Erratum: Nonlinear waves in a dispersive vacuum described with a high order derivative electromagnetic Lagrangian [Phys. Rev. D 103, 096012 (2021)]

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An algebraic error was present in Eq. (37). The correct equation and the following text should read

$$u(x^+ + Sx^-) = \frac{3(S-\epsilon_2 W_0^2)}{(2\epsilon_2 S W_0 - 3\epsilon_3 W_0^3)} \cosh^{-2}\left[\frac{\sqrt{S-\epsilon_2 W_0^2}(x^- + Sx^+)}{2\sqrt{\mu W_0^4}}\right].$$

The soliton amplitude u_0 and width l_0 are given by

$$u_0 = \frac{3(S-\epsilon_2 W_0^2)}{(2\epsilon_2 S W_0 - 3\epsilon_3 W_0^3)} \quad \text{and} \quad l_0 = 2\sqrt{\frac{\mu W_0^4}{S-\epsilon_2}}.$$

The parameter S depends on the soliton amplitude u_0 as

$$S = \frac{\epsilon_2 W_0^2 - \epsilon_3 W_0^2 W_0 u_0}{1 - 2\epsilon_2 W_0 u_0/3} \sim \epsilon_2 W_0^2 - \epsilon_3 W_0^2 W_0 u_0,$$

while the condition $S - \epsilon_2 W_0^2 > 0$ from the soliton width requires $W_0 u_0 < 0$, as also follows from the sign of the denominator $2\epsilon_2 S W_0 - 3\epsilon_3 W_0^3 \sim -\epsilon_3 W_0^3$ of the amplitude u_0.

The soliton propagation velocity depends on W_0 and u_0 as

$$V = (1-S)/(1+S) \approx 1 - 2\epsilon_2 W_0^2 + 2\epsilon_3 W_0^3 u_0,$$

while for the soliton width we obtain l_0

$$l_0 = \sqrt{-4\mu W_0^2/(\epsilon_3 W_0 u_0)},$$

i.e., $l_0 \approx \lambda\!\!\!^{-}_C (W_0/|u_0|)^{1/2}$ with the typical energy of the photons constituting the soliton $\hbar\omega_\gamma \approx m_e c^2 (|u_0|/W_0)^{1/2}$.

These corrections extend the parameter range where the soliton can form.

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