2HDM cross-section and exclusion contours

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The excluded regions taken from Eur.Phys.J.C 81 (2021) 4, 332 paper of the inclusive $H \to ZZ \to 4\ell$ analysis.

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2   2HDM Type-I cross-section

(a) $\tan\beta = 0.5$

(b) $\tan\beta = 0.6$

(c) $\tan\beta = 0.7$

(d) $\tan\beta = 0.8$

(e) $\tan\beta = 0.9$

(f) $\tan\beta = 1.0$

(g) $\tan\beta = 2.0$

(h) $\tan\beta = 3.0$

Figure 1: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.1$

(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

(f) $\tan\beta = 9.0$

(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 2: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.1$

Figure 3: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.4$

(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

(f) $\tan\beta = 9.0$

(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 4: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.4$

(a) $\tan \beta = 0.5$

(b) $\tan \beta = 0.6$

(c) $\tan \beta = 0.7$

(d) $\tan \beta = 0.8$

(e) $\tan \beta = 0.9$

(f) $\tan \beta = 1.0$

(g) $\tan \beta = 2.0$

(h) $\tan \beta = 3.0$

Figure 5: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.6$

(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

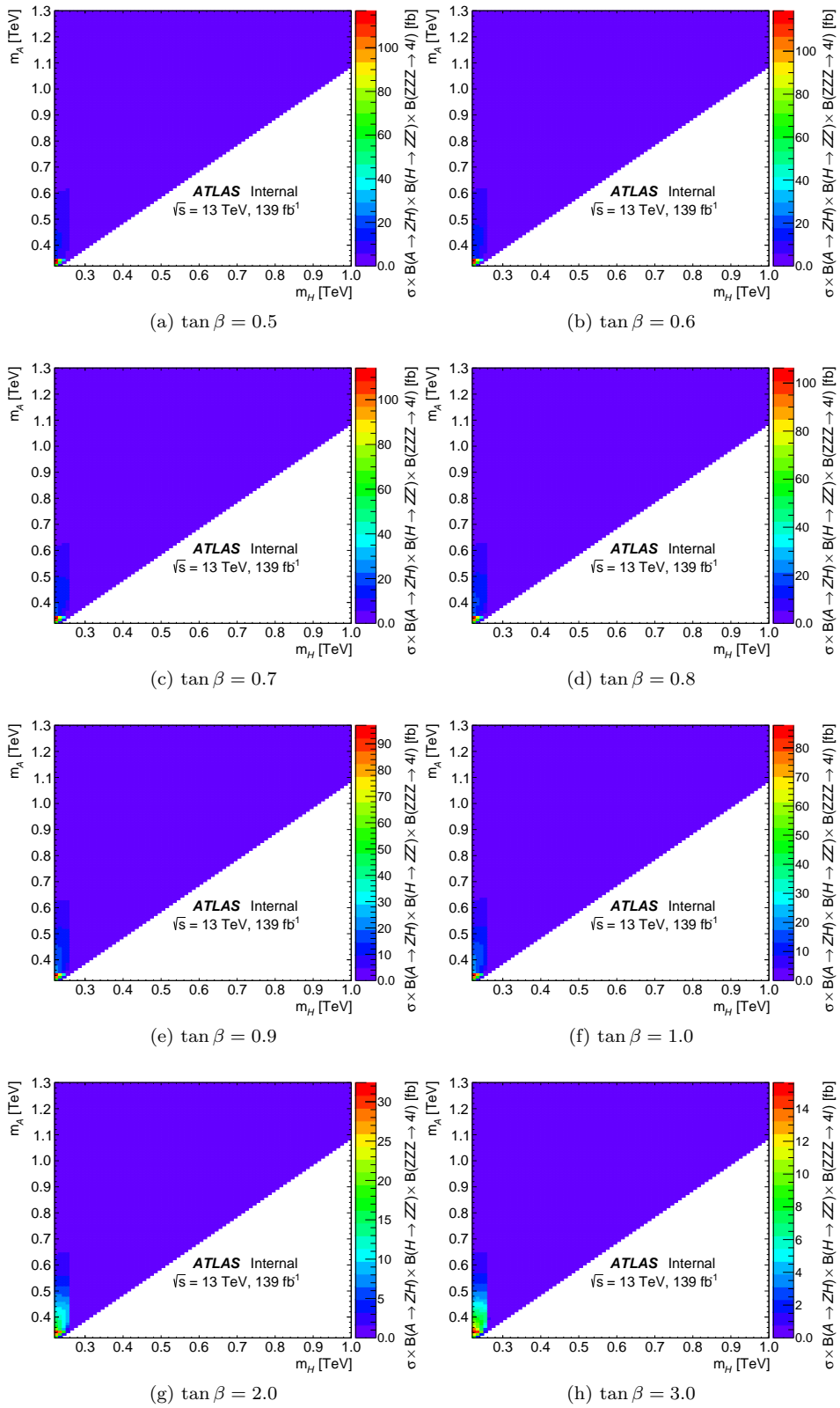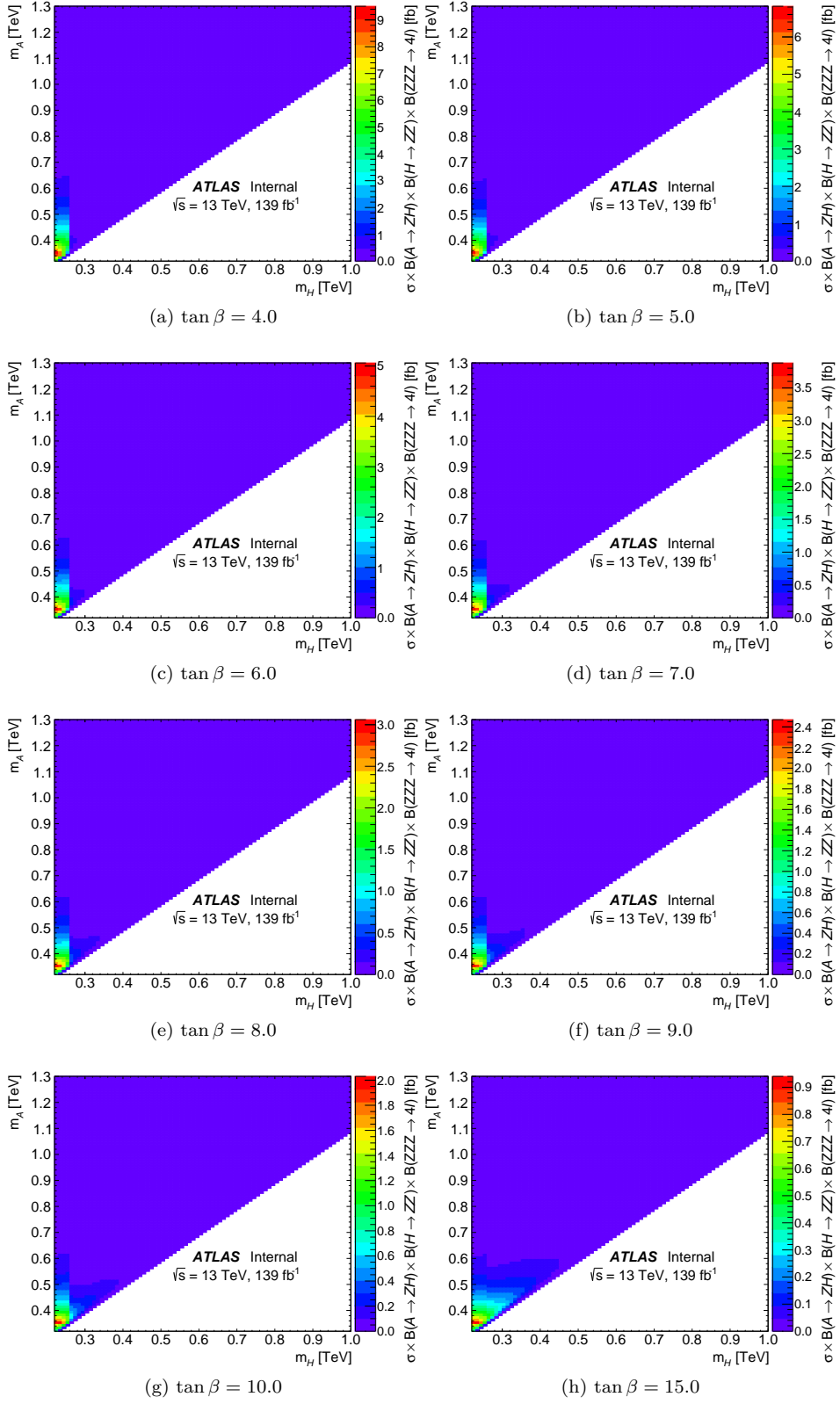(f) $\tan\beta = 9.0$

(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 6: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.6$

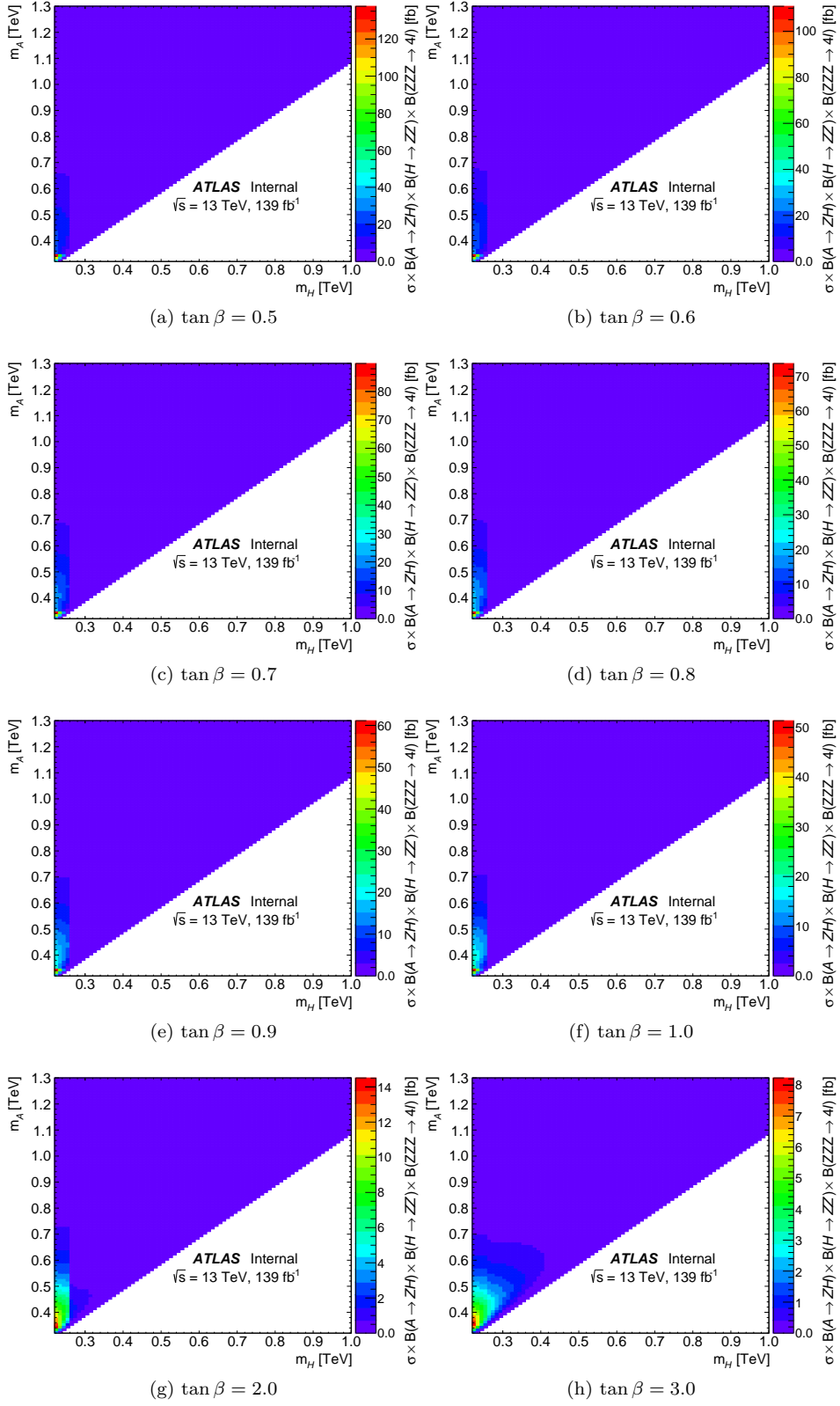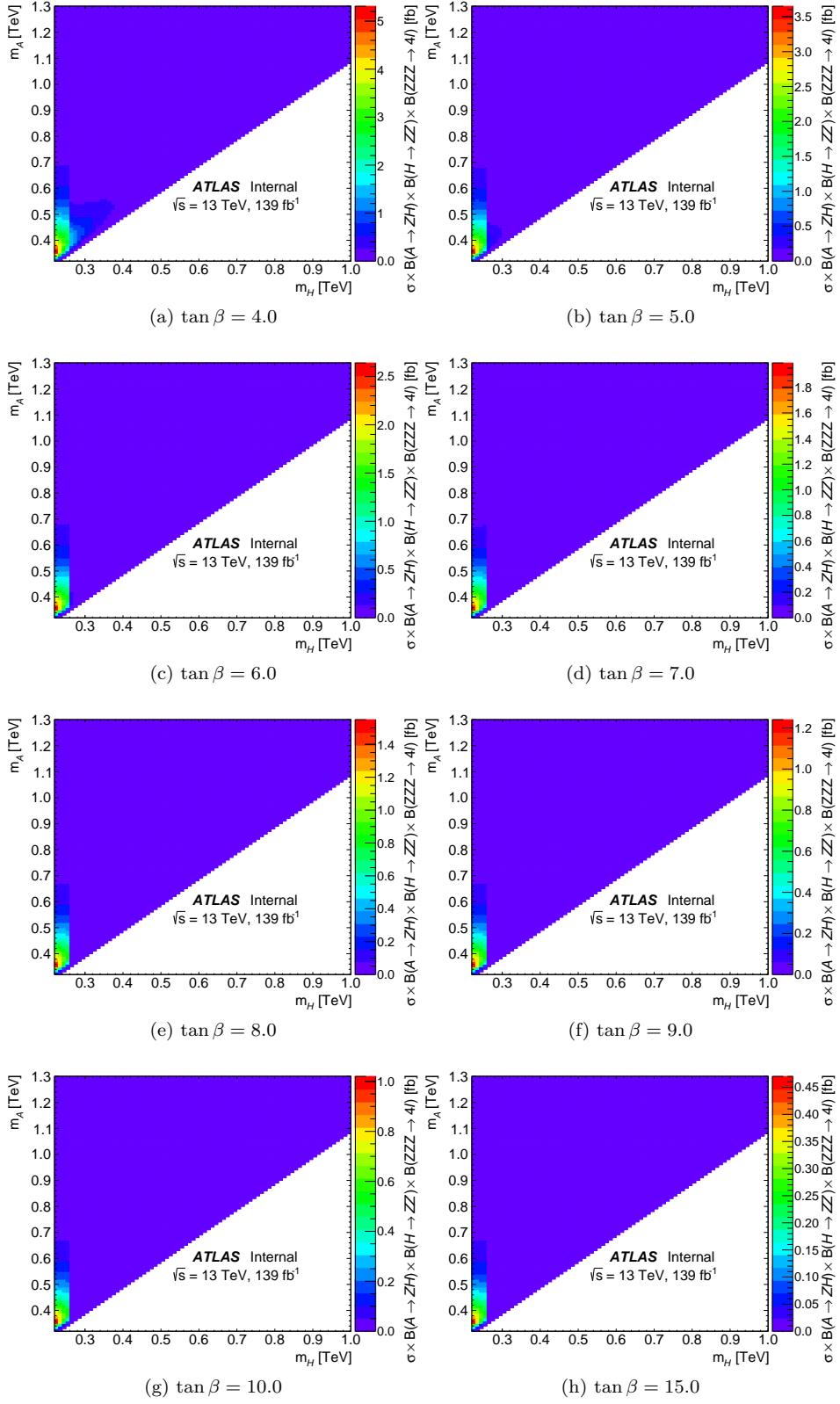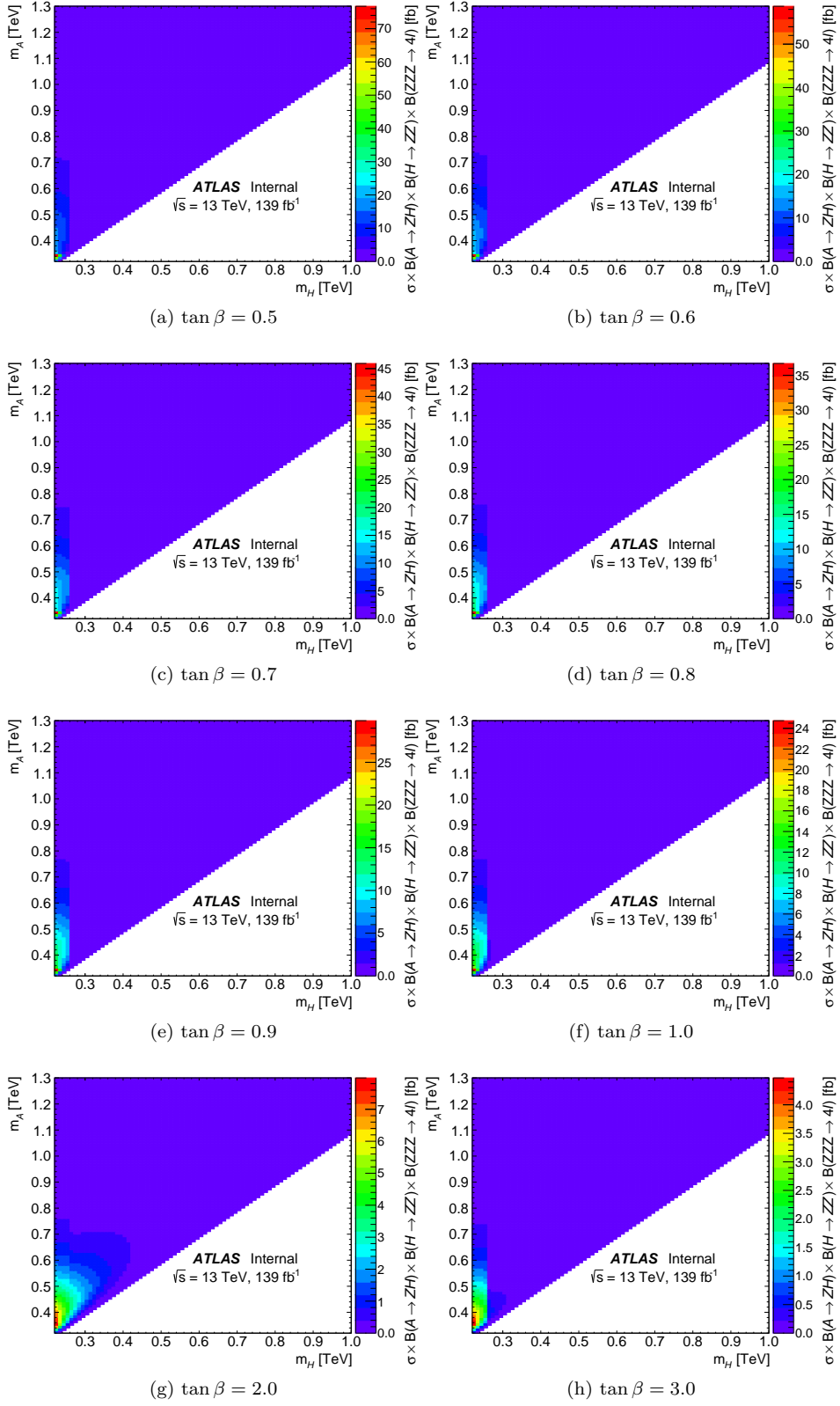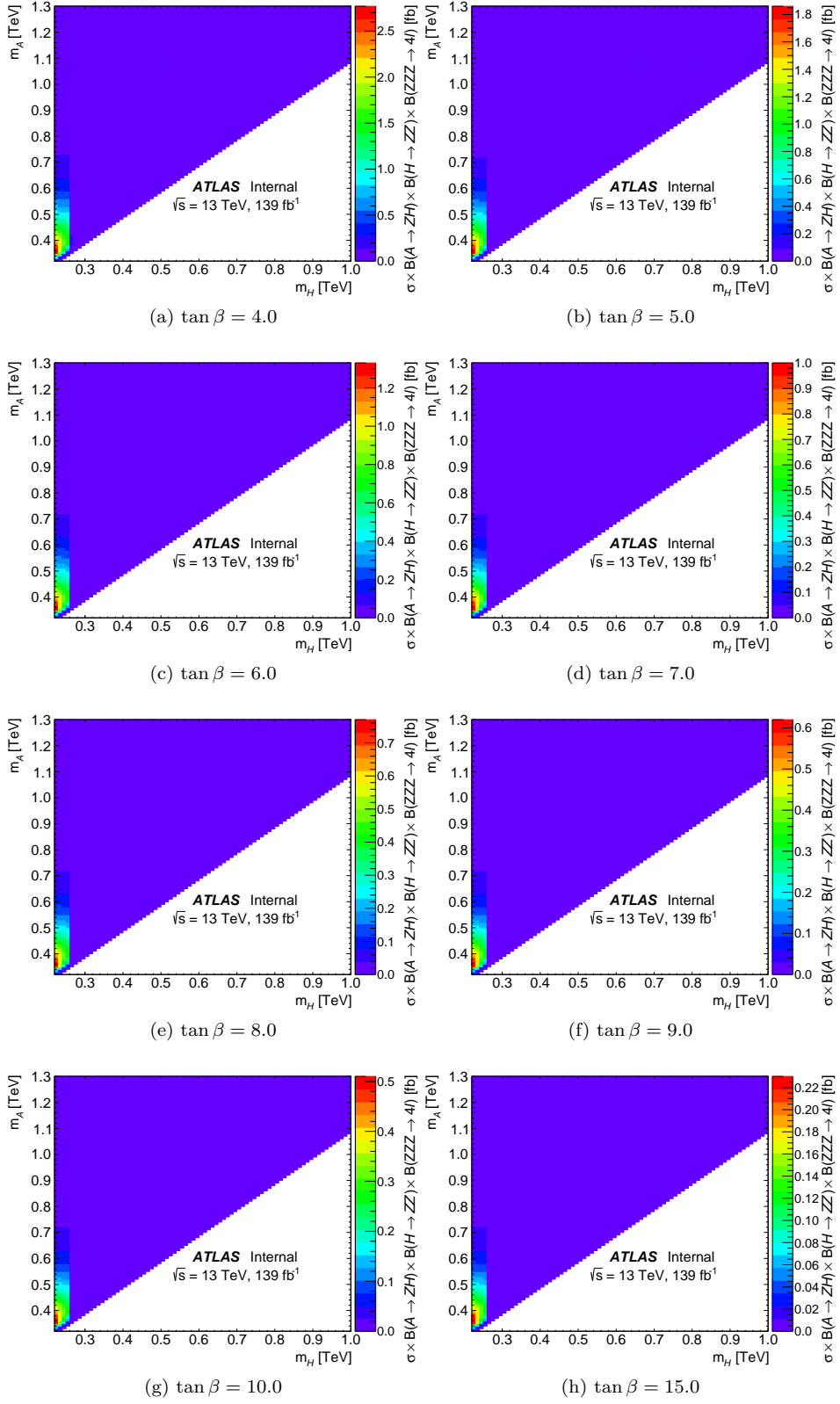Figure 7: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.7$

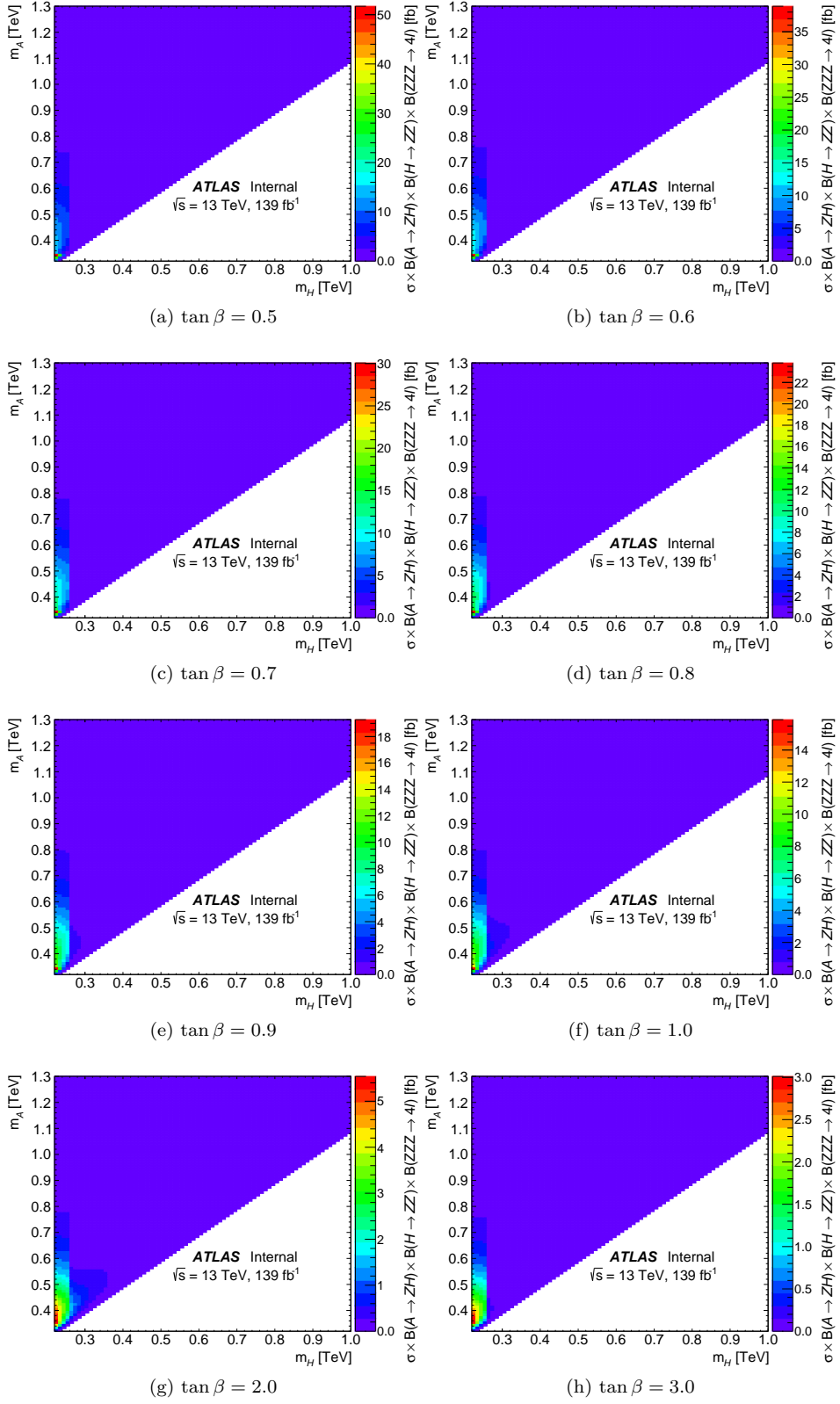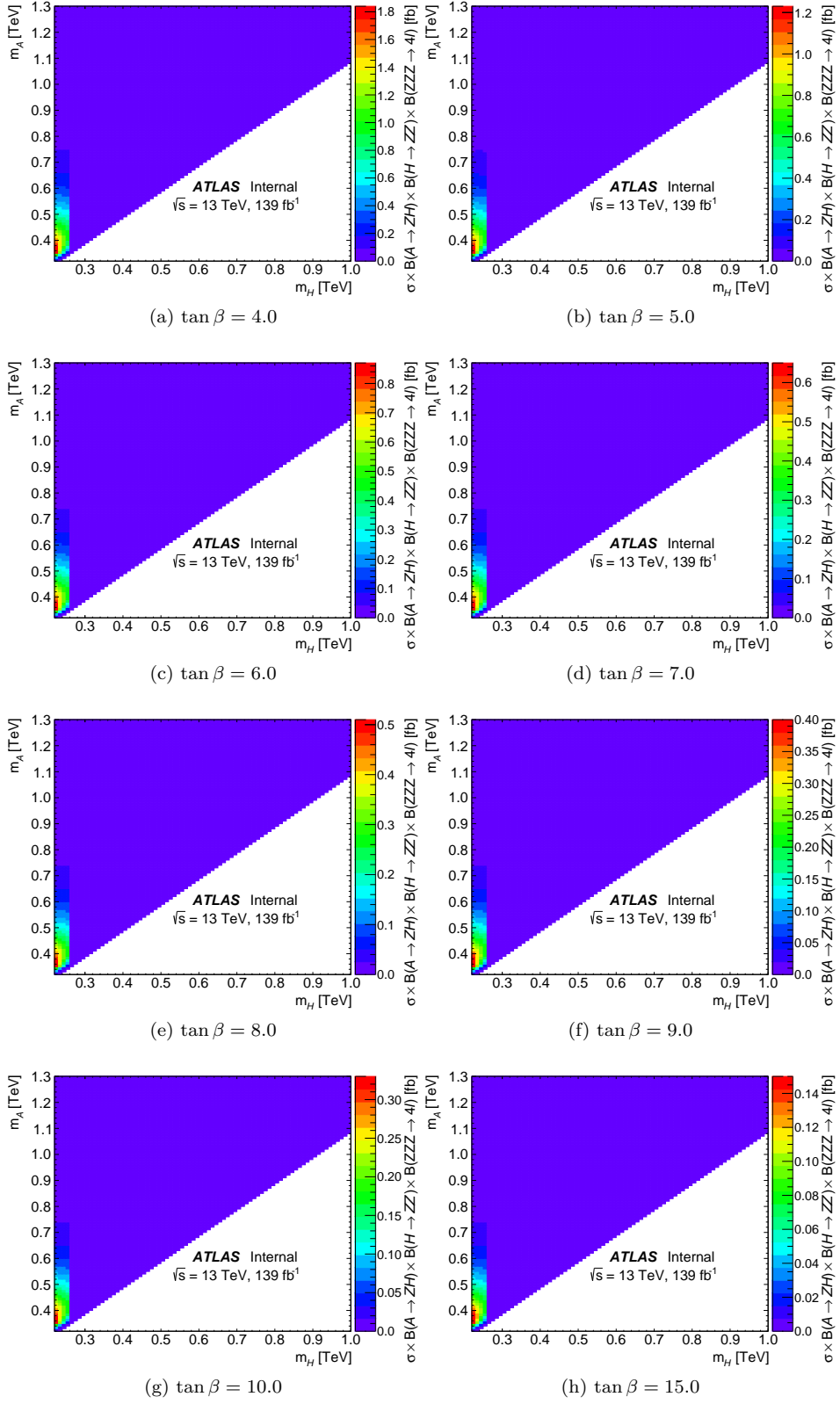(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

(f) $\tan\beta = 9.0$

(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 8: 2HDM Type-I cross-section for $\cos(\beta - \alpha) = 0.7$

3 2HDM lepton specific cross-section

(a) $\tan\beta = 0.5$

(b) $\tan\beta = 0.6$

(c) $\tan\beta = 0.7$

(d) $\tan\beta = 0.8$

(e) $\tan\beta = 0.9$

(f) $\tan\beta = 1.0$

(g) $\tan\beta = 2.0$

(h) $\tan\beta = 3.0$

Figure 9: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.1$

(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

(f) $\tan\beta = 9.0$

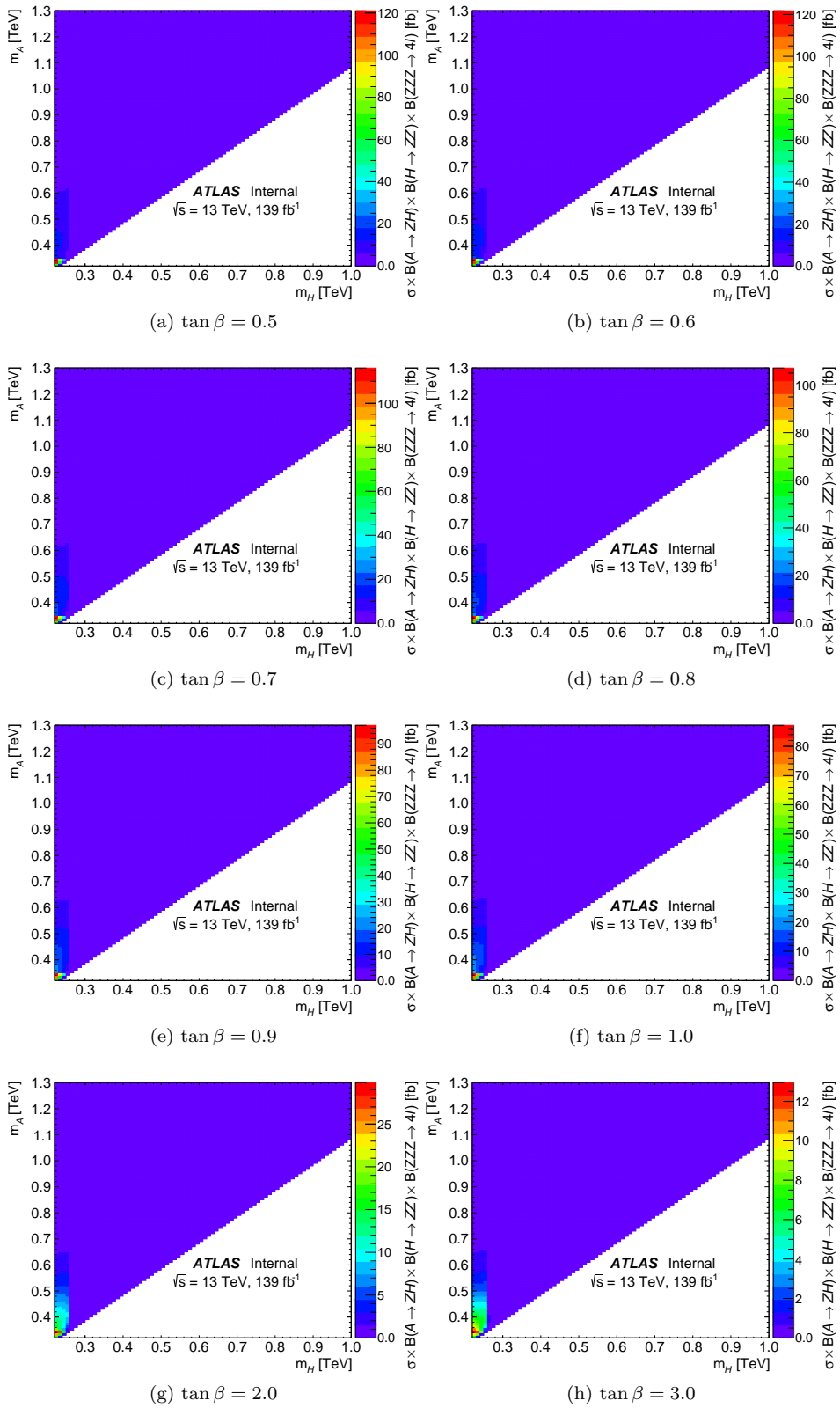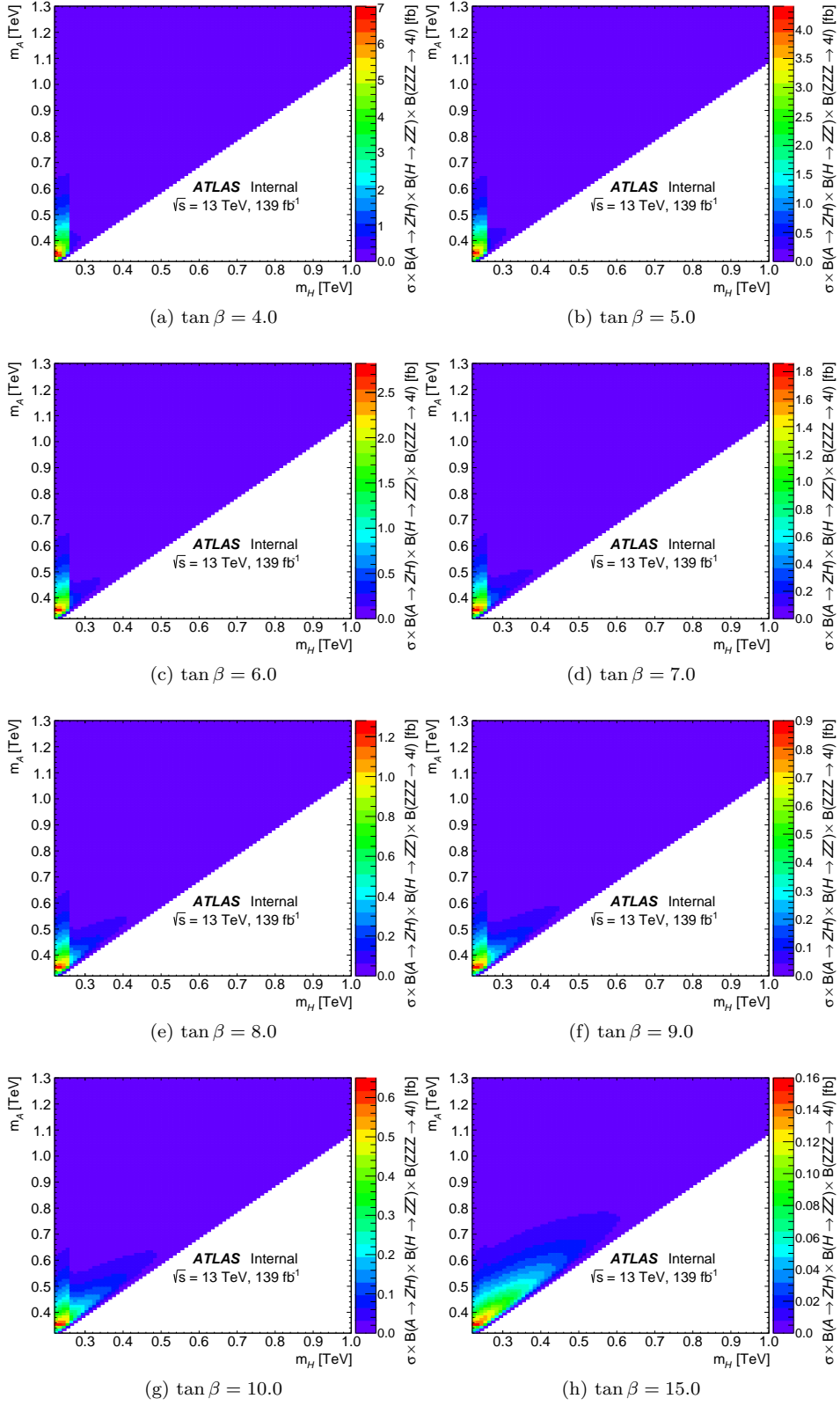(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 10: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.1$

Figure 11: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.4$

(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

(f) $\tan\beta = 9.0$

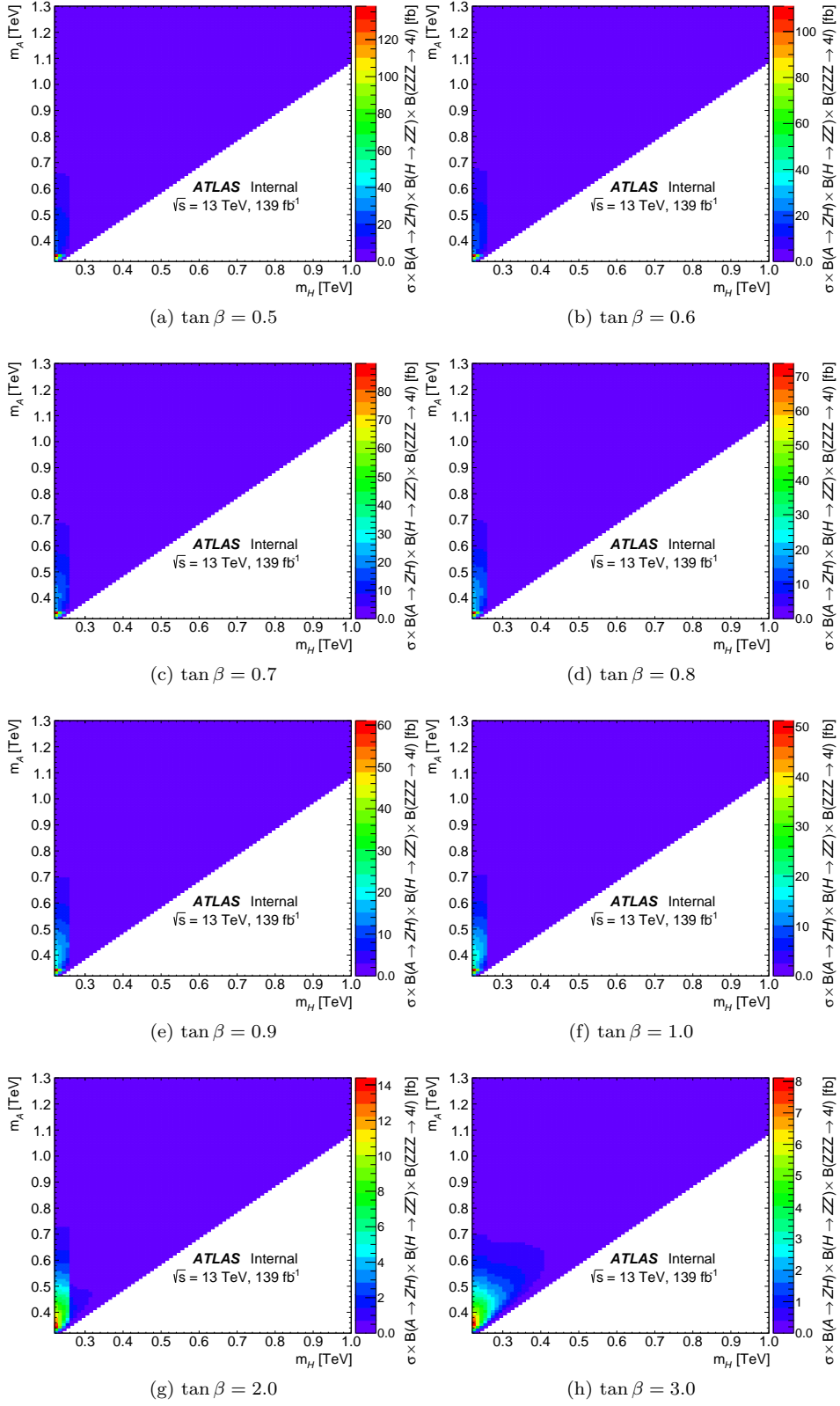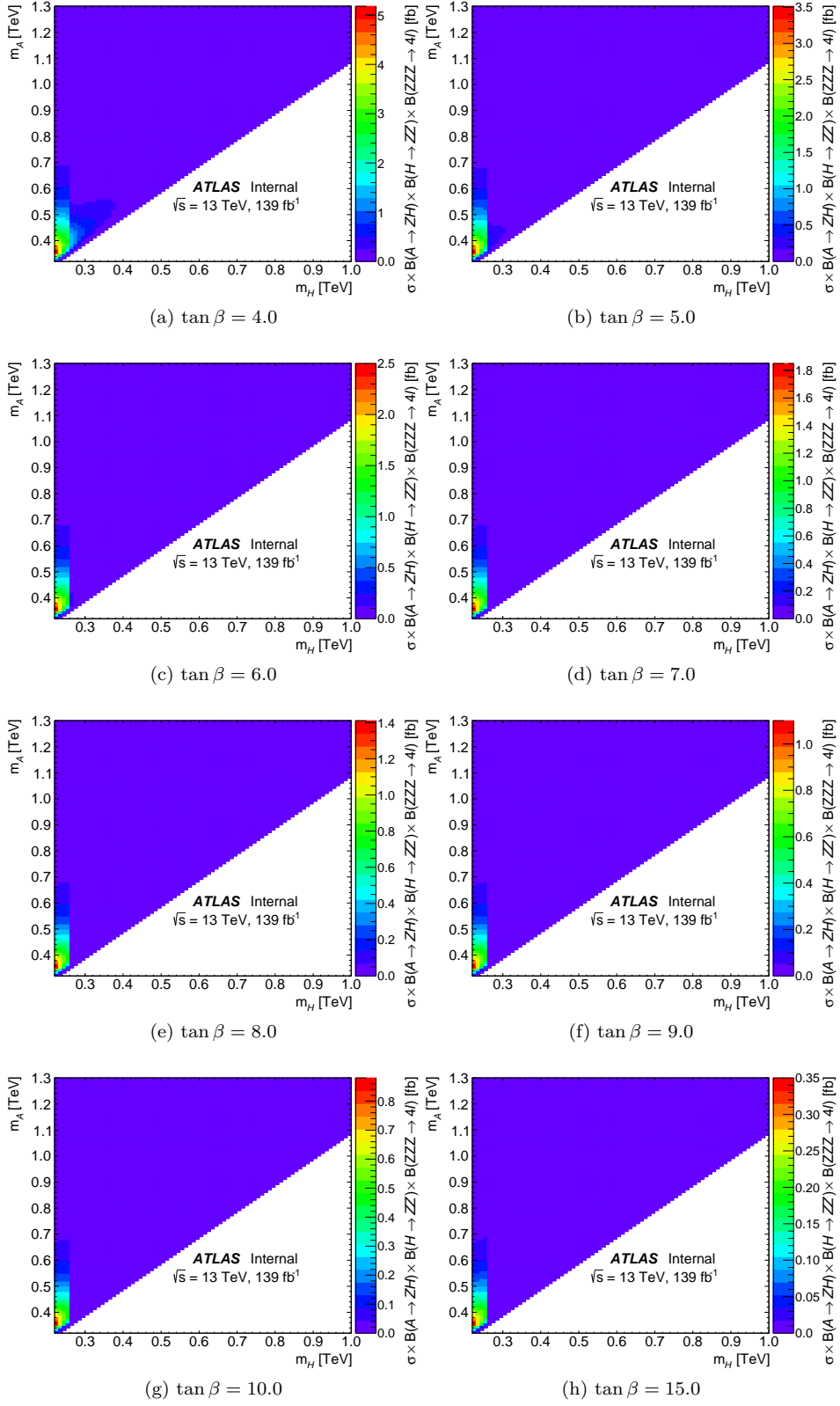(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 12: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.4$

Figure 13: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.6$

(a) $\tan \beta = 4.0$

(b) $\tan \beta = 5.0$

(c) $\tan \beta = 6.0$

(d) $\tan \beta = 7.0$

(e) $\tan \beta = 8.0$

(f) $\tan \beta = 9.0$

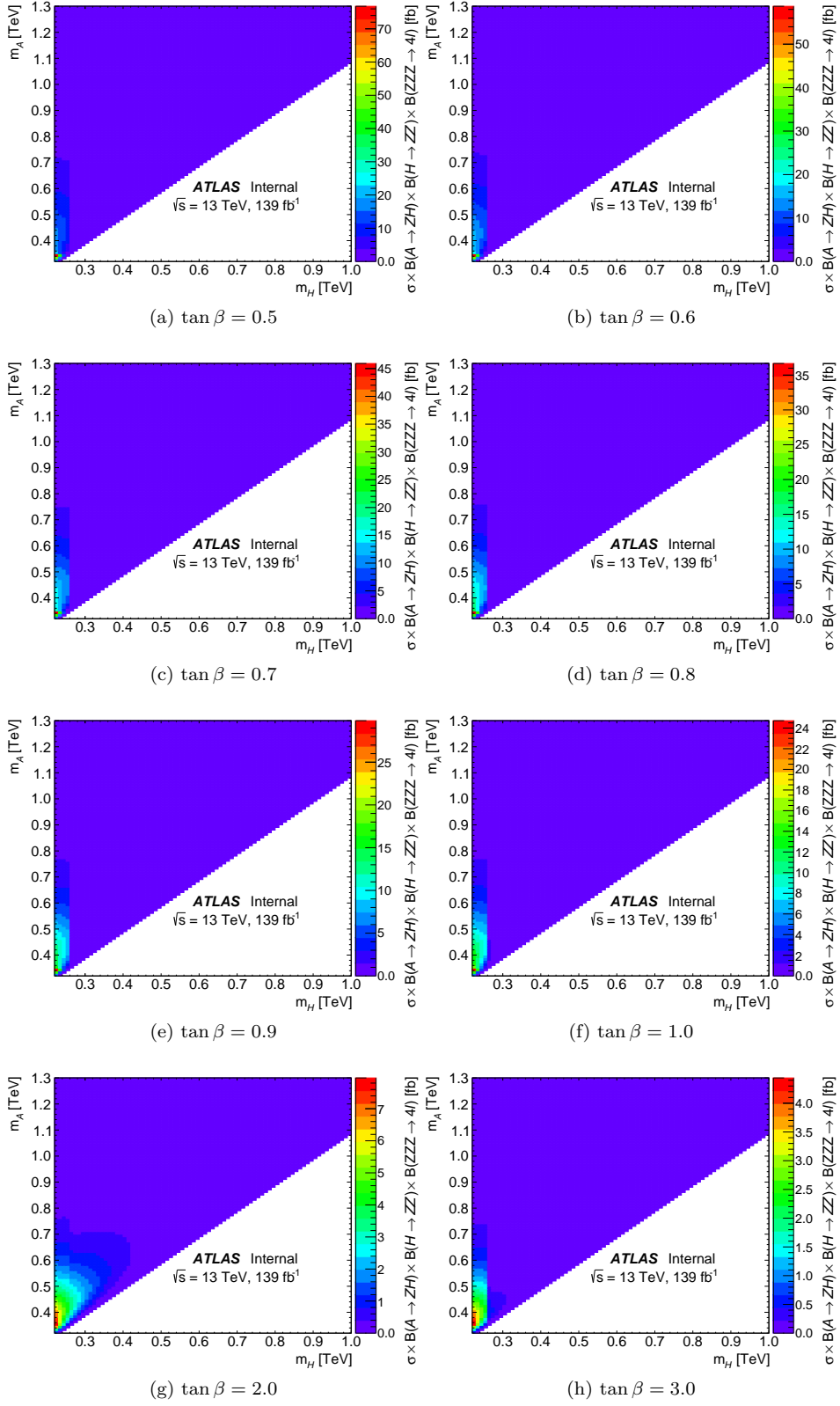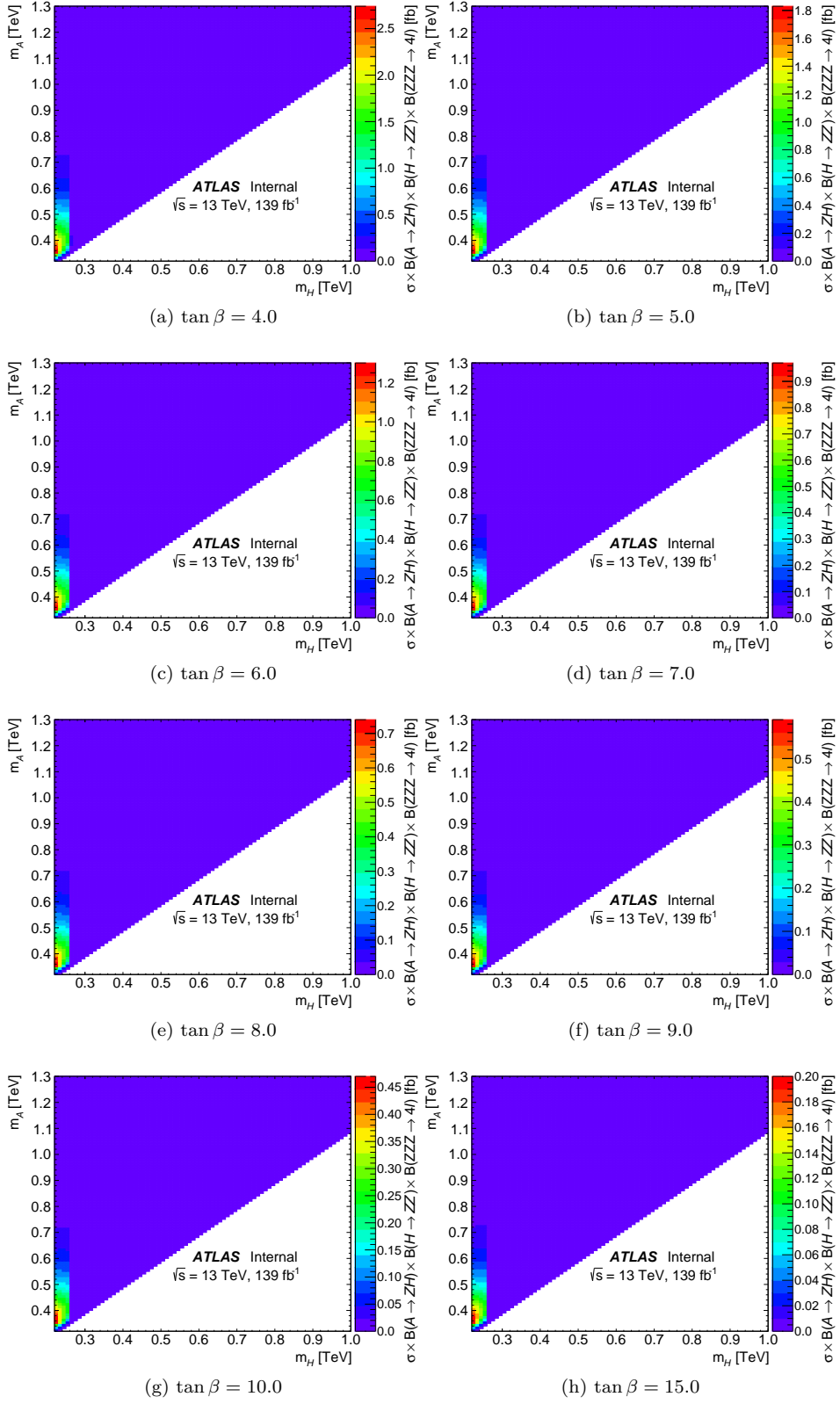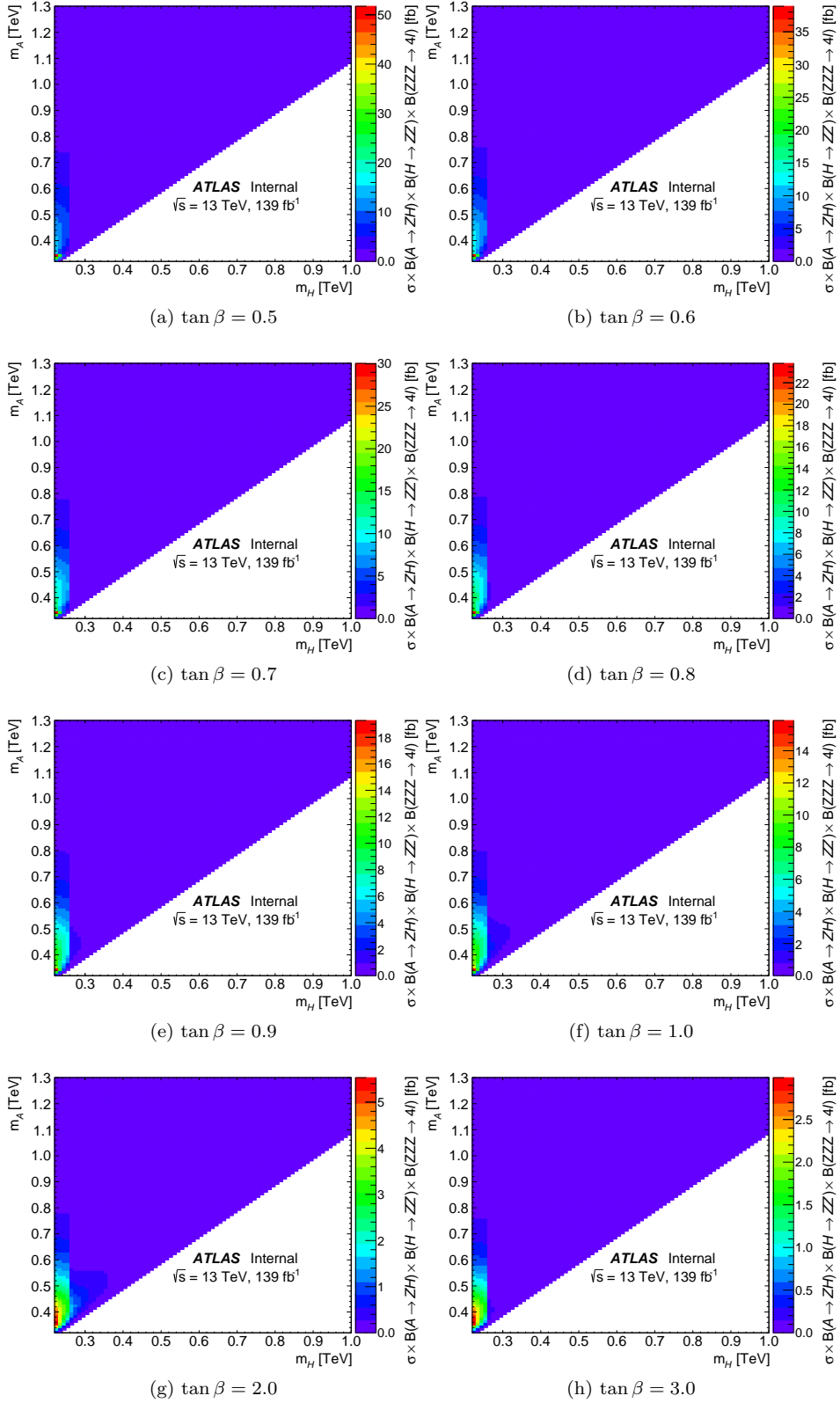(g) $\tan \beta = 10.0$

(h) $\tan \beta = 15.0$

Figure 14: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.6$

Figure 15: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.7$
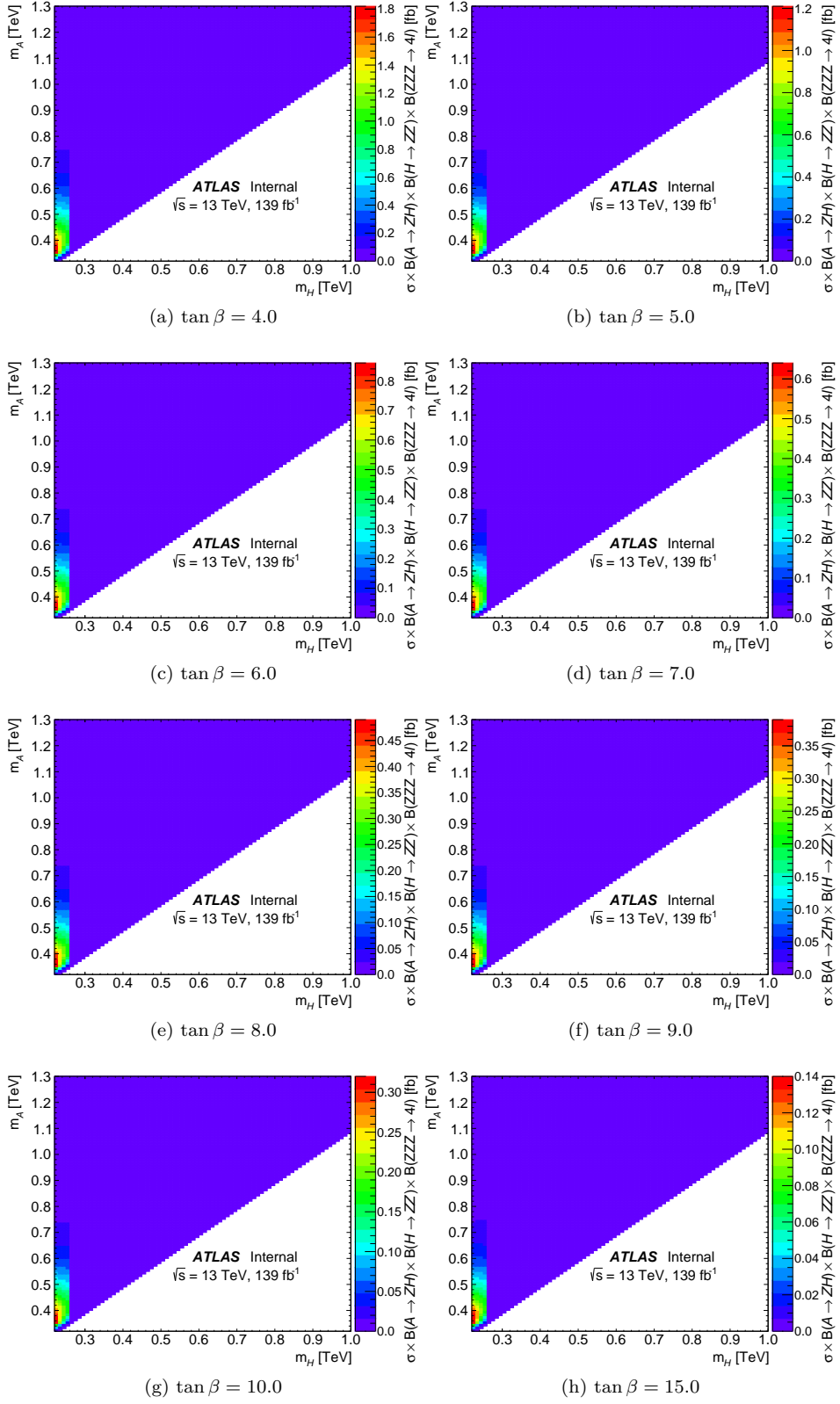
(a) $\tan\beta = 4.0$

(b) $\tan\beta = 5.0$

(c) $\tan\beta = 6.0$

(d) $\tan\beta = 7.0$

(e) $\tan\beta = 8.0$

(f) $\tan\beta = 9.0$

(g) $\tan\beta = 10.0$

(h) $\tan\beta = 15.0$

Figure 16: 2HDM lepton specific cross-section for $\cos(\beta - \alpha) = 0.7$

4   Exclusion contours

Figure 17: The exclusion limit at 95% CL in the 2HDM Type-I using the expected upper limit

(a) $\cos(\beta - \alpha) = 0.6$

(b) $\cos(\beta - \alpha) = 0.6$

(c) $\cos(\beta - \alpha) = 0.6$

(d) $\cos(\beta - \alpha) = 0.7$

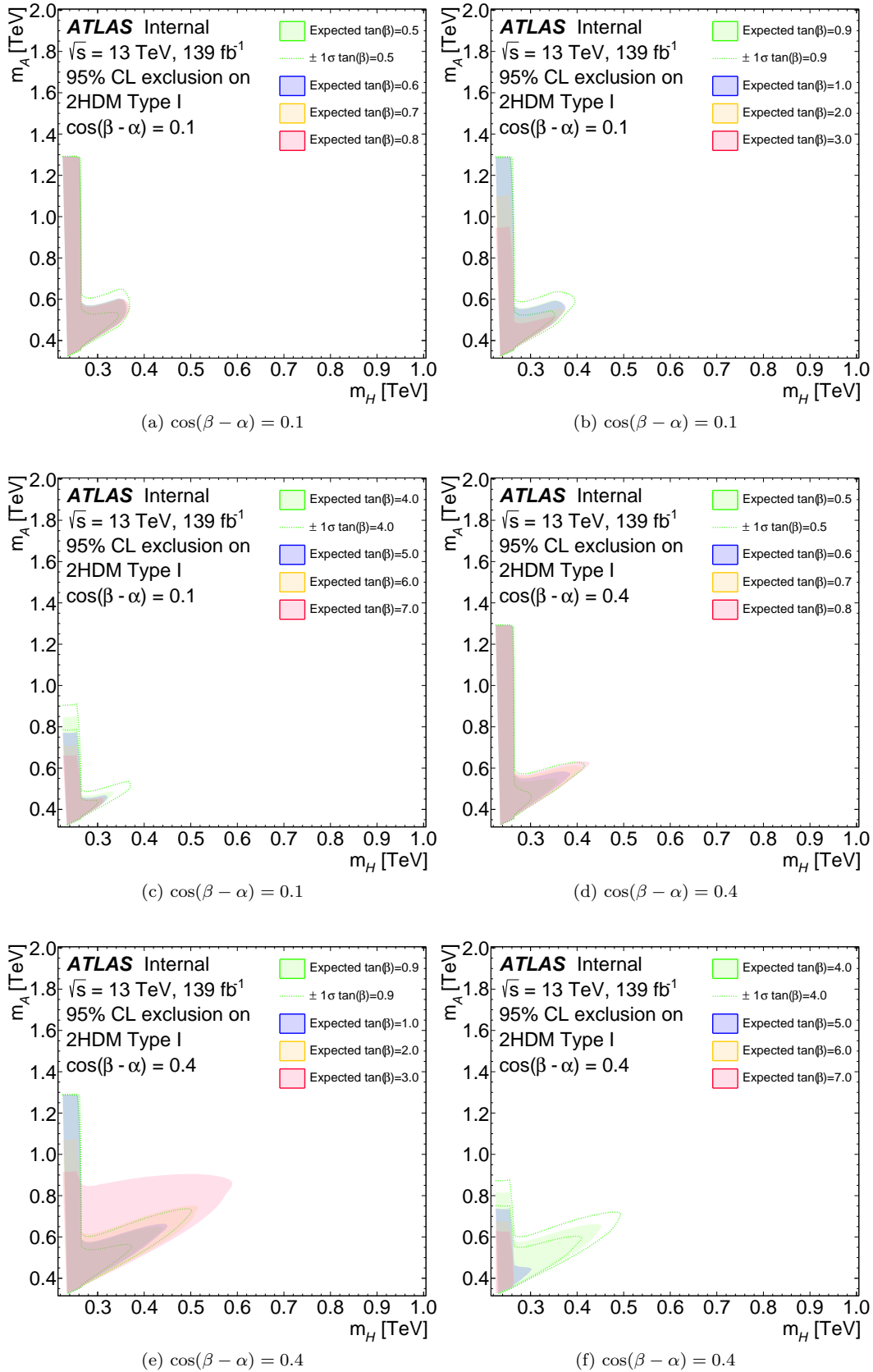(e) $\cos(\beta - \alpha) = 0.7$

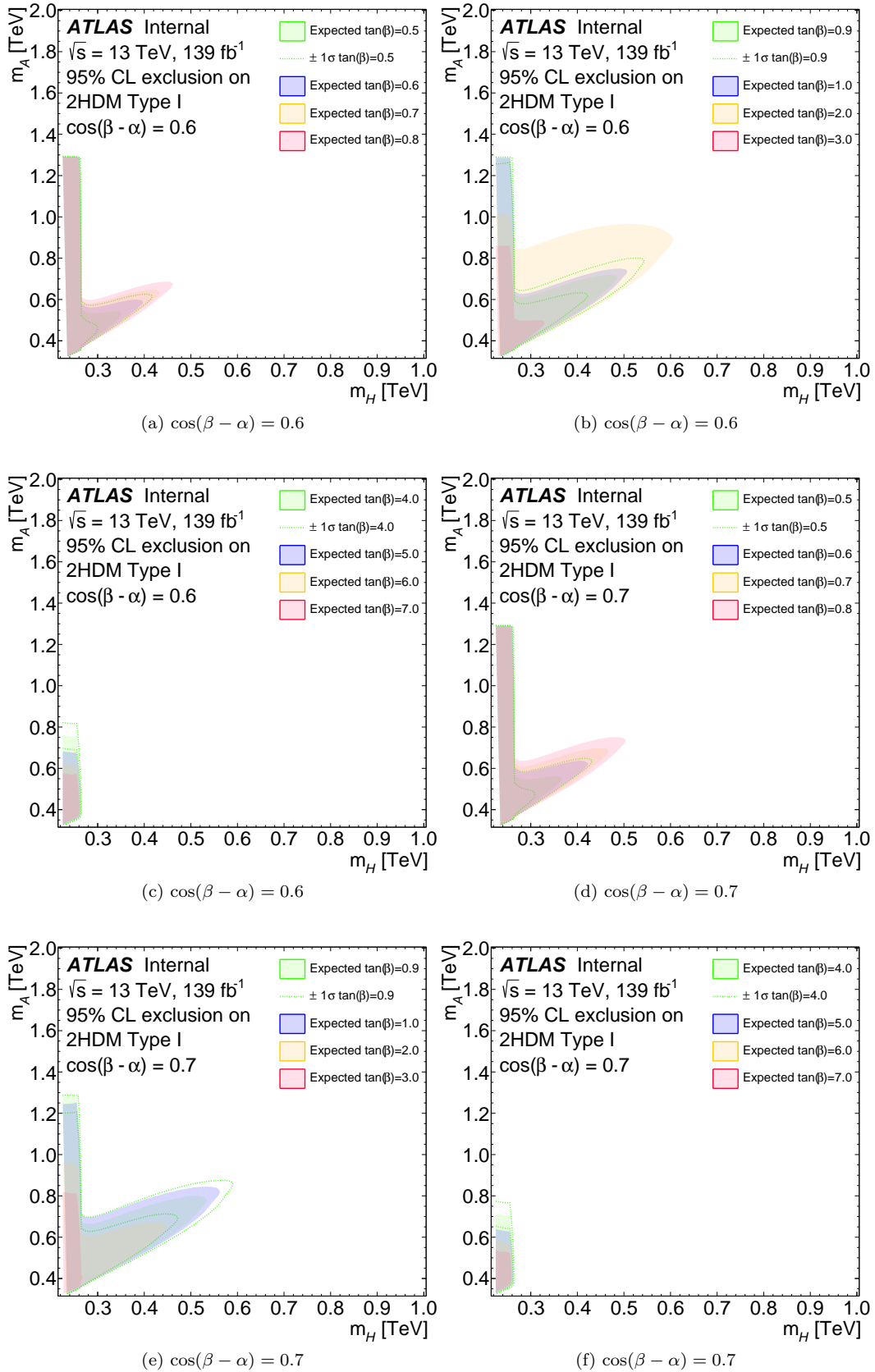(f) $\cos(\beta - \alpha) = 0.7$

Figure 18: The exclusion limit at 95% CL in the 2HDM Type-I using the expected upper limit
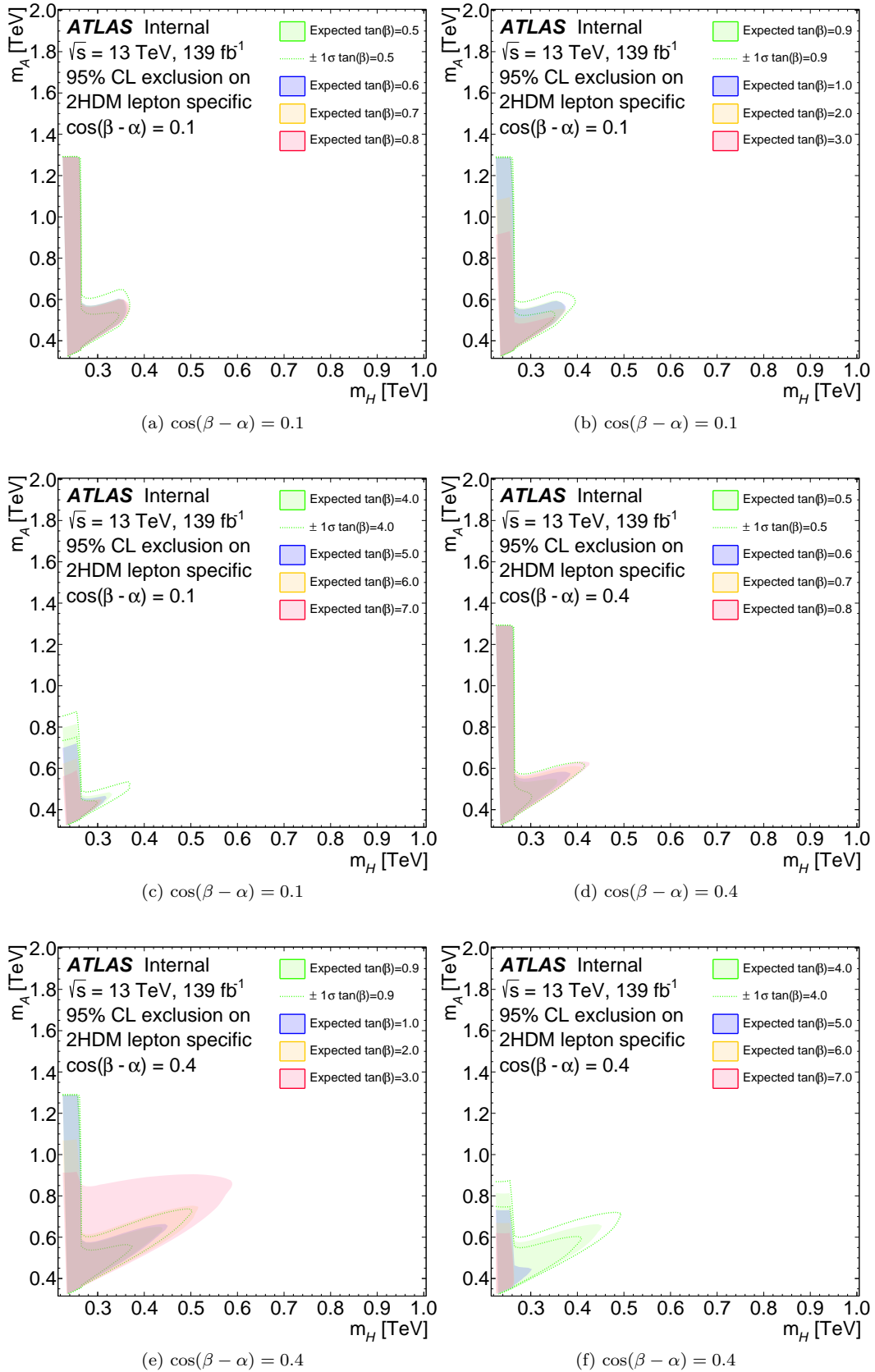
Figure 19: The exclusion limit at 95% CL in the 2HDM lepton specific using the expected upper limit
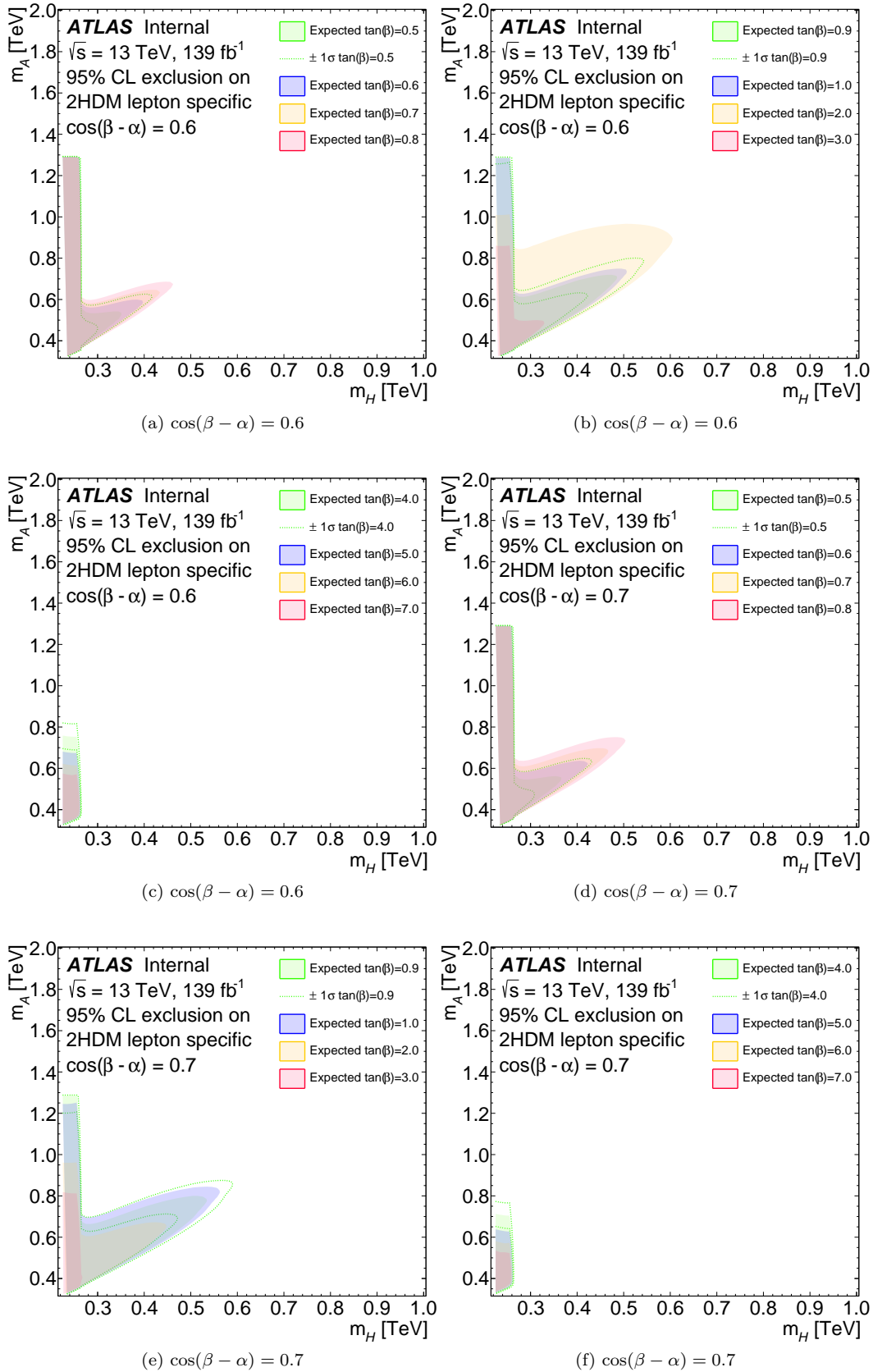
Figure 20: The exclusion limit at 95% CL in the 2HDM lepton specific using the expected upper limit