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Erratum

Erratum to: Flavor violating leptonic decays of τ and μ leptons in the Standard Model with massive neutrinos

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In the first paragraph of Sect. 4, the sentence "Without loss of generality, we assume the CP-conserving scenario" is incorrect. In fact, our results correspond to a value of $\delta_{CP} = 1.5\,\pi$ for the CP-violating phase of the PMNS matrix of three Dirac neutrinos.

We also missed in our numerical programs a 1/2 factor associated with our Eq. (108), where it must be taken, corresponding to the average over the initial spin states of the charged lepton.

In addition to this, we were setting our weak decay constants at the Z boson mass scale, while this should be done in the Thompson limit, as correctly pointed out in Ref. [1]. Our results were written in terms of $\frac{G_F^4 s_w^4}{4\pi^4}$ and theirs using $\frac{\alpha^2 G_F^2}{8 M_W^4 \pi^2}$. While both are formally equivalent, evaluating at the M_Z scale instead of in the low-energy limit implies a correction increasing $\sim 15\%$ all our original results.

Therefore, the combined effect of both issues yields $\sim$ 42% smaller branching ratios than we originally quoted. The corrected version of our Tables 1, 2 and 3 is given as follows

Table 1 Penguin contributions taking into account the constants in the Thompson limit

Decay channel	Our result	Ref. [2]
$\mu^- \to e^- e^+ e^-$	$5.7 \cdot 10^{-55}$	$6.0 \cdot 10^{-54}$
$\tau^- \to e^- e^+ e^-$	$2.9 \cdot 10^{-56}$	$1.0 \cdot 10^{-54}$
$\tau^- \to \mu^- \mu^+ \mu^-$	$5.8 \cdot 10^{-55}$	$2.1 \cdot 10^{-53}$
$\tau^- \to e^- \mu^+ \mu^-$	$1.7 \cdot 10^{-56}$	$6.0 \cdot 10^{-55}$
$\tau^- \to \mu^- e^+ e^-$	$4.2 \cdot 10^{-55}$	$1.5 \cdot 10^{-53}$

Table 2 Box contributions taking into account the constants in the Thompson limit

Decay channel	Our result	Ref. [2]
$\mu^- \to e^- e^+ e^-$	$1.2 \cdot 10^{-56}$	$1.5 \cdot 10^{-53}$
$\tau^- \to e^- e^+ e^-$	$2.0 \cdot 10^{-57}$	$2.6 \cdot 10^{-54}$
$\tau^- \to \mu^- \mu^+ \mu^-$	$4.4 \cdot 10^{-56}$	$5.6 \cdot 10^{-53}$
$\tau^- \to e^- \mu^+ \mu^-$	$9.9 \cdot 10^{-58}$	$1.2 \cdot 10^{-54}$
$\tau^- \to \mu^- e^+ e^-$	$2.3 \cdot 10^{-56}$	$2.9 \cdot 10^{-53}$

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Table 3 Complete results taking into account interference (constants in the Thompson limit are used)

Decay channel	Our result	Ref. [2]
$\mu^- \to e^- e^+ e^-$	$4.4 \cdot 10^{-55}$	$4.9 \cdot 10^{-54}$
$\tau^- \to e^- e^+ e^-$	$1.9 \cdot 10^{-56}$	$8.3 \cdot 10^{-55}$
$\tau^- \to \mu^- \mu^+ \mu^-$	$3.7 \cdot 10^{-55}$	$1.8 \cdot 10^{-53}$
$\tau^- \to e^- \mu^+ \mu^-$	$1.2 \cdot 10^{-56}$	$5.4 \cdot 10^{-55}$
$\tau^- \to \mu^- e^+ e^-$	$3.0 \cdot 10^{-55}$	$1.2 \cdot 10^{-53}$

The main conclusion of our work remains unchanged and it has been corroborated by Ref. [1]. That is, contrary to Ref. [3] and in agreement with [2], we found that the $\tau \to \ell\ell'\ell'$ branching ratios in the standard model with massive neutrinos are completely negligible.

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