General comments

This study explains the development of two aerosol decay functions, one with ventilation and deposition and the other with an additional coagulation term, and explores their application to cooking events across several sites in Tampere, Finland in 2022. The paper clearly indicates the novelty of the functions, the gap in the literature it is addressing and how, and the scientific and health implications of its findings. The main concern I have is the use of 'aerosol' and 'particle' interchangeably – while they can be treated similarly in the equations the authors use due to their size and dynamics, they are not the same thing, which should be made explicit in the paper and in the title for readers who may not be as familiar with these topics and concepts. Once this (and a few other minor suggestions, listed below) has been addressed, I think this paper can be accepted for publication.

Specific comments

My specific comments are broken down into Introduction, Methods, and Results/Discussion rather than according to the sections defined in the paper because I do not have very many; the main themes are: 1) adding some relevant context to the introduction, 2) including more details on experimental design and data treatment, and 3) clarifying a few figures and points in the results/discussion.

- Introduction
    - It would be worthwhile to add a couple of sentences describing intake fraction as well as the relationship between concentration, exposure, and dose, as not all readers may be familiar with these concepts or how they fit together.
    - There is a heavy focus on developed countries, but developing countries should at least be mentioned, especially when discussing cooking (lots of women and girls spend disproportionally more time cooking on stoves that may not be the same as those used in developed countries, which can lead to even higher exposure to PM).
    - Additionally, it would be useful to add a sentence or two focusing more on cooking (how some stoves are worse than others, some ingredients or styles of cooking cause more PM, etc.)
    - Please define the size range of UFP for those who may not be familiar with it.
- Methods
    - Can the authors clarify the frequency of measurements?
    - Were any correction factors developed and applied after co-location? Was any calibration of the sensors needed? What data processing or QA/QC steps were implemented after the measurements were finished?
    - Only one experiment was conducted per site, correct? Can the authors justify why only one was enough or why they chose not to conduct repeat experiments?
    - Can the authors include additional information on experimental design, including: any utensils and their materials, who was wearing the backpack (resident? Research team member?), how the sites were chosen, etc.?
    - Line 251: can the authors elaborate on what they mean by 'cooking styles and stove models'? What stove models were used and how were they different? Why were the cooking styles not standardized?
    - Just to clarify, did the authors use the air change rate in Lines 69-70 or calculate rates for each site?

    - Did whoever was wearing the backpack give an accurate account of their movements during the measurement period?
    - At what time and on what day did the experiments at each location occur?
- Results/Discussion
    - Can the authors indicate in Figure 2 or in a table in the SI what periods were spent in which room with respect to the backpack measurements?
    - This is not a major sticking point, but is it possible for the authors to provide information on 'typical' or 'expected' concentrations when cooking chicken and/or when cooking with rapeseed oil to help contextualize the results a little?
    - Figure 3: it is difficult to distinguish between case 3 and case 4, please use a different color scheme.
    - Figure 4: too much text, it might be better to put this information in a table or in the main text.
    - Line 345: why, physically (not just in the equation), does it matter more?
    - Were the ages of the 'chefs' taken into account in dose calculation (inhalation rate)?
    - Line 435: can the authors clarify what is meant by 'cooking-related'? Does this entail both the blue bar and the dark gray bar?
    - How was the influence from other activities that could potentially emit PM minimized?
    - Line 273: What might be some other explanations?
    - Did the authors conduct a comparison between outdoor measurements at city sites and at experimental sites? If not, why not? If so, what did it yield?
    - Figure 6: it's a little difficult to see, but is the indoor background in Case 1 similar to the others? If not, why not?

Technical comments

Overall, this paper is very well-written and structured. I have highlighted a few places where there were typographical errors or where the sentence was a little convoluted, as well as some minor suggestions for the structure. I also noticed that the use of past tense vs. present tense is not consistent throughout the paper – my general rule (to be applied as the authors see fit) is to use the past tense to indicate what the authors actually did (experimentally and mathematically) and the present tense for the results themselves. I may not have caught everything, so please review before resubmission just in case.

- Typographical errors:
    - Lines 58-60: sentence is unclear
    - Line 204: 'With a population' instead of 'With population'
    - Line 219: '…estimate of the geometric…' instead of 'estimate of geometric'
    - Line 227: 'underestimation' instead of 'underestimate'
    - Line 286: 'in the living room' instead of 'in living room'
    - Line 331: change conjugation from singular to plural
- Restructuring suggestions:
    - The explanation of what the mixing phase is and how it was determined in Section 4.2 and the derivation of equations for dose calculations in Section 4.4 should be moved into the methods section.
    - Given that the measurements took place only in September and October of 2022, I'm not sure I understand how Figure 5 and Section 4.3 add to the

conclusions or novelty of the paper. Can the authors either make the connection more explicit or move them to the SI?