Erratum: Retroactive Quantum Jumps in a Strongly Coupled Atom-Field System [Phys. Rev. Lett. 81, 4620 (1998)]

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Equation (9) of our Letter was printed incorrectly and should read

$$I_{\mathrm{hom}}(t) = 2\kappa\eta\ \mathrm{Tr}[\rho(t)y] + \sqrt{2\kappa\eta}\,\xi(t)\,. \tag{9}$$

The second paragraph on page 4623 was likewise incorrectly reproduced in the published version and should read as follows:

To estimate $E[\Delta_y^2]$, we use the fact that the system stays close to $|\psi_\pm^{\mathrm{fix}}\rangle$ most of the time. Suppose it starts in the state $|\psi_+^{\mathrm{fix}}\rangle$ so that $y_+ = y_+^{\mathrm{fix}} = -g/\kappa$. Then the spontaneous emission generates probability at a rate $\gamma_\perp/2$ for the atom to be in the state $|-\rangle$. The associated field y_- will drift towards y_-^{fix} and for short times $t \ll \kappa^{-1}$ can be approximated by $y_-(t) = -g/\kappa + 2gt$. This will persist only until the photocurrent signal it would have generated can be distinguished reliably from the photocurrent signal generated by the field $y_+ = y_+^{\mathrm{fix}}$. The integrated difference between the two signals over a time τ is, from Eq. (9), $\kappa\eta g\tau^2$. The rms noise in the signal is, again from Eq. (9), $\sqrt{\kappa\eta\tau}$. According to our explanation for the retroactive quantum jumps, the atom must decide which state to be in at the time τ such that the signal and noise are comparable, $\tau \sim (\kappa\eta g^2)^{-1/3}$. It will then (most likely) decide to remain in the state $|+\rangle$, and the process "repeats" (it is actually continuous). The average of $(y_+ - y_-)^2$ up to time τ is easily evaluated to be $\sim(g/\kappa\eta)^{2/3}$. Substituting this into Eq. (16) gives

$$\frac{1}{E[S^{-1}]} \sim \frac{\gamma_\perp}{2g^{2/3}(\kappa\eta)^{1/3}}\,. \tag{17}$$

This formula is valid for $g\eta^{1/2} \gtrsim \kappa$ and $\gamma_\perp \ll g^{2/3}(\kappa\eta)^{1/3}$.

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