cross section of the cell and is 1.5 um thick. It is therefore more like a sheet than a beam (see the figure at the end of this document, which is from Ruth et al., Ann. Glac. 2002). This means that the probability that two particles cross the laser sheet at the same time next to each other is much higher than behind each other, roughly 1-d/250um, where d is the particle diameter.
The diameter assigned to a particle is based on the maximum peak height of the attenuation. Two particles passing next to each other give the sum of their individual shadows, and therefore a larger peak height than each of them individually. They are therefore detected as a larger particle.

If particles hiding behind each other was a significant problem, then particles passing next to each other would happen 20-100 times more often. Our appendix F shows that particles passing next to each other is a negligible phenomenon, so particles hiding behind each other is therefore negligible.

4. Page 6, line 1: I think you mean Figure 4, not 5.

No, specifically we mean the orange line in subfigures a and b. We have added that to the manuscript.
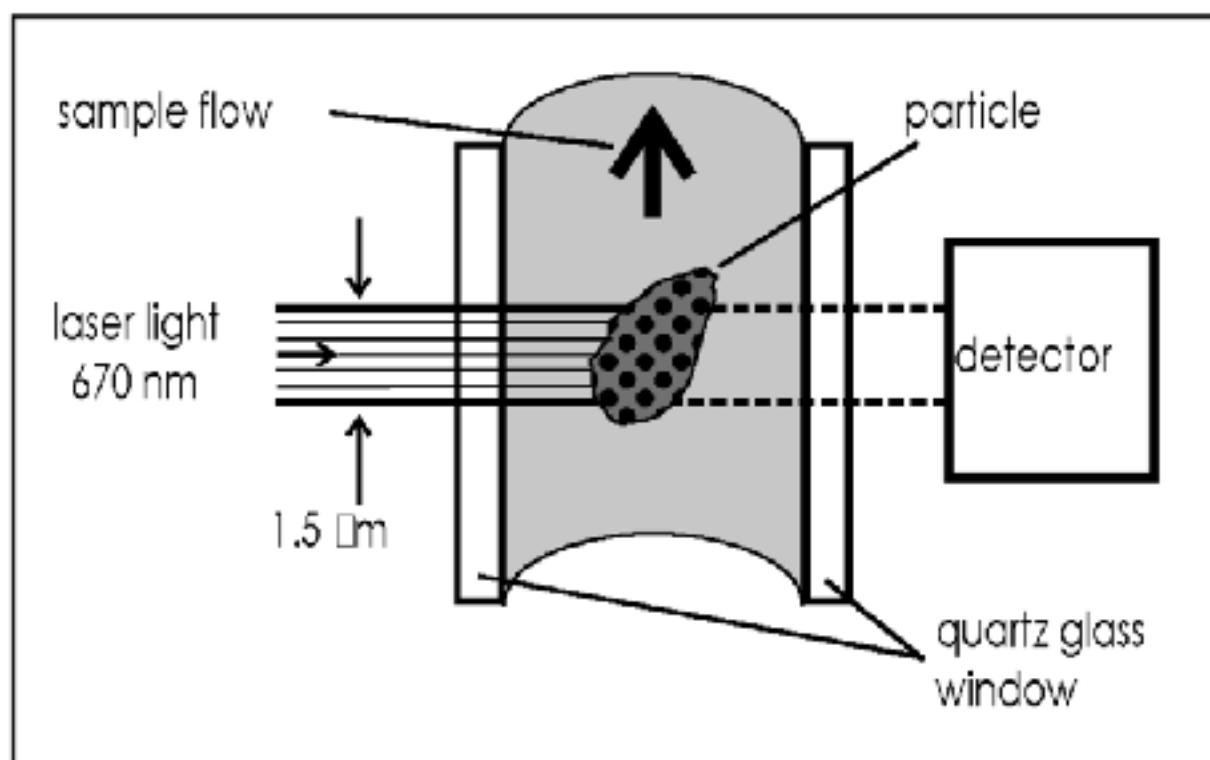
Fig. 2. Detection cell of the laser sensor (schematic). The cross section of the cell is 230 μm × 250 μm; the laser beam is 250 μm × 1.5 μm wide.