Assessing the accuracy of low-cost optical particle sensors using a physics-based approach

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Supplemental Information

Impact of viewing angle of scattered light collection

The viewing angle for a given OPC can strongly influence its ability to correctly count and size particles. Increasing the viewing angle typically leads to a larger fraction of the incident light being collected which can be helpful when inexpensive light detectors are being used. In addition to the total signal of the scattered light, it can also lower the influence of the Mie resonance by integrating over a wider degree. Figure S1 shows the impact that widening the viewing angle can have on an OPC with the same laser wavelength (658 nm) – the smallest viewing angle (blue) collects the least amount of light and shows the largest impact from the Mie resonance, whereas the red line ,which has a viewing angle similar to that of a nephelometer, shows the least impact from the Mie resonance and collects the most light.

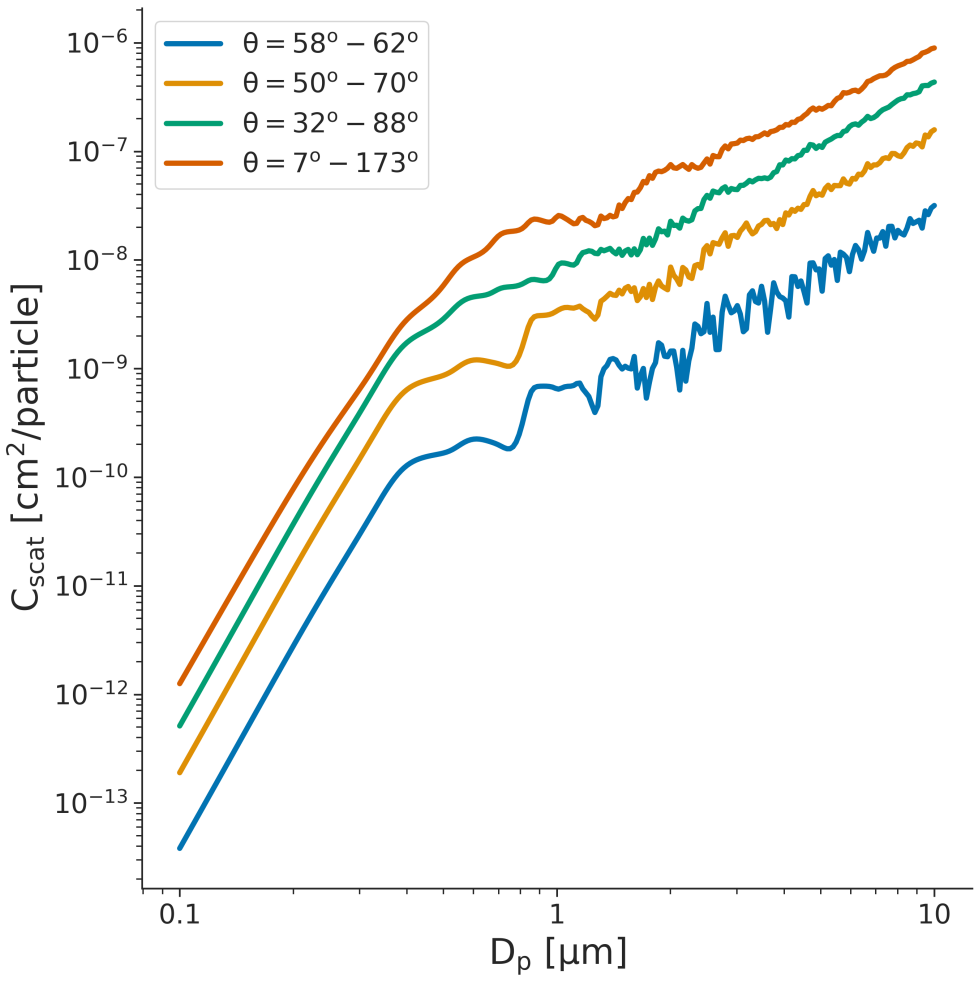

Figure S1. The amount of scattered light changes as a function of the OPC's viewing angle for a given incident laser wavelength. Above, the blue line depicts the total scattered light collected for a photometer-like instrument with a very narrow viewing angle. As the viewing angle is widened, the total amount of scattered light collected increases and the effect of the Mie resonance decreases.