

| Category | VBF-tagged | VH-tagged | Untagged |
|----------------------------|---|---|---|
| Selection | $\mathcal{D}_{2\text{jet}}^{\text{VBF}}$ or $\mathcal{D}_{2\text{jet}}^{\text{VBF,BSM}} > 0.5$ | $\mathcal{D}_{2\text{jet}}^{\text{ZH}}$ or $\mathcal{D}_{2\text{jet}}^{\text{ZH,BSM}}$, or $\mathcal{D}_{2\text{jet}}^{\text{WH}}$ or $\mathcal{D}_{2\text{jet}}^{\text{WH,BSM}} > 0.5$ | Rest of events |
| SM obs. | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VBF+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VH+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{kin}}$ |
| a_3 obs. | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{0-}^{\text{VBF+dec}}, \mathcal{D}_{\text{CP}}^{\text{VBF}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{0-}^{\text{VH+dec}}, \mathcal{D}_{\text{CP}}^{\text{VH}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{0-}^{\text{dec}}, \mathcal{D}_{\text{CP}}^{\text{dec}}$ |
| a_2 obs. | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{0h+}^{\text{VBF+dec}}, \mathcal{D}_{\text{int}}^{\text{VBF}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{0h+}^{\text{VH+dec}}, \mathcal{D}_{\text{int}}^{\text{VH}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{0h+}^{\text{dec}}, \mathcal{D}_{\text{int}}^{\text{dec}}$ |
| Λ_1 obs. | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{\Lambda_1}^{\text{VBF+dec}}, \mathcal{D}_{0h+}^{\text{VBF+dec}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{\Lambda_1}^{\text{VH+dec}}, \mathcal{D}_{0h+}^{\text{VH+dec}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{\Lambda_1}^{\text{dec}}, \mathcal{D}_{0h+}^{\text{dec}}$ |
| $\Lambda_1^{Z\gamma}$ obs. | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{\Lambda_1}^{Z\gamma, \text{VBF+dec}}, \mathcal{D}_{0h+}^{\text{VBF+dec}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{\Lambda_1}^{Z\gamma, \text{VH+dec}}, \mathcal{D}_{0h+}^{\text{VH+dec}}$ | $\mathcal{D}_{\text{bkg}}, \mathcal{D}_{\Lambda_1}^{Z\gamma, \text{dec}}, \mathcal{D}_{0h+}^{\text{dec}}$ |

| Category | VBF-tagged | VH-tagged | Untagged |
|------------------|---|---|--|
| Selection | $\mathcal{D}_{2\text{jet}}^{\text{VBF}}$ or $\mathcal{D}_{2\text{jet}}^{\text{VBF,BSM}} > 0.5$ | $\mathcal{D}_{2\text{jet}}^{\text{ZH}}$ or $\mathcal{D}_{2\text{jet}}^{\text{ZH,BSM}}$, or $\mathcal{D}_{2\text{jet}}^{\text{WH}}$ or $\mathcal{D}_{2\text{jet}}^{\text{WH,BSM}} > 0.5$ | Rest of events |
| SM obs. | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VBF+dec}}, \mathcal{D}_{\text{bsi}}^{\text{VBF+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VH+dec}}, \mathcal{D}_{\text{bsi}}^{\text{VH+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{kin}}, \mathcal{D}_{\text{bsi}}^{\text{gg,dec}}$ |
| a_3 obs. | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VBF+dec}}, \mathcal{D}_{0-}^{\text{VBF+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VH+dec}}, \mathcal{D}_{0-}^{\text{VH+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{kin}}, \mathcal{D}_{0-}^{\text{dec}}$ |
| a_2 obs. | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VBF+dec}}, \mathcal{D}_{0h+}^{\text{VBF+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VH+dec}}, \mathcal{D}_{0h+}^{\text{VH+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{kin}}, \mathcal{D}_{0h+}^{\text{dec}}$ |
| Λ_1 obs. | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VBF+dec}}, \mathcal{D}_{\Lambda_1}^{\text{VBF+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{VH+dec}}, \mathcal{D}_{\Lambda_1}^{\text{VH+dec}}$ | $m_{4\ell}, \mathcal{D}_{\text{bkg}}^{\text{kin}}, \mathcal{D}_{\Lambda_1}^{\text{dec}}$ |