# Erratum: Linear Gaussian quantum state smoothing: Understanding the optimal unravelings for Alice to estimate Bob's state [Phys. Rev. A 103, 012213 (2021)]

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In our original paper we conflated two different methods of semiclassical smoothing, the smoothed weak-value (SWV) state and the smoothed Wigner distribution (SWD). See Ref. [1] for a detailed explanation of their similarities and differences. All results and statements in the paper remain valid, if the following corrigenda are made.

Every instance of SWV, including in subscripts, should be replaced by SWD, with one exception.

The one exception is in the final sentence of the third paragraph, which should remain as is, except that the reference citations [18,21] should be shortened to Ref. [18]. However, following that sentence, the sentences "A different way of doing quantum smoothing, also introduced by Tsang [13], is to multiply together the Wigner distributions of $\rho_{\mathrm{F}}(\tau)$ and $\hat{E}_{\mathrm{R}}(\tau)$, and normalize, to get a smoothed Wigner distribution (SWD) $W_{\mathrm{SWD}}$. The 'state' corresponding to $W_{\mathrm{SWD}}$ is also, in general, not a valid quantum state" should be inserted.

The final paragraph of Sec. III C should be deleted, except for its last sentence.

Additionally, while the terminology is fairly standard throughout the field, we wish to be a bit more specific with the terminology regarding the 1SD contours in Figs. 2(c)–2(f) and the surrounding discussion. These are strictly the $e^{-1/2}$ contours of the Wigner function which only correspond to 1SD in the principle axes of the ellipse. They are not to be confused with a contour denoting 1SD in every direction, as is the case in Ref. [2].

[1] K. T. Laverick, A. Chantasri, and H. M. Wiseman, Inequivalent ways to apply semiclassical smoothing to a quantum system, Phys. Rev. A **112**, 022411 (2025).

[2] J. Zhang and K. Mølmer, Prediction and retrodiction with continuously monitored Gaussian states, Phys. Rev. A **96**, 062131 (2017).

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