

Interactive comment on “Laser filament-induced aerosol formation” by H. Saathoff et al.

Anonymous Referee #2

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The discussion paper by Saathoff et al. describes the nucleation of particles induced by laser-filament plasma. Several atmospheres are studied at the AIDA aerosol chamber: ambient air, humid synthetic air, humid nitrogen, argon-oxygen mixture, and pure argon as well as including trace gases such as SO₂ and alpha-pinene. Temperature and relative humidity are varied.

The paper is well-written, well-structured and clearly suitable for publication in ACP. It presents a number of original and interesting findings on aerosol nucleation under the special condition of laser-induced plasma. A number of results represent rather qualitative findings, nevertheless, I clearly recommend publication. Only a few minor comments should be addressed:

- Some of the measurements are influenced by contaminants in the chamber. As the contaminants are not identified and their concentration levels are unknown (and proba-

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bly change with time and chamber conditions), these experiments are not reproducible (p29858, l. 17). This fact should be mentioned in the text.

- The authors state the formation rates as number of particles per cm⁻³ plasma s⁻¹, i.e. as the particle formation rate per plasma volume. These stated formation rates in the filament are upper limits only. Most likely the nucleation is not only confined to the filament itself but is taking place inside the expanding plume that consists of the mixture of air in the filament and the surrounding air. Conditions inside this plume are rather inhomogeneous and are changing fast as the plume dilutes (especially when the fan is operated). Therefore it should be discussed in how far it is appropriate to state the formation rate as particles per cm⁻³ plasma s⁻¹ and that this is most likely an upper limit or a proxy for the actual formation rate. The observed formation rates will also depend on the mixing conditions and therefore again, the results are mostly quantitative.

- it should be stated more clearly that the measurements are often qualitative and that it will be difficult or not possible to systematically derive quantitative nucleation rates or growth rates as a function of conditions such as vapor concentrations which are independent of the specific chamber conditions.

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