Errata

Erratum: Radiative corrections to the Higgs boson decay into a longitudinal *W*-boson pair in a two-doublet model [Phys. Rev. D 51, 3544 (1995)]

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[S0556-2821(97)03215-3]

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There are three corrections to our previous work.

(i) Among the several terms in the formula (32), those having $g(p^2,m_A^2,m_A^2,m_G^2)$, $g(p^2,0,m_G^2,m_h^2)$, $g(p^2,0,m_G^2,m_H^2)$, $g(p^2,m_H^2,m_h^2,0)$, and $g(p^2,m_H^2,m_h^2,m_G^2)$ have to be multiplied by a factor 2.

(ii) In our work, the top quark loop contributions are neglected throughout. If one would take into account the top quark effect, then the renormalization prescription of the mixing angle β as given in Eq. (27) is not adequate. A more careful treatment is necessary for the β renormalization and this point has recently been discussed [S. Kanemura, T. Kubota, and H.-A. Tohyama, Nucl. Phys. **B483**, 111 (1997)].

(iii) The error mentioned in (i) affects the numerical computation in our work to some extent. Inclusion of the top quark effects together with consideration of the β renormalization mentioned in (ii) also introduces slight modifications. The corrected figures are presented here. (Figures 7 and 8 happen to be the same.) These figures show that the m_G and m_A dependences of the decay width $\Gamma(H\to W^+W^-)$ are not so wild as originally claimed. This is due to a subtle cancellation that occurs among the leading terms. We can conclude in this sense that there exists a screening effect with respect to the heavier Higgs boson masses m_G and m_A.

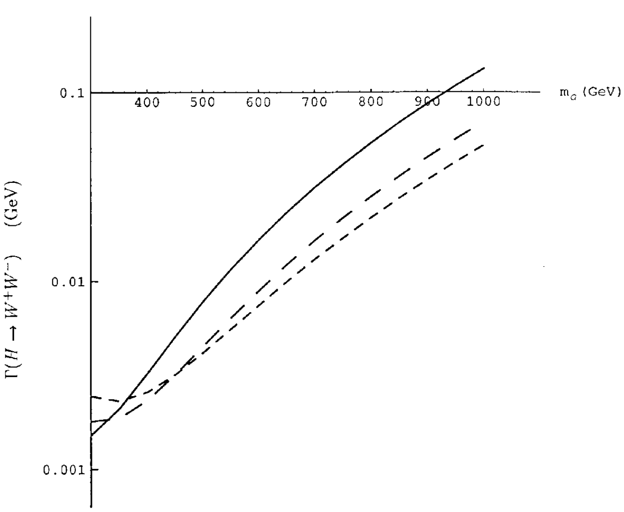


FIG. 5. The decay width $\Gamma(H\to H^+H^-)$ as a function of m_G. The parameters are set as $\tan\alpha=\tan\beta=2$, $m_H=300$ GeV, and $m_h=400$ GeV. The CP-odd Higgs boson mass is taken as $m_A=350$ GeV (solid line), $m_A=700$ GeV (dashed line), and $m_A=1000$ GeV (dotted line), respectively.

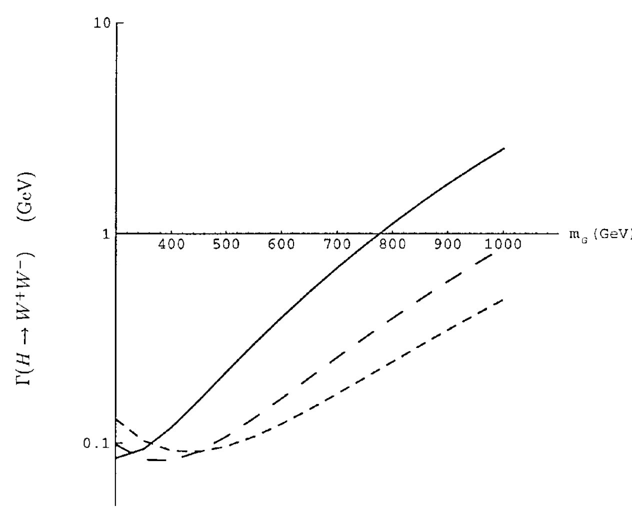
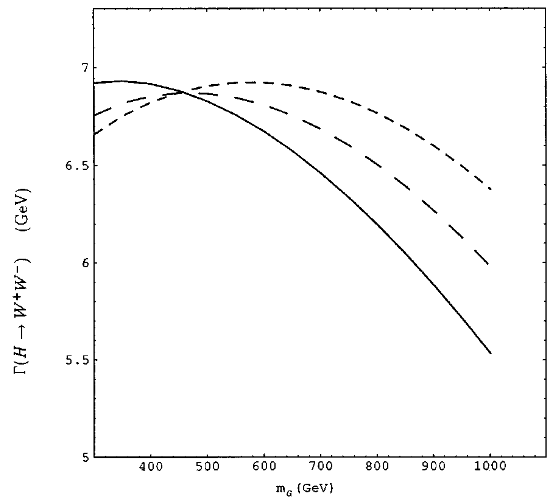


FIG. 6. The decay width $\Gamma(H\to H^+H^-)$ as a function of m_G. The para- meters are set as $\tan\alpha=\tan\beta=10$, $m_H=300$ GeV, and $m_h=400$ GeV. The CP-odd Higgs boson mass is taken as $m_A=350$ GeV (solid line), $m_A=700$ GeV (dashed line), and $m_A=1000$ GeV (dotted line), respectively.



FIGS. 7 and 8. The decay width $\Gamma(H \to H^+H^-)$ as a function of m_G. The parameters are set as $\sin^2(\alpha-\beta)=1$, $m_H=300$ GeV, and $m_h=400$ GeV. The CP-odd Higgs boson mass is taken as $m_A=350$ GeV (solid line), $m_A=700$ GeV (dashed line), and $m_A=1000$ GeV (dotted line), respectively. Figure 7 (for $\tan\beta=2$) and Fig. 8 (for $\tan\beta=10$) in our previous work have turned out to be the same.

Erratum: QCD predictions for annihilation decays of *P*-wave quarkonia to next-to-leading order in α_s [Phys. Rev. D 54, 6850 (1996)]

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We have made a numerical error. The term $-\frac{13}{9}n_f$ in Eq. (5) and Eq. (11) should read $-\frac{29}{27}n_f$. Accordingly, the coefficient C_{21} in Eq. (15) should be -5.061, and the numerical results of H_1, H_8 below Eq. (20) should read

$$H_1 = 18.45 \pm 5.2 \text{ MeV},$$

$$H_8 = 2.21 \pm 0.15 \text{ MeV}.$$

Equations (21), (22), (25), and (26) should read

$$\Gamma(\chi_{c0} \to LH) = 12.6 \pm 3.2 \text{ MeV},$$

$$\Gamma(h_c \to LH) = 0.71 \pm 0.07 \text{ MeV},$$

$$\Gamma(\chi_{c0} \to \gamma\gamma) = (3.72 \pm 1.11) \text{ keV},$$

$$\Gamma(\chi_{c2} \to \gamma\gamma) = (0.49 \pm 0.15) \text{ keV}.$$

In the physically motivated range $\mu = m_c - 2m_c$, the decay rates vary from 13 MeV to 8 MeV for $\Gamma(\chi_0 \to LH)$, and from 0.7 MeV to 0.6 MeV for $\Gamma(h_c \to LH)$, respectively, while the obtained two phenomenological parameters $H_1 = 17$–19 MeV, $H_8 = 2.2$–3.0 MeV.

The main conclusions remain unchanged.

We would like to thank Professor E. Braaten for pointing out this numerical error by comparing their recent result based on the threshold expansion method with our result by using the covariant projection method in dimensional regularization.

It has turned out that the two methods in dimensional regularization give identical results for the color-singlet sector of the *P*-wave decay widths, and are consistent with the previous calculation of Barbieri *et al.* using the binding energy as the infrared cutoff.

Erratum: Bounds on long-lived relics from diffuse γ-ray observations [Phys. Rev. D 55, 4435 (1997)]

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It should be made clear that $\mathcal{L}(E_\gamma)$ in Eq. (8) has dimensions of 1/(energy), and $\mathcal{L}(E_\gamma)$ in Eq. (9) is assumed to have units of $[\mathrm{GeV}]^{-1}$. The y-axis label in Fig. 2 should read ''$\mathcal{L}(E_\gamma)\times E_{\mathrm{tot}}$,'' so that it is dimensionless. The first part of Eq. (17) should be written

$$\mathcal{L}(E_\gamma)M_X=\frac{dN_\gamma}{dx},$$

and is therefore dimensionless. The y-axis labels in Figs. 6 and 7(a) are dimensionally correct, but mislabeled with M_X instead of the proper E_{inj}, and so should read ''$E_{\mathrm{inj}}\eta_X B_\gamma$ [GeV].'' The y-axis label in Fig. 8 should read ''$\mathcal{L}(E_\gamma)/2$ $[\mathrm{GeV}]^{-1}$'' (the factor of 2 was a normalization constant that should have been incorporated into the graph).

Directly related to the dimensions of $\mathcal{L}(E_\gamma)$, the normalization of Figs. 9 through 12 is incorrect. In the region where the spectra are dominated by unscattered photons (i.e., $E_{\gamma 0}\gtrsim 0.1$ to 10 MeV for $M_X\lesssim 1$ to 10 TeV), the curves in Figs. 9 and 10 should be multiplied by a factor $[M_X/(2\ \mathrm{GeV})]^{-1}$, where M_X is the mass of the relic for a particular curve. The curves in Fig. 11 should be divided by the same factor. The best relic density bound is always obtained from the region dominated by unscattered photons. This occurs because the scattered spectra scale as roughly $E_{\gamma 0}^{-1.5}$, while the diffuse photon background scales as $E_{\gamma 0}^{-2.1}$; hence, the best bounds come from higher energies. Figure 12 is presented here, with the correct normalization. The consequence of the corrected normalization is to somewhat reduce the upper bound on the relic lifetimes that can be excluded by our analysis. The range of excluded lifetimes for relics that decay hadronically [stated in Eq. (19), and in the conclusions] should thus be

$$10^{12}\lesssim\tau_X\lesssim 10^{26}\ \mathrm{s}$$

for relics in the mass range 50→10 000 GeV. For larger mass relics (as stated in the paper), the upper bound gets somewhat weaker.

In the second-to-last sentence of Sec. VII C, the inequality should be ''$M_X\gtrsim 1$ TeV,'' and in the last sentence, the bulk of injected photons are below about ''$M_X/10$.'' In Sec. VII D, the first paragraph, the second-to-last sentence should end with ''longer lifetime.'' In the last sentence of Sec. VII D, the mass should be ''M_X=50 GeV.''

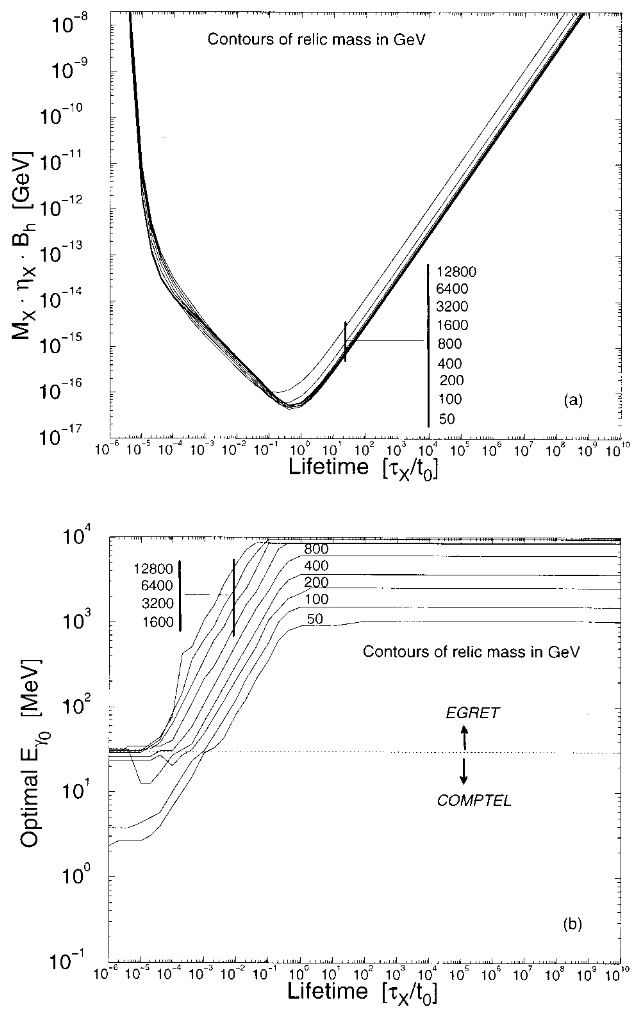

FIG. 12.

We thank M. Birkel for enlightening correspondence related to Fig. 8.

