

Erratum: Solid-state ^{229}Th nuclear laser with two-photon pumping **[Phys. Rev. A **108**, L021502 (2023)]**

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In Sec. V of our original article, the stimulated emission (absorption) rate of the cavity photons was defined as $K = \frac{4|\langle \text{gr}, m_{\text{gr}} | \mathcal{M}_{M1} | \text{is}, m_{\text{is}} \rangle|^2 \mathcal{B}_{\text{zpf}}^2}{\Gamma_0}$ and the denominator Γ_0 was incorrectly taken as $\gamma_{\text{is}}^{\text{decay}} + \gamma_{\text{is}}^{\text{drift}}$. The correct denominator should be $\Gamma_0 = \gamma_{\text{is}}^{\text{decay}} + \gamma_{\text{is}}^{\text{drift}} + \beta$, where $\beta = \frac{c_0(1-R)}{2l}$ is the cavity photon decay rate due to the output channel. Here c_0 is the speed of light, l is the length of the gain medium, and R is the transmittance of the right mirror [Fig. 3(a)]. Using this corrected formula, discussion relevant to the performance of the nuclear laser [i.e., Fig. 3(b)] should be revised. Here we propose two schemes for the operation of the nuclear laser.

(i) *Fixed mirror reflectivity.* We use the same parameters as in the paper, except for a new $R = 99.99\%$. The stimulated emission rate K becomes much smaller due to the large β . As a result, the peak power of the nuclear laser would drop to the nanowatt range, but the pulse would last for about 1 s [revised Fig. 1(a)]. The total number of γ -ray photons emitted per pulse remains on the order of 10^9 . In short, this yields a weaker but longer pulse, compared to Fig. 3(b) in the original article.

(ii) *Switched mirror reflectivity.* One can use, for example, a chopper wheel or electrically tunable mirror to switch the reflectivity of the mirror. The mirror reflectivity is kept at a high value R_1 for some duration t_1 , leading to a relatively large K and efficient stimulated emission of γ -ray photons, which accumulate in the cavity. For a subsequent duration t_2 , the reflectivity is reduced to a small value R_2 , allowing photons to quickly couple out, generating a strong and short γ -ray pulse. Periodic switching could produce a train of such strong and short pulses. Using $R_1 = 99.99\%$, $t_1 = 10^{-4}$ s, $R_2 = 10\%$, and $t_2 = 10^{-6}$ s, the simulated pulse train is shown in the revised Fig. 1(b).

We thank Karen Mamian and Charles Roques-Carmes for pointing out this mistake.

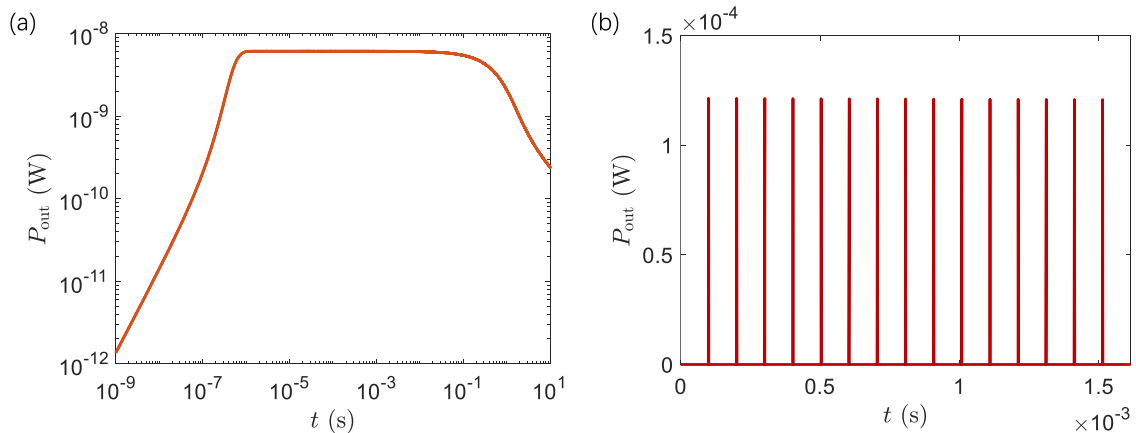


FIG. 1. Two schemes for the operation of the nuclear laser: (a) fixed mirror reflectivity, yielding a single weak but long pulse, and (b) switched mirror reflectivity, yielding a series of strong but short pulses.