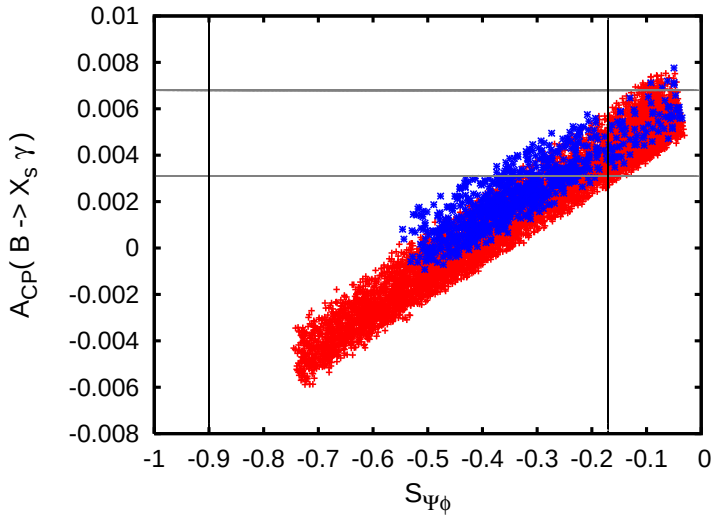

FIG. 2: Correlation between CP asymmetry in $B \to X_s\gamma$ and $S_{\psi\phi}$, the CP asymmetry in $B_s \to J/\psi\phi$; where the red and blue regions correspond to $m_{t'} = 400$ and 600 GeV whereas horizontal lines represent the SM limit for CP asymmetry and the vertical lines represent the 2σ limit for CP asymmetry in $B_s \to J/\psi\phi$.

Here the new physics Wilson coefficients $C_{7,8}^{\rm new}$ are at scale M_W. In SM4,

$$C_{7,8}^{\rm new} = \frac{V_{t's}^* V_{t'b}}{V_{ts}^* V_{tb}} C_{7,8}^{t'}(M_W) \ . \tag{48}$$

In the Fig. 2 we have shown the correlation between CP asymmetries in $(B \to X_s\gamma)$ and $B_s \to J/\psi\phi$ $(S_{\psi\phi})$. The current 2σ experimental range for $S_{\psi\phi}$ is given by $[-0.90, -0.17]$ [76]. The SM value for $A_{CP}(B \to X_s\gamma)$ corresponds to $S_{\psi\phi} \approx 0$ or in other words $\phi_s^{t'} \approx 0$. It is easy to understand the nature of the plot i.e decrease of $A_{CP}(B \to X_s\gamma)$ with increase of $S_{\psi\phi}$. From the expression for $A_{CP}(B \to X_s\gamma)$ (eq. (46)), it is clear that in SM the only contribution to A_{CP} will come from the first part of the fourth term. In the presence of new phase and new coupling, the first two terms and the fourth term will contribute to A_{CP}. Contribution from the first two term is always negative and increases (mod value) with the new physics coupling (within the NP region we are interested) whereas the fourth term is always positive and it has very small increase with the new physics coupling or phase.