Erratum: Surpassing the Resistance Quantum with a Geometric Superinductor [Phys. Rev. Applied 14, 044055 (2020)]

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I. TYPO

Section II of the original publication contains a typo. The expression for the characteristic-impedance scaling of the planar coil is

$$Z_C = 2\pi f_g L_g \sim \sqrt{\frac{l}{p}}, \tag{1}$$

and not $Z_C \sim \sqrt{l}/p$ as stated in the original paragraph, with l and p being the wire length and pitch, respectively.

II. PHOTON NUMBER

In Sec. IV of the original publication, the photon number values were consistently overestimated by a factor $(2\pi)^2$ due to an error in our analysis. In the following, we correct this and address all affected parts of the manuscript.

The new version of Fig. 3(a)—shown below as Fig. 1—now includes the correct photon number values on the horizontal axis. The critical photon number n_C fitted to the two level system model [Eq. (C1) in the original manuscript] decreases to 0.10 from previously 3.91. All other fit parameters remain the same.

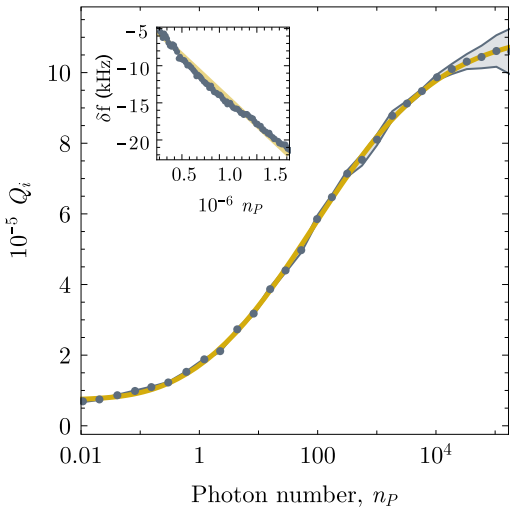


FIG. 1. Corrected version of Fig. 3(a) of the original manuscript. Shown is the measured Q_i of a representative overcoupled coil ($p = 300$ nm, $n = 155$, $Q_e = 6 \times 10^4$ on SOI-BE) as a function of the mean intraresonator photon number n_P. The blue dots are values extracted from a Lorentzian fit and the band represents the 90% confidence interval. The yellow line is a fit to a TLS model. The inset shows the frequency shift $\delta f = 9.4$ mHz per photon, obtained from a linear fit (yellow) of the measured data (blue dots).

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For the same reason the linearity extracted from the linear fit in the inset of Fig. 1 decreases by a factor of $(2\pi)^2$, resulting in a larger frequency shift of

$$\delta f = f_0(n_P) - f_0(0) = 9.4 \text{ mHz/photon}, \tag{2}$$

instead of the 0.24 mHz/photon as originally stated. This result approaches the linearity values observed in *low-resistivity* GrAl resonators [1]. To the best of our knowledge the reported planar coil devices therefore remain the most linear superinductors to date.

III. SUMMARY

The conclusions of the manuscript remain unchanged. The typo and photon number change do not affect any of the other results of the paper. For example, all values reported in Table I of the original manuscript remain unaffected. The analysis code has been corrected and is available online [2].

[1] N. Maleeva, L. Grünhaupt, T. Klein, F. Levy-Bertrand, O. Dupre, M. Calvo, F. Valenti, P. Winkel, F. Friedrich, W. Wernsdorfer, A. V. Ustinov, H. Rotzinger, A. Monfardini, M. V. Fistul, and I. M. Pop, Circuit quantum electrodynamics of granular aluminum resonators, Nat. Commun. **9**, 3889 (2018).

[2] M. Peruzzo, A. Trioni, F. Hassani, M. Zemlicka, and J. M. Fink, Data for: Surpassing the Resistance Quantum with a Geometric Superinductor, 2020, https://doi.org/10.5281/zenodo.19471844.