| Channel | Collider | $m_h$ | mSUGRA | mGMSB | mAMSB |
|---|---|---|---|---|---|
| $V^* \to Vh \to Vb\bar{b}$ | Tev<br>LC | $\lesssim 135$<br>$\lesssim 0.7\sqrt{s}$ | $\pm\ 10\%$ | $\pm\ 10\%$ | $M_A \lesssim 300 : +50\%$ |
| $VV \to h \to bb$ | LHC | $\lesssim 120$ | $\pm\ 10\%$ | $\pm\ 10\%$ | $M_A \lesssim 300 : +50\%$ |
| $V^* \to Vh \to Vc\bar{c}$ | LC | $\lesssim 0.7\sqrt{s}$ | $M_A \lesssim 500 : \pm 20\%$ | $M_A \lesssim 200 :\ \lesssim\ -50\%$<br>$200 \lesssim M_A \lesssim 400 : -50\%$<br>$400 \lesssim M_A \lesssim 600 : -20\%$ | $500 \lesssim M_A \lesssim 650 : -20\%$<br>$300 \lesssim M_A \lesssim 500 : -50\%$<br>$M_A \lesssim 300 :\ \lesssim\ -50\%$ |
| $V^* \to (V)h \to (V)WW^*$ | (LC), LHC | $(\lesssim 0.7\sqrt{s}),\ \gtrsim 110$ | $M_A \lesssim 150 : \pm 20\%$,<br>for $\tan\beta \lesssim 30$ or $\gtrsim 50$ | like $Vc\bar{c}$ | like $Vc\bar{c}$ |
| $V^* \to Vh \to V\tau^+\tau^-$<br>$VV \to h \to \tau^+\tau^-$ | LC<br>LHC | $\lesssim 0.7\sqrt{s}$<br>$\lesssim 150$ | $M_A \lesssim 150 : \pm 50\%$,<br>for $\tan\beta \gtrsim 50$ | $\tan\beta \gtrsim 50 :\ \gtrsim\ 50\%$ | $M_A \lesssim 500 :\ +50\%$ |
| $V^* \to (V)h \to (V)gg$ | (LC), LHC | ? | $M_A \lesssim 200 :\ \pm\ 20\%$ | like $Vc\bar{c}$ | $550 \lesssim M_A \lesssim 650 : -20\%$<br>$250 \lesssim M_A \lesssim 550 : -50\%$<br>$M_A \lesssim 250 :\ \lesssim\ -50\%$ |
| $gg \to h \to \gamma\gamma$ | LHC | $\lesssim 150$ | $M_A \lesssim 150 : \pm 20\%$<br>$\tan\beta \lesssim 30$ or $\gtrsim 50$ | like $Vc\bar{c}$ | $550 \lesssim M_A \lesssim 750 : -20\%$<br>$250 \lesssim M_A \lesssim 550 : -50\%$<br>$M_A \lesssim 250 :\ \lesssim\ -50\%$ |
| $t\bar{t} \to t\bar{t}h \to t\bar{t}b\bar{b}$ | LHC | $\lesssim 130$ | SM like | SM like<br>$+50\%$ for $\tan\beta \gtrsim 50$ | $M_A \lesssim 300 :\ +50\%$ |
| $\gamma\gamma \to h \to b\bar{b}$ | $\gamma$C | ? | $M_A \lesssim 150 :\ +50\%$ | SM like | $M_A \lesssim 300 :\ +50\%$ |
| $\gamma\gamma \to h \to WW^*$ | $\gamma$C | ? | $M_A \lesssim 200$ :<br>$-20\% \div +50\%$ | $M_A \lesssim 200 :\ \lesssim\ -50\%$<br>$200 \lesssim M_A \lesssim 400 : -50\%$<br>$400 \lesssim M_A \lesssim 600 : -20\%$ | $500 \lesssim M_A \lesssim 650 : -20\%$<br>$250 \lesssim M_A \lesssim 500 : -50\%$<br>$M_A \lesssim 250 :\ \lesssim\ -50\%$ |
| $\gamma\gamma \to h \to \tau^+\tau^-$ | $\gamma$C | ? | $\tan\beta \sim 50 : \pm 50\%$<br>$\tan\beta < 50 : +50\%$<br>for $M_A \lesssim 150$ | $\tan\beta \gtrsim 50 :\ \gtrsim\ 50\%$ | $M_A \lesssim 600 :\ +50\%$ |
| $\gamma\gamma \to h \to \gamma\gamma$ | $\gamma$C | ? | $M_A \lesssim 200$ :<br>$-20\% \div +50\%$ | like $\gamma\gamma \to h \to WW^*$ | $500 \lesssim M_A \lesssim 650 : -20\%$<br>$250 \lesssim M_A \lesssim 500 : -50\%$<br>$M_A \lesssim 250 :\ \lesssim\ -50\%$ |
| $\mu^+\mu^- \to h \to b\bar{b}$ | $\mu$C | up to $\sqrt{s} < 2m_W$ | $M_A \lesssim 250 : +50\%$<br>$M_A \lesssim 150, \tan\beta > 50 : -50\%$ | $200 \lesssim M_A \lesssim 600 : +50\%$<br>$M_A \lesssim 200 :\ \gtrsim 50\%$ | $450 \lesssim M_A \lesssim 900 : +50\%$<br>$M_A \lesssim 450 :\ \gtrsim 50\%$ |
| $\mu^+\mu^- \to h \to WW^*$ | $\mu$C | up to $\sqrt{s} < 2m_W$ | $\pm\ 10\%$ | $\tan\beta \simeq 50 :\ +50\%$ | $M_A \lesssim 600 :\ +50\%$ |
| $\mu^+\mu^- \to h \to \tau^+\tau^-$ | $\mu$C | up to $\sqrt{s} < 2m_W$ | $M_A \lesssim 250 : +50\%$<br>$M_A \lesssim 150, \tan\beta > 50 : -50\%$ | like $\mu^+\mu^- \to h \to b\bar{b}$ | like $\mu^+\mu^- \to h \to b\bar{b}$ |

Figure 1: *Behavior of the production and decay modes (see Eq.(14)) to the most relevant channels at present and future collider in three different SUSY breaking scenarios. When there is suppression or enhancement we indicate its maximum magnitude together with the parameters where this happens. If not stated explicitly, for the rest of the parameter space the mode behaves like the SM. The Higgs mass range where detection of a statistically signal is possible is also shown. For the LHC, the numbers follow the Ref.[hep-ph/0203123] and for LC and $\mu$C the Ref.[hep-ph/9703381].*