

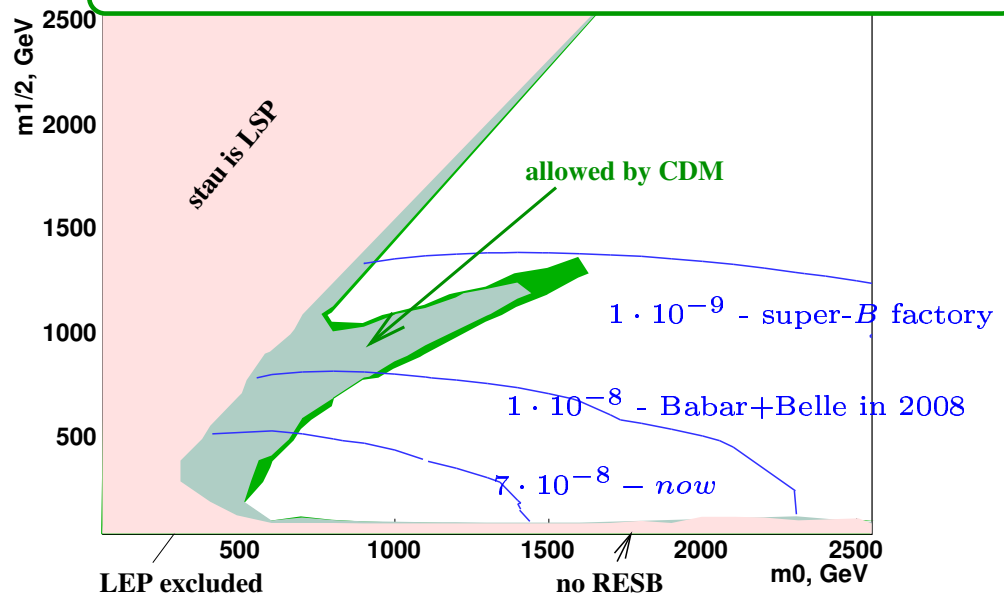


# BABAR and tau LFV decays

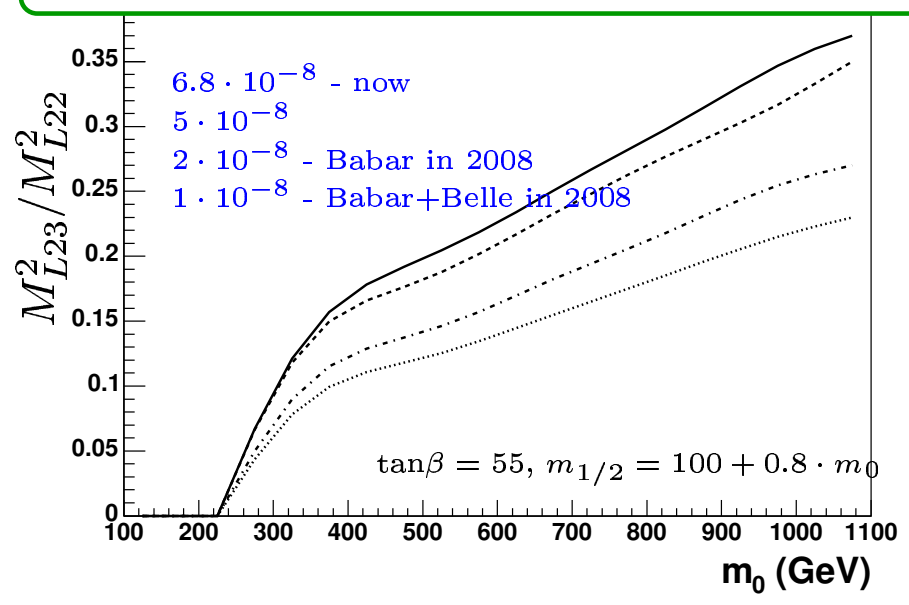


As was shown in many talks tau LFV decays are sensitive to non-SM contributions, (e.g. SUSY with seesaw included). While direct searches are crucial to prove SUSY existence, LFV decays are a tool to estimate the size of  $M_{Li3}^2/M_{Lii}^2$ ,  $M_{Ri3}^2/M_{Rii}^2$ .

$\tau \rightarrow \mu\gamma$  in mSUGRA-NuR,  $\tan\beta = 55$



model independent limits from  $\tau \rightarrow \mu\gamma$



Babar is aiming to have  $1 \text{ ab}^{-1}$  in 2008, which would give sensitivity to tau LFV decays of  $2 - 5 \cdot 10^{-8}$ . Super-B factory would be necessary to bring measurements of tau LFV branching ratios to quantitatively different level.



# BABAR and tau LFV decays II



All channels have to be explored for see whole picture. While  $\tau \rightarrow \mu\gamma$  is the most sensitive channel in most of the models, other channels can play more significant role under particular conditions.

1.  $\text{BR}(\tau \rightarrow e\gamma) \gg \text{BR}(\tau \rightarrow \mu\gamma)$ ,  
 $\text{BR}(\mu \rightarrow e\gamma)$   
 if hierarchy of neutrinos is inverted.
2.  $\text{BR}(\tau \rightarrow \mu\mu\mu) > \text{BR}(\tau \rightarrow \mu\gamma)$  due to SUSY Higgs, if  $M_{\text{SUSY}} > 1\text{TeV}$  and  $\tan\beta$  is large

Current Upper limits ( $\times 10^{-7}$ )  
at 90% CL

	BABAR	Belle
$\tau^- \rightarrow \mu^- \gamma$	<b>0.7</b>	3.4
$\tau^- \rightarrow e^- \gamma$	<b>1.1</b>	3.8
$\tau^- \rightarrow e^- e^+ e^-$	2.0	3.5
$\tau^- \rightarrow \mu^- \mu^+ \mu^-$	1.9	2.0
$\tau^- \rightarrow \ell^- \ell^\pm \ell'^\mp$	(1-3)	(2-4)
$\tau^- \rightarrow \ell^- h^+ h^-$	(1-3)	
$\tau^- \rightarrow \ell^+ h^- h^-$	(0.7-5)	
$\tau^- \rightarrow \ell^- K_S^0$		0.5
$\tau^- \rightarrow \ell^- \pi^0, \eta, \eta'$		2-10
$\tau^- \rightarrow \Lambda \pi^-$		1.4
$\tau^- \rightarrow \Lambda \pi^-$		0.7

to be improved

All references and plots can be found in O.Igonkina SUSY05 presentation.