


Erratum: Einstein-Cartan Portal to Dark Matter **[Phys. Rev. Lett. 126, 161301 (2021)]**

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In [1], an additional higher order term was missing in the scalar-fermion interaction, and the overall sign of the four-fermion terms was flipped. As a result, the overall sign of Eq. (2) in [2] should be flipped. This does not affect any results in the main text of the Letter.

The following changes must be applied to Appendix A of [2] (presented in the Supplemental Material). (i) The overall sign of Eq. (A2) should be flipped. (ii) Equation (A3) must read

$$S_{sf} = \int d^4x \sqrt{-g} \frac{3\alpha}{4} \left[\frac{\partial_\mu \Omega^2}{\Omega^2} + \frac{\gamma}{\gamma^2 + 1} \left(\frac{\partial_\mu \eta}{\Omega^2} + \partial_\mu \gamma \right) \right] V^\mu + \int d^4x \sqrt{-g} \frac{3}{4} \left[\beta \frac{\partial_\mu \Omega^2}{\Omega^2} + \frac{1 + \gamma\beta}{\gamma^2 + 1} \left(\frac{\partial_\mu \eta}{\Omega^2} + \partial_\mu \gamma \right) \right] A^\mu, \quad (\text{A3})$$

with $\Omega^2 = 1 + (\xi h^2/M_P^2)$. (iii) Equation (A6) becomes

$$\mathcal{L}_{sf} = -\frac{3\alpha}{4} \left(\xi + \frac{\bar{\gamma}\xi_\eta + \xi_\gamma - \xi}{\bar{\gamma}^2 + 1} \right) \left(\frac{h}{M_P} \right)^2 \partial_\mu V^\mu - \frac{3}{4} \left(\beta\xi + \frac{(\bar{\gamma} + \beta)(\bar{\gamma}\xi_\eta + \xi_\gamma - \xi)}{\bar{\gamma}^2 + 1} \right) \left(\frac{h}{M_P} \right)^2 \partial_\mu A^\mu. \quad (\text{A6})$$

(iv) Equation (A7), in turn, must read

$$\frac{\Omega_N}{\Omega_{\text{DM}}} \simeq 3.2 \left(\beta\xi + \frac{(\bar{\gamma} + \beta)(\bar{\gamma}\xi_\eta + \xi_\gamma - \xi)}{\bar{\gamma}^2 + 1} \right)^2 \times \left(\frac{T_{\text{prod}}}{M_P} \right)^3 \left(\frac{M_N}{T_{\text{prod}}} \right)^2 \left(\frac{M_N}{10 \text{ keV}} \right), \quad (\text{A7})$$

(v) In the discussion below Eq. (A7), the specific values of the nonminimal couplings $(1/\bar{\gamma}) = \xi_\eta = 0$ should read $(1/\bar{\gamma}) = \xi_\eta = \beta = 0$, and $\xi_\gamma = \xi$, $\xi_\eta = 0$ should read $\beta = [(-\xi_\eta \bar{\gamma}^2 + \xi \bar{\gamma} - \xi_\gamma \bar{\gamma})/(\xi \bar{\gamma}^2 + \xi_\eta \bar{\gamma} + \xi_\gamma)]$.

The above changes do not affect the conclusions of Appendix A.

- [1] M. Shaposhnikov, A. Shkerin, I. Timiryasov, and S. Zell, Einstein-Cartan gravity, matter, and scale-invariant generalization, *J. High Energy Phys.* **10** (2020) 177; Erratum, *J. High Energy Phys.* **08** (2021) 162.
- [2] M. Shaposhnikov, A. Shkerin, I. Timiryasov, and S. Zell, Einstein-Cartan Portal to Dark Matter, *Phys. Rev. Lett.* **126**, 161301 (2021).