Replicating the Oblique Constraints

- Replicating James' work on the obliques has yielded very similar results to his
- Figures 1 and 2 compare to his work on Overleaf, and Figure 3 compares to Figure 3 in 2003.03386

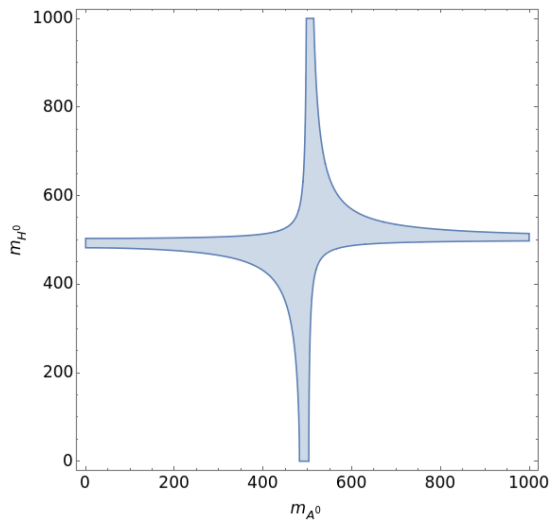

Figure 1: Cross-section in $m_{H^0} - m_{A^0}$ space for $m_{H^+} = 500\,\text{GeV}$,$\theta = \frac{\pi}{2}$, and assuming $U = 0$ at 95% CL

- Overall, we see the same results as James has discussed: that it is very closely set that at least one of the new scalar masses must be approximately equal to m_{H^+}
- There appears to very little difference now between our results and I'm quite happy with my calculations so I'd say we're quite happy to see we're in agreement on these results

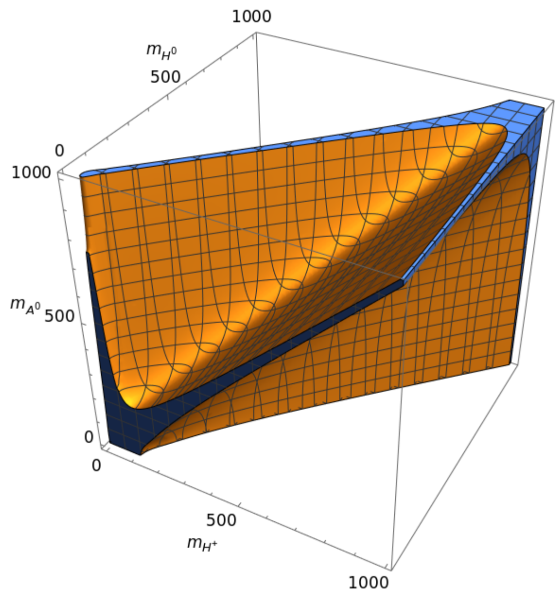

Figure 2: Full scan for $\theta = \frac{\pi}{2}$ and $U = 0$ at 95% CL

- I've managed to quite closely replicate the work of Figure 3 in 2003.03386 considering just T, seen in Figure 3 here
- We can see that again this favours the scalar masses lying fairly close to m_{H^+}, although there is more room for variation than above

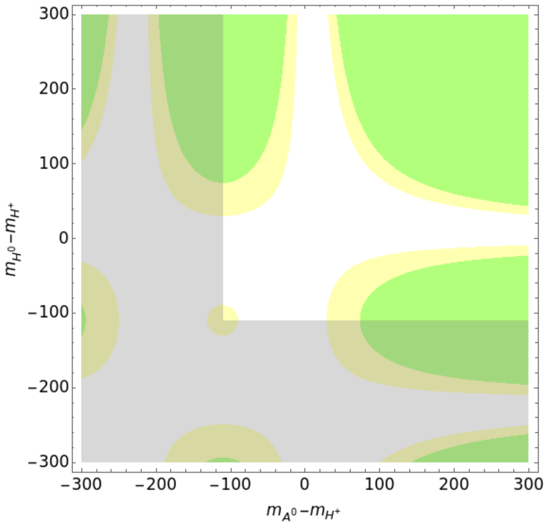

Figure 3: Scalar mass splittings excluded by T for $\theta = \frac{\pi}{2}$ and $m_{H^+} = 110\,\mathrm{GeV}$ at 1σ (yellow) and 2σ (blue). The gray region indicates where is forbidden by requiring that $m_{H^0}, m_{A^0} > 0$.

- However, this is for $m_{H^+} = 110\,\mathrm{GeV}$ which is smaller than the limits set by direct searches, so in Figure 4, I have tested this again for $m_{H^+} = 500\,\mathrm{GeV}$
- This essentially replicates Figure 1 without the additional constraints of S

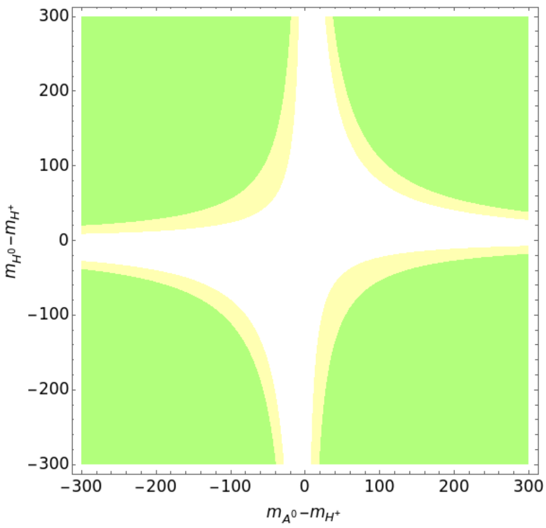

Figure 4: Scalar mass splittings excluded by T for $\theta = \frac{\pi}{2}$ and $m_{H^+} = 500\,\mathrm{GeV}$ at 1σ (yellow) and 2σ (blue).