

# ***Interactive comment on “Spectral Aerosol Extinction (SpEx): a new instrument for in situ ambient aerosol extinction measurements across the UV/visible wavelength range” by C. E. Jordan et al.***

## **Anonymous Referee #1**

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This paper reports on a new instrument for measuring aerosol extinction. A number of instrument already exist that are capable of this type of measurement, the advantage of this approach, according to the authors, is that it uses a broad band (xenon) light source versus a few specific wavelengths (ie LEDs). This has a number of advantages; better determination of wavelength dependent properties (e.g., assess accuracies of extinction Angstrom exponents), and by extending to lower wavelengths than typical (300 nm) provides a better measure of brown carbon (more on this below). Whether it proves to be an effective approach for measuring brown carbon outside of large plumes

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remains to be seen; as an indirect measurement, this is challenging. But, overall, the paper is well written and describes a range of careful experiments validating the instruments performance – a very nice paper.

Abstract lines 12 to 14 relating to brown carbon; while strictly true this instrument will have major limitations measuring brown carbon since it is an indirect measurement (extinction). Furthermore, there are other instruments currently available that also measure absorption in the 300nm wavelength range (7 wavelength aethalometer, although smallest wavelength is over 350 nm).

An advantage of this instrument is that it does not disturb the aerosol, measuring it in its native state (ie not collected on filters etc). How is the instrument likely to be operated in the field, ie at what cell T, and RH, ambient? What about issues with heating of the cell, etc? ie, how is the large effect of particle liquid water going to be accounted for? Also, enhanced UV light absorption may be due to Brown Carbon or clear shells over absorbing cores (ie, no brown carbon present). Will this method be able to distinguish this? If not, it should be noted, since the paper tends to emphasize the use of this instrument for investigating extinction in the UV range (also, pg 6492 line 2 and 3 are not strictly correct when considering this).

Pg 6481, lines 10 and following discussing LODs; what about sampling in the FT (ie, the intro discusses aircraft based deployment of the instrument). Can the instrument be effectively used for FT measurements?

How will the instrument perform if used for size-selected extinction measurements? Is there sufficient sensitivity? (Noting that in the conclusion it is stated that this is not the major application envisioned).

At 300 nm are there aerosol species that absorb other than brown carbon. Eg, were any tests made with nitrate?

Conclusions, pg 6492, lines 10 – 12. Washenfelder used data from a PILS-LWCC

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measurement of BrC to do the source apportionment (or any measure of BrC, for that matter) since the BBCES could not detect it. This is a very important point about trying to measure BrC from an extinction measurement.

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 6469, 2015.

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