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Type: research article

Title: Distinguishing thermal and pseudothermal light by testing the Siegert relation

Journal: Optics Express

General:

The current manuscript describes a method to distinguish between true thermal light and pseudothermal light generated by the rotating-glass technique using the Siegert relation. The topic is interesting and relevant. The experimental work seems solid and is relatively well explained.

However, there are two main points that need to be addressed.

1. The authors should comment on how this work differs from some of the results shown in M. Morisse et al. (2024), EPL 147, 15001. It appears that the Morisse et al. 2024 paper (Fig. 2) shows the same result as the current manuscript (Fig. 4). The authors should comment on the novelty of their work.
2. The author should comment on the potential application of this method. What areas would benefit from distinguishing true thermal from pseudothermal light? I think the fundamental science aspect is enough for publication, but it would be interesting to comment on any potential use/application.

In addition to these general comments, the author should address the following specific points.

Specifics:

1. **Line 32:** ... such as rotating ground glass diffusers [18–23],

Since the rotating ground is an old but still widely used technique, I suggest that, in addition to the papers already cited, the author cite these recent papers that use it.

K. Pieper, A. Bergmann, R. Dengler, and C. Rockstuhl, "Using a pseudo-thermal light source to teach spatial coherence," *European Journal of Physics*, vol. 39, no. 4, p. 045303, 2018.

Howard, L. A., et al. "Optimal imaging of remote bodies using quantum detectors." *Physical Review Letters* 123.14 (2019): 143604.

You, C., et al. "Identification of light sources using machine learning." *Applied Physics Reviews* 7.2 (2020).

2. **Line 51:** missing). "(see Fig.1(b)."
3. **Line 56:** typo "souce"
4. **Line 63:** missing). "(see Fig.1(c)"
5. **Line 65-66:** "timestamped, from which detection time differences between the detectors were histogrammed,"

Please provide additional information about the timestamping process. For example, if you're using a commercial timetagger, please provide the RMS time jitters of the device. They are typically in ps. This is relevant information.

6. **Fig 2.** The error bars seem to be the standard deviation. This should be made explicit.
7. **Line 91.** The authors introduce the experimental setup of Fig 3. The authors should cite works that, for different but related purposes, implement similar optical setups.

Ferrantini, J et al, Multifrequency-resolved Hanbury Brown–Twiss effect. *APL Photonics* 10 (2): 026113

Kulkov, S, et al. "Inter-pixel cross-talk as background to two-photon interference effects in SPAD arrays." *Journal of Instrumentation* 19.12 (2024): P12015.

Guerin, William, et al. "Stellar intensity interferometry in the photon-counting regime." *Comptes Rendus. Physique* 26.G1 (2025): 659-679.

8. **Fig 4:** As in fig 2, the error bars seem to be the standard deviation. This should be made explicit.

Finals Remarks

The current manuscript needs to address the abovementioned points to be considered for publication. I look forward to reading the amended manuscript.