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Interactive comment on "A DMA-train for precision measurement of sub 10-nm aerosol dynamics" *by* Dominik Stolzenburg et al.

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We appreciate the thoughtful comments by referee #1. For discussion purposes we would like to respond to the general points raised, while the minor points will be addressed in the final response together with an updated version of the manuscript.

We acknowledge the well-justified comment about the time-resolution of the DMA train. Generally, we think that there is a need for fast sizing techniques in the sub-10 nm range, providing both high time-resolution and good counting statistics. The reasons for high (sufficient) time resolution have been pointed out by Wang and Flagan, Aerosol Sci. Technol. 13, 230 (1990). The time resolution needed depends on the actual aerosol system under investigation. For nanoparticles growing at rates between 10 and 100 nm/h scan times around 10 s should be sufficient such that the size distribution

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does not undergo significant changes during one scan. However, while fast scanning devices based on electrical mobility analysis are capable of measuring size distribution close to 1 Hz, poor counting statistics in the sub-10 nm size range oftentimes prevents quantitative analysis of nanoparticle dynamics. The fixed size sampling of the DMA train in several channels allows us to monitor particle evolution at a time scale of a few seconds and brings the advantage of using signal averaging at the single sizes and thereby exploiting the full counting statistics.

It is certainly true that the response time of the DMA train is well above 1 second. The transmission of the sampled aerosol through the DMA-train sampling procedure is in the order of 3 seconds based on calculations from the flow velocities. However, due to the symmetry of the six sample channels, we believe that the response time can be accounted for in the data inversion if needed.

The actual time-resolution then depends mainly on the well-known CPC response times. Due to the different counters used, a conservative estimate for the time resolution is therefore rather around 5 seconds. Literature about fast sizing techniques (e.g. Wang et al., 2002; Olfert et al. 2008, Tröstl et al., 2015) will be included in the updated manuscript.

We agree with the referee, that a plot showing both, the overall and the individual contributions to the total detection efficiency similar to Jiang et al. 2011 is worth to be included in the updated manuscript. It is actually readily available as we were already considering to include it in the first version of the manuscript.

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