Erratum: Robust calibration of a universal single-qubit gate set via robust phase estimation [Phys. Rev. A **92**, 062315 (2015)]

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In Eq. 5.5 in Sec. V, we state that the probability of an error occurring at the j th iteration is given by the probability that the estimate is outside of $\pi/(2k_j)$ of the actual value. However, as pointed out in Refs. [1,3], an error can, in fact, occur even when the estimate at the j th round is within $\pi/(2k_j)$ of the true value. The correct condition that characterizes when an error occurs is that the estimate is outside of $\pi/(3k_j)$ of the actual value [1,3]. Thus, whereas the detailed analysis of Appendix C does bound the probability that the j th iteration estimate is within $\pi/(2k_j)$ of the true value, this only gives a lower bound on the probability of an error occurring.

In fact, Ref. [2] already bounds the probability that the estimate at the j th round is within $\pi/(3k_j)$ of the actual value and Ref. [1] provides a tighter analysis—so whereas our analysis in Sec. V A is not correct, Refs. [1,2] show that the general procedure still attains Heisenberg scaling with a slightly worse constant overhead than the performance claimed in the original paper. A simple argument in Appendix B of Ref. [3] then shows how to leverage those analyses to obtain (through an additional constant overhead) a procedure with Heisenberg scaling that is robust to additive errors, superceding Sec. V B and showing the main result of the original paper—that phase estimation can provide robust calibration of a universal single gate set—is still valid.

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[2] B. L. Higgins, D. W. Berry, S. D. Bartlett, M. W. Mitchell, H. M. Wiseman, and G. J. Pryde, Demonstrat-

ing heisenberg-limited unambiguous phase estimation without adaptive measurements, *New J. Phys.* **11**, 073023 (2009).

[3] A. E. Russo, W. M. Kirby, K. M. Rudinger, A. D. Baczewski, and S. Kimmel, Consistency testing for robust phase estimation, *Phys. Rev. A* **103**, 042609 (2021).