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Erratum: Slepton non-universality in the flavor-effective MSSM

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We report an error in the soft mass matrices due to the values of the flavons in the $\Delta(27)$ model taken as an example in our work [1] (section 3). In this model, we took the VEVs of the flavons to reproduce the observed Yukawa hierarchy as, $v_3/M_\ell = \sqrt{\alpha} \sim \mathcal{O}(1)$, $v_{23}/M_\ell \sim \varepsilon$, $v_{123}/M_\ell \sim \varepsilon^2$ and $v_1 \sim v_3$, with the tau yukawa y_τ taken as an overall factor. However, in order to take y_τ out the Yukawa matrix, the correct values of the VEVs are $v_3/M_\ell = \sqrt{y_\tau}$, $v_{23} = \sqrt{y_\tau}\,\varepsilon$ and $v_{123} = \sqrt{y_\tau}\,\varepsilon^2$, as pointed out in ref. [2]. While this has been implicitly taken into account in writing the Yukawa and in the Trilinear matrices, it has not been correctly included in the Kähler and, consequently, in the Soft-Mass matrix.

On the other hand, the factor f in eq. (2.5) of [1] should be corrected as

$$f \;=\; (2N_{\rm in}-1)\cdot(2N_{\rm out}-1)+1. \tag{1}$$

Given these considerations, we have to correct eq. (3.11) and then (3.13) of ref. [1] as,

$$B_{\ell,R} \to \alpha \begin{pmatrix} 2\varepsilon^4 & -3(4+8\alpha)\varepsilon^3 & 3(4+8\alpha)\varepsilon^3 \\ -3(4+8\alpha)\varepsilon^3 & 2\varepsilon^2 & -2\varepsilon^2 \\ 3(4+8\alpha)\varepsilon^3 & -2\varepsilon^2 & 2 \end{pmatrix}, \tag{2}$$

$$m^2_{\ell,R} \to m_0^2 \begin{pmatrix} 1 & -3\alpha(3+7\alpha)\varepsilon^3 & 3\alpha\left(3+\frac{11}{2}\alpha-\frac{x_2}{3x_4}\right)\varepsilon^3 \\ -3\alpha(3+7\alpha)\varepsilon^3 & 1+\alpha\varepsilon^2 & -\alpha\,(1-3x_4)\,\varepsilon^2 \\ 3\alpha\left(3+\frac{11}{2}\alpha-\frac{x_2}{3x_4}\right)\varepsilon^3 & -\alpha\,(1-3x_4)\,\varepsilon^2 & 1+\alpha \end{pmatrix}, \tag{3}$$

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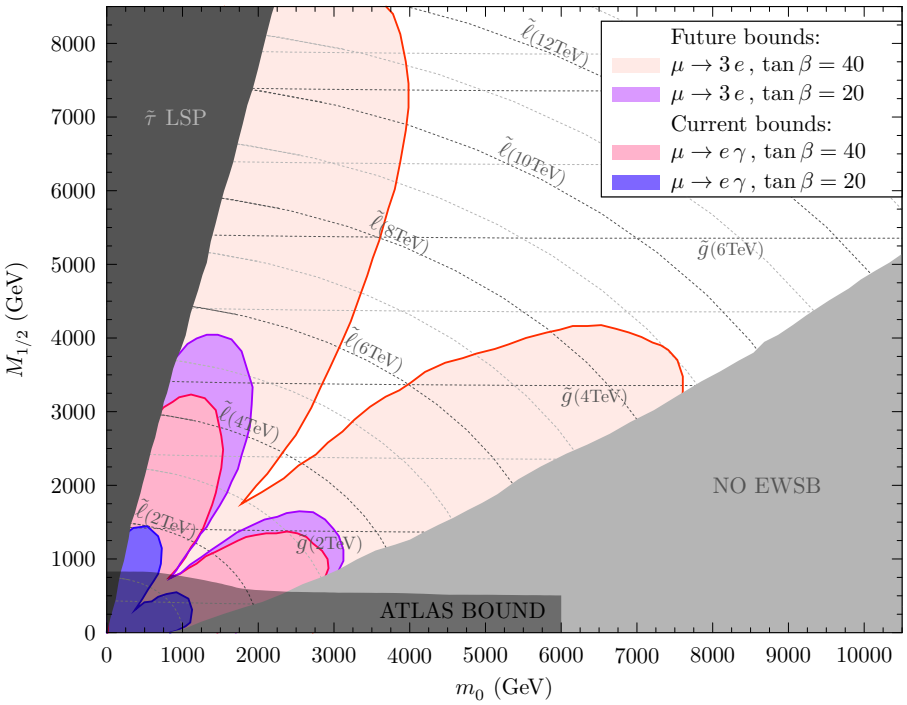

Figure 1. Excluded regions due to $\mu \to e\gamma$ and $\mu \to eee$ for two reference values: $\tan\beta = 20$ (blue shapes) and $\tan\beta = 40$ (red shapes). In the dark (blue and red) regions, we compare with current $\mu \to e\gamma$ bounds, while in the light (blue and red) regions we compare with the expected $\mu \to eee$ sensitivity in the near future. Interestingly, even for present bounds, these results are competitive with mSUGRA ATLAS limits (gray area).

where $\alpha = y_\tau$. Compared to the result of [1], this is an overall y_τ rescaling of the nonuniversal entries that are responsibles of the observed flavor violating effects, which are then significantly reduced. As shown in figure 1, the net effect is a reduction of the excluded parameter space corresponding to this model. Note that, in this figure, we have chosen larger values of $\tan\beta = 20, 40$, as $\tan\beta = 5$ is now giving no interesting constraints. In this figure, we present also the region excluded because of unsuccessful electoweak symmetry breaking, which was not included in the previous figure. A similar region is understood to be excluded also in figures 7 and 8 of [1].

Because of the change in the factor f, also the 3/2 factors in eqs. (4.8), (5.8) should be replaced by 2. However, this change has no impact on the results of ref. [1].

References

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