

The manuscript by K. Durak *et al.* entitled 'Diffraction-limited Fabry-Perot Cavity in the Near Concentric Regime' addresses the implementation of a near concentric optical cavity for achieving strong coupling between a single atom and a single photon. The authors experimentally show the traditional problems that arise with these types of cavities, namely the difficulties in coupling of light into the fundamental mode due to aberrations. Then they experimentally show the superiority of their new "anaclastic" design in which the mode matching becomes rather trivial. This result will help achieve the goal of strong coupling without the need for very high finesse mirrors.

I believe the presented results will be of importance to the cavity quantum electrodynamics community; I recommend the publication of the manuscript in NJP. However I have a few suggestions before publication that can improve the manuscript. These are listed below.

- 1) In figures 2 and 7, where are the exact concentric conditions, i.e., what focusing parameters correspond to the exact concentric condition? Either a vertical dotted line or a comment in the captions will be helpful instead of making the reader try to back it out from the provided formulas.
- 2) Figure 5 shows the characterization of the cavity for the focusing parameter  $u=0.113$ . Why this value instead of the mentioned design parameter of  $u=0.113$ . A comment in the text would be enlightening.
- 3) The authors do not clearly state whether the aberration problems that they are trying to solve can also be fixed in principle by other pre-compensation methods. For example, the wave-fronts can be properly pre-modified with spatial light modulators or volume phase holograms or adaptive (distortable) mirrors to match the mode. Nevertheless I agree that the solution the authors implemented is more elegant. A discussion of this issue is necessary in the conclusion paragraph in my opinion.
- 4) Concerning the inset of figure 5: Certain other higher order modes are clearly visible at frequencies below that of the fundamental mode. What modes are these? And, in particular, is there any higher order mode that is falling underneath the fundamental mode that we cannot tell from the figure? A couple of lines concerning this will be very helpful in the manuscript.
- 5) Despite that the rest of the article is very clear, I find the sentence "...aberrations significantly increase the losses in the fundamental mode..." in the abstract very confusing. When one says "fundamental mode" I think of the cavity fundamental mode, and it is not that the aberrations increase the losses of the fundamental cavity mode; if you managed to couple to the fundamental cavity mode regardless of the aberrations, you would not have any excess loss. When the authors say fundamental mode here, do they mean the TEM00 free space mode? Sure, since the TEM00 mode turns into a bunch of cavity higher order modes while being coupled into the cavity (in the plano-convex), one gets losses (??).

Below is a list of wording problems that came to my attention

- 1) Fig.2 caption: '... the joining line is added...' → '... the joining line is added...'
- 2) In the text that comes right after eq. 6: '...can be evaluated expression...' → '...can be evaluated using expression...'

- 3) In the paragraph above eq. 8: '... technically challenging confocal configuration...' , I believe the authors mean concentric?