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Erratum: Quantum Temporal Correlations and Entanglement via Adiabatic Control of Vector Solitons [Phys. Rev. Lett. 97, 023902 (2006)]

Mankei Tsang

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On closer inspection, it is found that the soliton solution given by Eq. (2) and the expression for the energy E_{nmp} below Eq. (2) in the published Letter [1] are valid only for the Manakov soliton ($B = 1$) or uncoupled scalar solitons ($B = 0$). This can be seen by observing that the energies calculated using Eqs. (1) and (2) in Ref. [1] in different regions of the configuration space are different unless $B = 1$ or $B = 0$. For example, for $n = 2$ and $m = 1$, the energy in the regions of $x_1 < y_1 < x_2$ and $x_2 < y_1 < x_1$ calculated using Eq. (2) is different from the energy in the other regions, unless $B = 1$ or $B = 0$.

This error does not affect the rest of Ref. [1] that focuses on the Manakov soliton. Furthermore, it can be argued on physical grounds that the proposed scheme should still work for any positive B, despite the lack of an explicit soliton solution in general. First, it can be shown using the "center-of-mass" coordinate system [2] that all stable solutions of the Schrödinger equation given by Eq. (1) in Ref. [1] must consist of a dispersive center-of-mass component and a bound-state component. For any positive B, the bound-state component must become flat in the ultimate limit of adiabatic pulse expansion, so any stable solution still approaches the form of Eqs. (6) and (7) in Ref. [1]. Second, the average timing jitter of the two pulses is affected only by dispersion, regardless of B. If the net dispersion is zero and the fiber is assumed to be lossless, the output jitter is the same as the input jitter. As long as the solitary wave propagation is stable against the adiabatic change in fiber parameters, the bandwidth can be adiabatically reduced, leading to a raised timing standard quantum limit. Hence the final jitter must be lower than the raised standard quantum limit regardless of B. Finally, Eq. (1) in Ref. [1] shows that the cross-phase modulation effect manifests itself as an attractive potential among photons across the two polarizations. In a stable solution of Eq. (1), the relative position and relative momentum of the two pulses can therefore be controlled by adjusting the balance between dispersion and cross-phase modulation. Since temporal entanglement has been proved to occur for the Manakov soliton in Ref. [1], this physical picture should remain qualitatively the same for a different cross-phase modulation coefficient, and temporal entanglement should also occur for any positive B.

There are also two typographical errors in [1]. The factor $\frac{1}{N(N-1)}$ in Eq. (9) should read $\frac{2}{N(N-1)}$, and in the second-to-last paragraph, $Y = (1/m)\sum_{k=m+1}^{N} z_k$ should read $Y = (1/m)\sum_{k=n+1}^{N} z_k$. These typographical errors do not affect the rest of the Letter in any way.

[1] M. Tsang, Phys. Rev. Lett. **97**, 023902 (2006).
[2] P. L. Hagelstein, Phys. Rev. A **54**, 2426 (1996).