

Talbot interferometry with a point-like source: rationale, technology, & experiment

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We are building a matterwave interferometer for 10^6 amu particles with 200 nm separation to test the superposition principle for massive particles [1]. A successful demonstration would correspond to a macroscopicity $\mu=18$ and would begin to constrain CSL $\lambda_{\text{CSL}} < 1.4 \cdot 10^{-11}$ Hz. I will outline the theoretical approach, describe the rationale for our design choices, and review the experimental progress so far. For particles in free-flight, our target mass appears to be a practical maximum for earth-bound experiments; I will briefly mention the MAQRO consortium which seeks to put an experiment like ours into space [3]

References

[1] Bateman, Nimmrichter, Hornberger, Ulbricht, Nat. Comm. 5, 4788 (2014)

[2] Nimmrichter & Hornberger, Phys. Rev. Lett. 110,160403 (2013)

[3] Kaltenbaek et al., Exp. Astro. 34, 123 (2012).

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