Erratum: Versatile engineering of multimode squeezed states by optimizing the pump spectral profile in spontaneous parametric down-conversion [Phys. Rev. A **97, 033808 (2018)]**

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(Received 29 January 2019; published 21 February 2019)

DOI: [10.1103/PhysRevA.99.029902](https://doi.org/10.1103/PhysRevA.99.029902)

In Sec. II E of the paper, we applied numerical methods to study the effect of a quadratic spectral phase (chirp) on the output of a spontaneous parametric down-conversion process pumped by a Gaussian laser pulse. There was an error in the code used to produce Fig. 1 of the paper, which we correct below.

The spectral profile of the chirped pulse $\alpha^{(\text{ch})}(\omega)$ is written in terms of the Gaussian profile $\alpha^{(\text{g})}(\omega)$ and the quadratic phase ϕ_2 as

$$\alpha^{(\text{ch})}(\omega) = \alpha^{(\text{g})}(\omega) e^{i(\phi_2/2)(\omega-\omega_0)^2}. \quad (1)$$

The results for the parametric gains are plotted in Figs. 1(a) and 1(b) of the paper as a function of the ratio between the duration of the pulse without and with quadratic phase,

$$r \equiv \frac{\Delta t'}{\Delta t} = \sqrt{1 + \left(\frac{\phi_2}{2 \Delta t^2} \right)^2}, \quad (2)$$

which is related to ϕ_2 by

$$\phi_2 = \frac{\sqrt{r^2 - 1}}{2\sigma_\omega^2}, \quad (3)$$

so that $\alpha^{(\text{ch})}(\omega)$ can be written

$$\alpha^{(\text{ch})}(\omega) = \alpha^{(\text{g})}(\omega) e^{i(\sqrt{r^2 - 1}/4\sigma_\omega^2)(\omega-\omega_0)^2}. \quad (4)$$

The plots in Fig. 1 of the paper were instead obtained with the wrong definition,

$$\alpha^{(\text{ch})}(\omega) = \alpha^{(\text{g})}(\omega) e^{i[(r^2 - 1)^2/\sigma_\omega^2](\omega-\omega_0)^2}, \quad (5)$$

FIG. 1. Amended version of Fig. 1 in the paper: Comparison between the effect of the quadratic phase and simply increasing the pulse duration with the correct definition of the pump's spectral profile. (a) Largest parametric gain for chirped (solid blue curve) and nonchirped (dotted green curve) pump pulses as a function of the increase in pulse duration $\Delta t'/\Delta t$. The gains are all divided by the largest parametric gain for $\phi_2 = 0$ and $\Delta t'/\Delta t = 1$, denoted by $\Lambda_{11}^{(0)}$. (b) First 100 gains for increasing pulse duration for chirped (dark blue) and nonchirped (light green) pulses [normalized as in (a)]. (c) Spectral amplitude (blue, solid line) and phase (orange, dotted line) of the first supermode obtained with $\Delta t' = 2\Delta t$ ($\phi_2 \approx 2700 \text{ fs}^2$) compared to the first supermode for $\phi_2 = 0$ (gray, dashed line).

namely, with the substitution,

$$\phi_2 \rightarrow 2 \frac{(r^2 - 1)^2}{\sigma_\omega^2}. \quad (6)$$

We report in Fig. 1 here the plots obtained with the correct definition [Eq. (3) above]. The spectral profile of the first squeezed mode was not concerned with the error and was already correct in the article. The effect of quadratic phase on the parametric gains is much smaller than that reported in the paper. This is due to the fact that the bad substitution effectively amounted to plotting the results for larger values of ϕ_2 for large r . Our results can be reproduced running the code that we provide as a *Mathematica* notebook in the Supplemental Material [1]. We note, furthermore, that the colors of the curves were inverted in the caption describing Fig. 1(a) in the paper.

Since the error regards the definition of the chirped pump in the code, it does not affect the analytical results of Sec. II E of the paper nor the results in other sections. In particular, the various numerical optimizations of the pump spectral profile, which constitute the core of the article, are unaffected.

The authors are grateful to A. Sakaguchi for pointing out this error.

[1] See Supplemental Material at <http://link.aps.org/supplemental/10.1103/PhysRevA.99.029902> for a Mathematica notebook for reproducing Fig. 1.