



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-1387-RC1>, 2023  
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## **Comment on egusphere-2022-1387**

Bifford Williams (Referee)

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Referee comment on "Pseudorandom modulation continuous-wave narrowband sodium temperature and wind lidar" by Xin Fang et al., EGU sphere,  
<https://doi.org/10.5194/egusphere-2022-1387-RC1>, 2023

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This paper describes a new lidar and shows initial observations using the PMCW technique that has been discussed for years but has not been used operationally. The paper is well written and the results look good. I just have a few small comments and I do not need to see the paper again before publication unless other reviewers have significant concerns.

1. The writing is generally good and understandable but it could use a read over by a native English speaker to fix some prepositions, etc.
2. In the Introduction, the authors mention using this smaller laser for space observations. What is the effect of of the large ground backscatter signal on the PMCW method. This can't easily be avoided with a large baseline like the near-field signal in a ground-based system
3. Section 2: For the EOM, what are the 0 and 1 levels? Many EOM's are 10% and 90% splitting. How does this code impurity affect the results?
4. Section 3: Your fiber AOM is more properly described as an AO frequency shifter, since frequency shifting is the main goal. That also avoids any confusion with your EO modulator. Similarly, figures 1 and 2 use different terms for the same device: PPLN vs SHG, you might want to pick one for clarity,
5. Have you sent any of the output yellow beam (before the EOM) into the Doppler Free to check for frequency offsets/broadening in the 2nd fiber amplifier?
6. For Figure 7a and 8: At 1km/1hour resolution it would be very rare to see any true vertical winds of more than 1-2 m/s, based on many observations with much higher SNR Na systems. So much of the signal in Figure 7a is likely noise. How do the measured vertical winds compare with your PMCW error calculations? You should add error bars to Figure 8.
7. Section 5, line 260: "And the zonal wind..." -> "The zonal wind..."