Effects of variation of m_s scale with different values of $\tan\beta$ for neutrino parameters
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Initial conditions for inverted hierarchy case (IH)

1. Self complementarity relation at seesaw scale, $\theta_{23} = q \times (\theta_{13} + \theta_{23})$,q=1.1

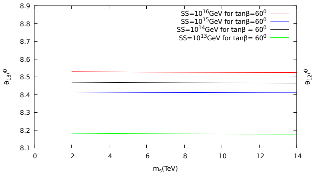
2. Dirac phase=240^0 and Majorana Phases, $\psi_1 = \psi_2 = 180^0$

3.sign(m_1)=-sign(m_2)

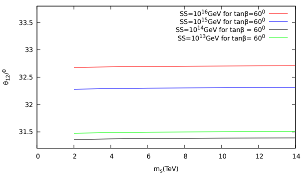
4.We use SUSY RGEs from SS scale to m_s and from m_s scale to EW scale, SM RGEs are used.

5.We give inputs , θ_{12} from $31^0 - 32.5^0$ and θ_{13} from $8.1^0 - 8.5^0$, $\Sigma m_i \approx 0.1$ eV

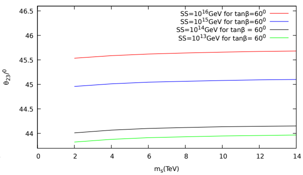
θ_{ij} vs m_s and Δm^2_{ij} vs m_s for IH case $(m_1 \approx m_2)$ for tanβ $=60^0$



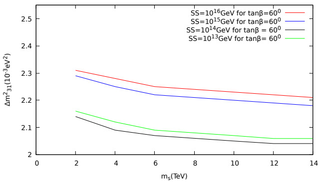
(a) θ_{13} vs m_s(TeV) .



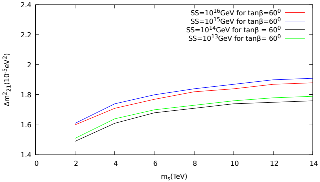
(b) θ_{12} vs m_s(TeV) .



(c) θ_{23} vs m_s(TeV) .

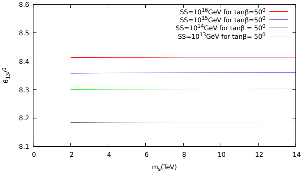


(d) Δm^2_{31} vs m_s(TeV) .

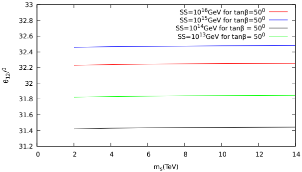


(e) Δm^2_{21} vs m_s(TeV) .

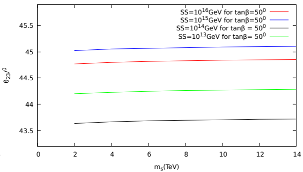
θ_{ij} vs m_s and Δm^2_{ij} vs m_s for IH case ($m_1 \approx m_2$) for tanβ $=50^0$



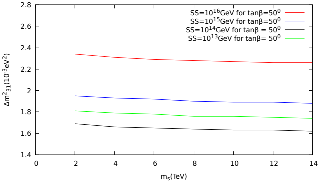
(a) θ_{13} vs m_s(TeV) .



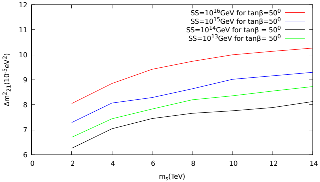
(b) θ_{12} vs m_s(TeV) .



(c) θ_{23} vs m_s(TeV) .

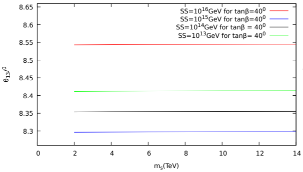


(d) Δm^2_{31} vs m_s(TeV) .

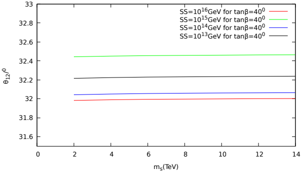


(e) Δm^2_{21} vs m_s(TeV) .

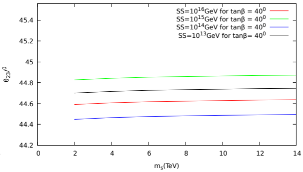
θ_{ij} vs m_s and Δm^2_{ij} vs m_s for IH case $(m_1 \approx m_2)$ for tanβ $=40^0$



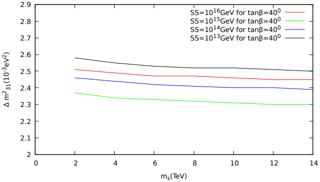
(a) θ_{13} vs m_s(TeV) .



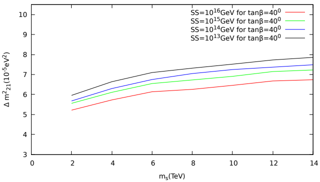
(b) θ_{12} vs m_s(TeV) .



(c) θ_{23} vs m_s(TeV) .



(d) Δm^2_{31} vs m_s(TeV) .



(e) Δm^2_{21} vs m_s(TeV) .

Conclusions and References

Since at SS scale of 10^{14}GeV, for tan(40),Δm^2_{21} is found to be $7.25 \times 10^{-5} eV^2$ and Δm^2_{31}, $2.40 \times 10^{-3} eV^2$ which is within 2σ range at m_s scale of 10TeV.Hence, can conclude that among tan(60),tan(50) and tan(40) tan 40 is more prefer and among SS scale 10^{16}GeV, 10^{15}GeV and 10^{14}GeV, 10^{14}GeV is more preferable.Also we can see that Δm^2_{21} increases with increasing m_s acale while Δm^2_{31} decreases.Among θ_{13} ,θ_{12} and θ_{23} θ_{13} is more stable.

References:

1.S. F. King and N. Nimai Singh. Inverted hierarchy models of neutrino masses. Nucl. Phys., B596, 2001.

2.Konsam Sashikanta Singh and N. Nimai Singh. Effects of the Variation of SUSY Breaking Scale on Yukawa and Gauge Couplings Unification. Adv.High Energy Phys., 2015:652029, 2015.