

Erratum: New Method for the Astrometric Direct Detection of Ultralight Dark Matter [Phys. Rev. Lett. 134, 111003 (2025)]

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In our Letter, we identified two observable signals induced by ultralight dark matter: a secular proper motion and an *annually modulating* angular deflection. Upon further analysis, we withdraw the annually modulating deflection. This term originates from an inconsistent treatment of the observer's motion and is not an observable, gauge-invariant effect. The correct, physical result is obtained by evaluating our expressions in the instantaneous rest frame of the observer, which is equivalent to setting the observer velocity $\mathbf{v}_o = 0$ wherever it appears.

Accordingly, statements referring to two signals should be read as referring only to the *secular* proper-motion signal. Terms proportional to $\mathbf{v}_o$ in the main text (e.g., in the expressions for the observed photon four-momentum and in the deflection integrals) and in Supplemental Material should be omitted. The sensitivity estimates and projections have been recomputed using only the secular channel. In particular, in the Abstract, the phrase “energy density as low as $3 \times 10^{-11} \text{ GeV cm}^{-3}$ ” should read “ $10^{-4} \text{ GeV cm}^{-3}$.”

Our central conclusion, that astrometry provides a direct gravitational probe of ultralight dark matter, remains unchanged. A corrected version of Fig. 2 is provided below to replace the original.

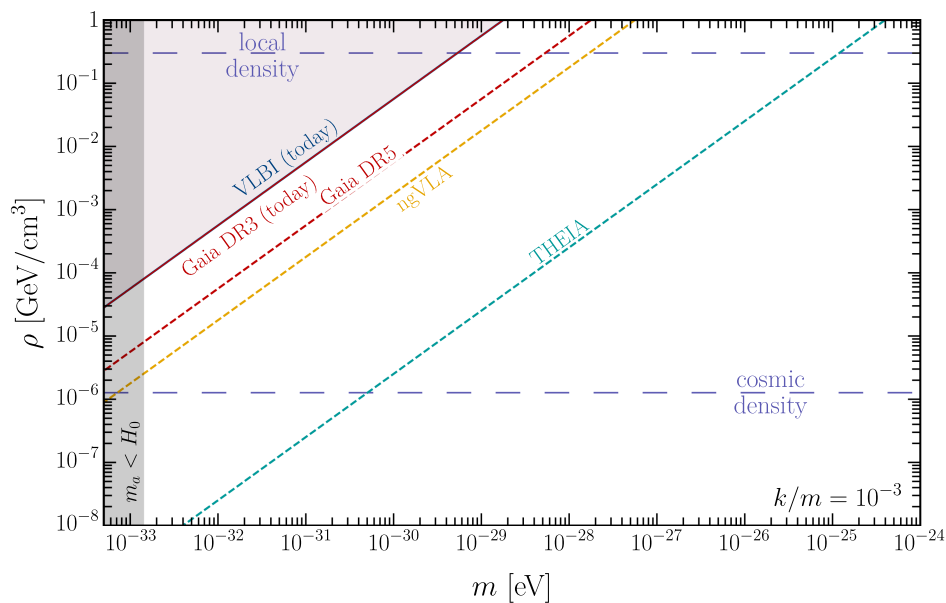


FIG. 2. The sensitivity of astrometry to ultralight dark matter. Solid lines represent the potential of reanalyses of existing VLBI (solid blue line) and Gaia DR3 (solid red line) data to detect dark matter. Dashed lines project sensitivities for near-future data releases from Gaia DR5 (dashed red line) and the next-generation Very Large Array (dashed yellow line). The sensitivity of a search using THEIA, a proposed successor to Gaia, is shown in dashed teal. Details of the chosen parameters are discussed in the main text.