CORRIGENDA

Abstract, line 19 :

the lifetime is $O(6\times10^{-4}$ to $2\times10^{-12})$ seconds.

Page 3, second paragraph :

line 3 : The $\gamma\gamma$ branching ratio is uncertain, but could be quite large...

line 9 : The $\gamma\gamma$ rate could be comparable with e^+e^- in order of magnitude...

third line from bottom : ...between 6×10^{-4} and 2×10^{-12} sec...

Page 9, section 2.4 :

line 4 : replace $C\sqrt{g}$ by $C\sqrt{-g}$.

Eq. (2.18) : $C_H \equiv -\langle 0|V|0\rangle = m_H^2\, v^2/8$

Page 36, first line

$$\frac{\Gamma(H\rightarrow\gamma\gamma)}{\Gamma(h\rightarrow\gamma\gamma)} \lesssim 10^{-5}$$

Page 43, line 6

replace "...decreases from ~30%..." by

"...may vary between (30-100)% at $m_H = m_\pi$ and (12-100)% at $m_H = 2m_\mu$,... Hence we would estimate

$$\frac{\Gamma(K^+\rightarrow\pi^+ + H,\ H\rightarrow e^+e^-)}{\Gamma(K^+\rightarrow \mathrm{all})} \simeq O(1-10)\times10^{-8}$$

Figure 18

The W propagator is : $\dfrac{-ig_{\mu\nu}}{p^2-m_W^2}$

--*-*-*

Please, replace page 41 and Figs. 1 and 2 by the following.

The contributions to A, B and C from each graph of Fig. 17 are listed in the Table. Their sum is seen to obey the conditions (4.17). Thus while the individual contributions are neither finite nor gauge invariant, they sum to give a finite gauge invariant result :

$$\frac{i\alpha}{v\pi}\,\frac{7}{2}\left(-k_{1\mu}k_{2\nu}+\frac{m_H^2}{2}g_{\mu\nu}\right) \tag{4.18}$$

In the notation of Eq. (4.11), the result (4.18) corresponds to

$$I_W=-\frac{7}{4} \tag{4.19}$$

The diagrams of Fig. 19 involving a closed $H^{\pm}$ loop are separately finite and gauge invariant, as they must be by virtue of the renormalizability of scalar electrodynamics. Their contribution is of order m_H^2/m_W^2 relative to the amplitude (4.18) *). We conclude from (4.19) that the contribution of the W boson loop to $H\to\gamma\gamma$ may be very important. We have not calculated corrections to I_W as m_H approaches the W^+W^- threshold : we expect the behaviour to be similar to that for I_ℓ, Fig. 16.

We see that in the minimal model assumed here the W loop contribution is large and interferes destructively with the hadronic and leptonic contributions. In fact fermion (as well as scalar meson) loop contributions are directly related to a mass insertion in the corresponding contribution of the vacuum polarization, and since convergent, are determined by the absorptive part which is positive definite. For the W contribution, the vacuum polarization is not defined in the unitary gauge ; one must instead consider a W mass insertion in an S matrix element such as e^+e^- elastic scattering. But there are now several different diagrams which can contribute to the W^+W^- intermediate state and the direct connection with I is lost.

Unfortunately, this sign indeterminacy renders the $\gamma\gamma$ decay rate prediction extremely model dependent. The value of I is very sensitive to the addition of heavy leptons (for $m_H < 2m_L$), more hadronic degrees of freedom (for $m_H \lesssim$ new hadronic mass scale), and especially to the choice of the intermediate boson model. To guess a reasonable range of predictions we take

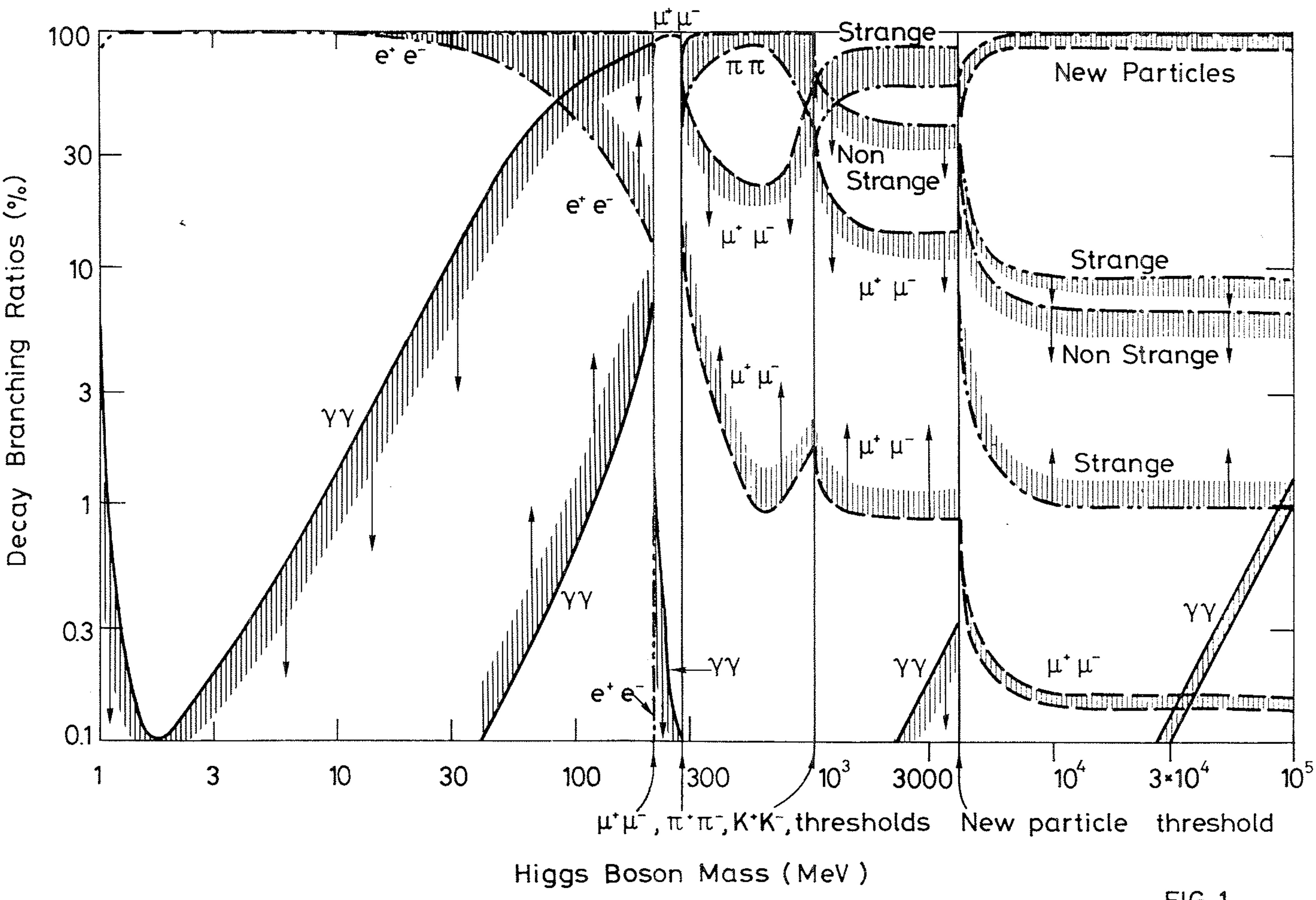
$$|I| = |I_{hadrons} + I_\ell \pm I_W|$$

using I_ℓ from Fig. 16, $I_{hadrons}$ from (4.12) and I_W from (4.19). Then reference to Fig. 1 indicates that the $\gamma\gamma$ decay mode could be significant for certain ranges of m_H **).

---

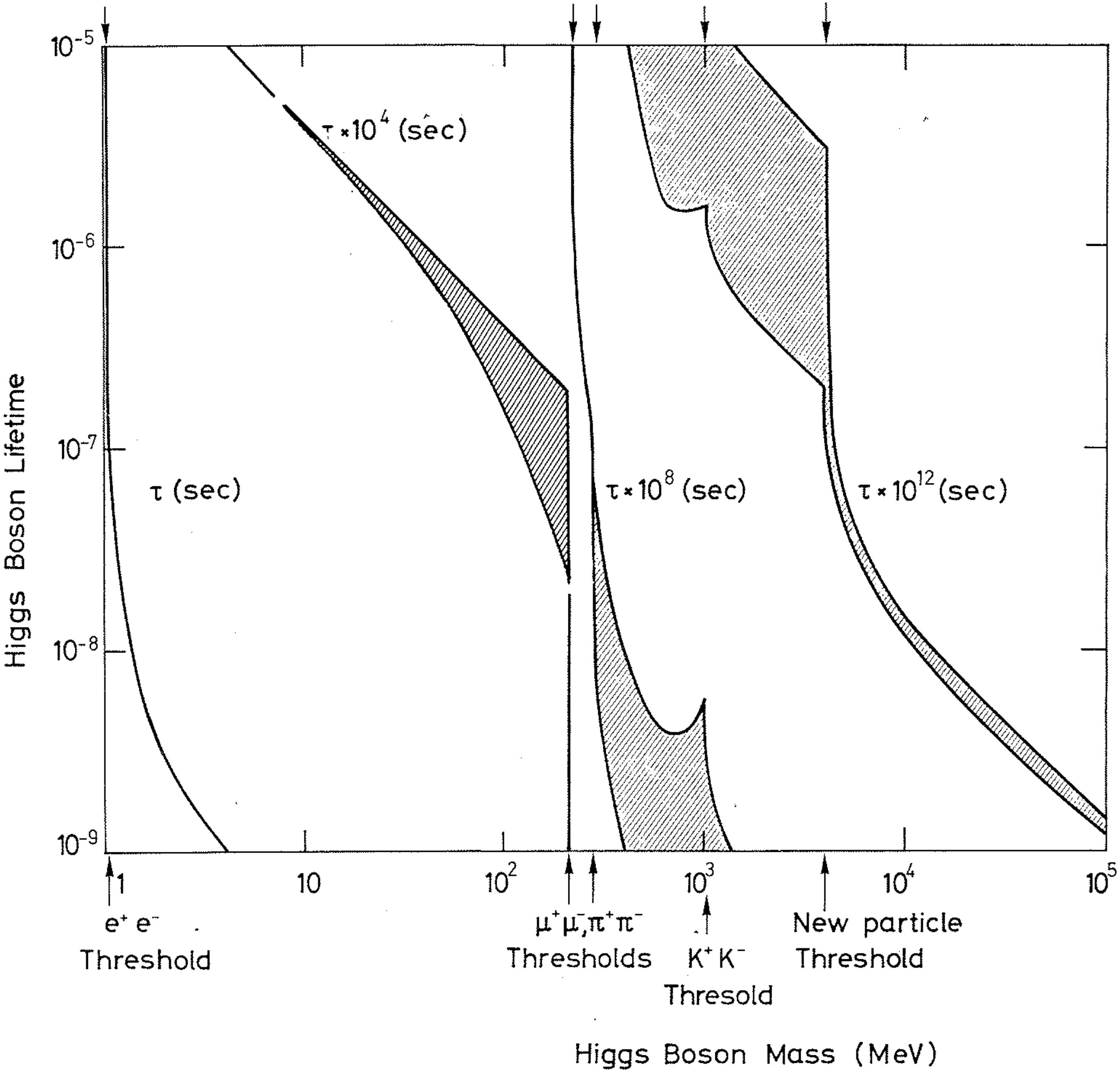
*) We have also repeated the fermion loop calculation of Resnick et al.[12] in order to determine the relative signs of the amplitudes. This serves as a further check on the over-all normalization of (4.19).

**) However, the value of $\Gamma(H\to\gamma\gamma)$ is at most $O(10^{-5})\times\Gamma(h\to\gamma\gamma)$ for a hadron h of comparable mass, as was mentioned in Section 3.5.1.



Decay Branching Ratios (%)
100
30
10
3
1
0.3
0.1
1
3
10
30
100
300
10^3
3000
10^4
3×10^4
10^5
$\mu^+\mu^-$
Strange
$e^+ e^-$
$\pi\pi$
New Particles
Non Strange
$e^+ e^-$
$\mu^+ \mu^-$
Strange
$\mu^+ \mu^-$
Non Strange
$\gamma\gamma$
$\mu^+ \mu^-$
$\mu^+ \mu^-$
Strange
$\gamma\gamma$
$\gamma\gamma$
$\gamma\gamma$
$e^+ e^-$
$\gamma\gamma$
$\mu^+ \mu^-$
$\gamma\gamma$
$\mu^+\mu^-$, $\pi^+\pi^-$, K^+K^-, thresholds
New particle threshold
Higgs Boson Mass (MeV)

FIG. 1



Higgs Boson Lifetime
10-5
10-6
10-7
10-8
10-9
τ×10^4 (sec)
τ (sec)
τ×10^8 (sec)
τ×10^12 (sec)
1
10
10^2
10^3
10^4
10^5
e+ e-
Threshold
μ+μ-, π+π-
Thresholds
K+ K-
Thresold
New particle
Threshold
Higgs Boson Mass (MeV)

FIG. 2