

$$K_1(t) = \frac{1}{2}A_0^2 [(1 + \cos\phi_s)e^{-\Gamma_L t} + (1 - \cos\phi_s)e^{-\Gamma_H t} + 2e^{-\Gamma_s t}\sin(\Delta m_s t)\sin\phi_s],$$

$$K_2(t) = \frac{1}{2}A_{\parallel}^2 [(1 + \cos\phi_s)e^{-\Gamma_L t} + (1 - \cos\phi_s)e^{-\Gamma_H t} + 2e^{-\Gamma_s t}\sin(\Delta m_s t)\sin\phi_s],$$

$$K_3(t) = \frac{1}{2}A_{\perp}^2 [(1 - \cos\phi_s)e^{-\Gamma_L t} + (1 + \cos\phi_s)e^{-\Gamma_H t} - 2e^{-\Gamma_s t}\sin(\Delta m_s t)\sin\phi_s],$$

$$K_4(t) = |A_{\parallel}||A_{\perp}|[e^{-\Gamma_s t}\{\sin\delta_1\cos(\Delta m_s t) - \cos\delta_1\sin(\Delta m_s t)\cos\phi_s\} \\ - \frac{1}{2}(e^{-\Gamma_H t} - e^{-\Gamma_L t})\cos\delta_1\sin\phi_s],$$

$$K_5(t) = \frac{1}{2}|A_0||A_{\parallel}|\cos(\delta_2 - \delta_1) \\ [(1 + \cos\phi_s)e^{-\Gamma_L t} + (1 - \cos\phi_s)e^{-\Gamma_H t} + 2e^{-\Gamma_s t}\sin(\Delta m_s t)\sin\phi_s],$$

$$K_6(t) = |A_0||A_{\perp}|[e^{-\Gamma_s t}\{\sin\delta_2\cos(\Delta m_s t) - \cos\delta_2\sin(\Delta m_s t)\cos\phi_s\} \\ - \frac{1}{2}(e^{-\Gamma_H t} - e^{-\Gamma_L t})\cos\delta_2\sin\phi_s]$$

$$\mathcal{A}_1^{\text{dir,SM}} \cong 0,$$

$$\mathcal{A}_1^{\text{mix,SM}} = \eta_1 \sin(\phi_s^{\text{SM}}) \cong 0,$$

$$\mathcal{A}_1^{\Delta\Gamma,\text{SM}} = \cos(\phi_s^{\text{SM}}) \cong 1.$$

$$\sin^2 \beta_s = \frac{\widetilde{BR}}{2|\lambda_c^{(D)}|^2|\Delta|^2} \left( 1 - \sqrt{1 - (\mathcal{A}_{\text{dir}})^2 - (\mathcal{A}_{\text{mix}})^2} \right)$$

$$\sin^2 (\beta_s + \gamma) = \frac{\widetilde{BR}}{2|\lambda_u^{(D)}|^2|\Delta|^2} \left( 1 - \sqrt{1 - (\mathcal{A}_{\text{dir}})^2 - (\mathcal{A}_{\text{mix}})^2} \right)$$