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# ***Interactive comment on “A new method for measuring the imaginary part of refractive index structure parameter in the urban surface layer” by R. Yuan et al.***

## **Anonymous Referee #2**

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### Major Comments:

The most innovative parts of this paper are: 1) the derivation of a rather simpler expression of the imaginary part of the atmospheric refractive index structure parameter (ARISP) (also, the equation to calculate transverse wind velocity), based on results of some original papers; 2) the aerosol concentration, e.g. in an urban area, could be obtained accordingly with ordinary LAS (Large Aperture Scintillometer) observations. This would extend the LAS usages in some cities to environmental monitoring. Generally the manuscript was properly written, with clear theoretical derivations, as well as carefully designed/ operated experiments. The paper is appropriate to the journal At-

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atmospheric Chemistry and Physics (ACP). However, the present manuscript still needs some revisions before it can be accepted for publication.

Comments for revision:

1) Some inconsistencies in, for instance, 'Conclusions' and 'Abstract'. While the 'Conclusions' part emphasizes aerosol effects on the imaginary part of the ARISP, the 'Abstract' also stress the effect of 'trace gases' (with selected wavelength of LAS). The scintillometer used by the authors (with wavelength 620 nm), as well as the most popular LAS's used in recent decades (with light wavelength about 850 nm to 880 nm), are all working in the atmospheric windows. These would be improper for the assessment of trace gases. 2) The theoretical derivation, particularly for section 2.3 and 2.4, is a little lengthy. Some formulas particularly unused symbols are better to be deleted (e.g. the  $4F^*(k,L)$  term in Eq. (1)). While the symbols used should be described clearly. 3) In several places it mentioned that 'the LAS observations are performed at the height of 24.5 m'. However, the scintillometer used is actually a slant path (one side 18.5 m, another 24.5 m). An effective path height is better to be used. 4) The English writing in this manuscript need to be carefully revised. Following are only a few examples: Page 21286, line 22: 'trace gas' better to be 'atmospheric trace gases'; Page 21289, line 14-22: The symbols used in Eq. 1 need to be described precisely, e.g.,  $k$  is the wave number of the light wave used;  $z$  is the position along the propagation path; etc. Page 21289, line 23-24: 'temperature' is also 'conservative'? 'passive scalars with their sources at the surface'? Page 21290, line 15: 'by the real part', of what? Page 21297, line 2: 'data process' should be 'data processing'. Page 21302, line 27-28: On the date and time, better to be '...at 09:00LT, 15 Jan 2014, and at 12:00LT the next day'.

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