PDF en función de las Asimetrías*

Análisis integrado en φ

$$L(t,\theta_1,\theta_2,m,I_{cat}) = f_{sig}L_{sig}(t,\theta_1,\theta_2,m,I_{cat}) + (1-f_{sig})L_{bkg}(t,\theta_1,\theta_2,m,I_{cat})$$

$$L_{sig}(t,\theta_1,\theta_2,m,I_{cat}) = M_{sig}(m)T_{sig}(t)P_{sig}(\theta_1,\theta_2)\sum_{n=1}^{2} K_n(t,I_{cat})f_n(\theta_1,\theta_2)$$

$$K_1(t,I_{cat}) = \frac{1}{2}\tilde{A}_0^2\Big[\left(1+\mathcal{A}_{long}^{\Delta\Gamma}\right)e^{-\Gamma_L t} + \left(1-\mathcal{A}_{long}^{\Delta\Gamma}\right)e^{-\Gamma_H t} + 2I_{cat}\left(1-2\omega_{mis}\right)e^{-\Gamma_S t}\left(\mathcal{A}_{long}^{dir}\cos\left(\Delta m_s t\right) + \mathcal{A}_{long}^{mix}\sin\left(\Delta m_s t\right)\right)\Big]$$

$$K_2(t,I_{cat}) = \frac{1}{2}A_T^2\Big[\left(1+\mathcal{A}_T^{\Delta\Gamma}\right)e^{-\Gamma_L t} + \left(1-\mathcal{A}_T^{\Delta\Gamma}\right)e^{-\Gamma_H t} + 2I_{cat}\left(1-2\omega_{mis}\right)e^{-\Gamma_S t}\left(\mathcal{A}_T^{dir}\cos\left(\Delta m_s t\right) + \mathcal{A}_T^{mix}\sin\left(\Delta m_s t\right)\right)\Big]$$

$$f_1(\theta_1,\theta_2) = 4\cos^2\theta_1\cos^2\theta_2$$

$$f_2(\theta_1,\theta_2) = \sin^2\theta_1\sin^2\theta_2$$

$$M_{sig}(m) = f_1 e^{-\frac{(m-M_B)^2}{\sigma_1^2}} + (1-f_1)e^{-\frac{(m-M_B)^2}{\sigma_2^2}}$$

$$T_{sig}(t) = \frac{t^3}{b_{sig}+t^3}$$

$$P_{sig}(\theta_1,\theta_2) = \left(1+k_1\cos\theta_1+k_2\cos^2\theta_1+k_3\cos^3\theta_1\right)\left(1+k_1\cos\theta_2+k_2\cos^2\theta_2+k_3\cos^3\theta_2\right)$$

*No se muestra aquí la convolución con la función de resolución temporal

$$L_{bkg} = e^{-\Gamma_{bkg} t} e^{-\Gamma_m m} \frac{t^3}{b_{bkg} + t^3} P_{bkg}(\theta_1, \theta_2)$$

$$\begin{aligned} P_{bkg}(\theta_1, \theta_2) = &\big(1 + c_1 \cos\theta_1 + c_2 \cos^2\theta_1 + c_3 \cos^3\theta_1\big) \\ &\big(1 + c_1 \cos\theta_2 + c_2 \cos^2\theta_2 + c_3 \cos^3\theta_2\big) \end{aligned}$$

Los nuevos parámetros $\tilde{A}_0^2, A_T^2, \mathcal{A}_T^{mix}, \mathcal{A}_T^{\Delta\Gamma}$ se relacionan con los de la antigua PDF según[1]:

$$\tilde{A}_0^2 = A_0^2$$

$$\tilde{A}_T^2 = 1 - \tilde{A}_0^2 = A_\parallel^2 + A_\perp^2$$

$$\mathcal{A}_T^{mix} = \frac{A_\parallel^2 \mathcal{A}_\parallel^{mix} + A_\perp^2 \mathcal{A}_\perp^{mix}}{A_\parallel^2 + A_\perp^2} = \frac{A_\parallel^2 \sin\phi_\parallel - A_\perp^2 \sin\phi_\perp}{A_\parallel^2 + A_\perp^2}$$

$$\mathcal{A}_T^{\Delta\Gamma} = \frac{A_\parallel^2 \mathcal{A}_\parallel^{\Delta\Gamma} + A_\perp^2 \mathcal{A}_\perp^{\Delta\Gamma}}{A_\parallel^2 + A_\perp^2} = \frac{A_\parallel^2 \cos\phi_\parallel - A_\perp^2 \cos\phi_\perp}{A_\parallel^2 + A_\perp^2}$$

$$\mathcal{A}_T^{dir} = \frac{A_\parallel^2 \mathcal{A}_\parallel^{dir} + A_\perp^2 \mathcal{A}_\perp^{dir}}{A_\parallel^2 + A_\perp^2} = 0$$

La nueva PDF tiene ahora 8 parámetros: A_0^2, A_T^2 , $\mathcal{A}_T^{mix}$, $\mathcal{A}_T^{\Delta\Gamma} \mathcal{A}_T^{mix}$, $\mathcal{A}_T^{dir}$,$\mathcal{A}_{long}^{\Delta\Gamma}$, $\mathcal{A}_{long}^{mix}$,$\mathcal{A}_{long}^{dir}$; restringidos por las siguientes ligaduras:

$$A_T^2 = 1 - A_0^2$$

$$|\mathcal{A}_{long}^{dir}|^2 + |\mathcal{A}_{long}^{mix}|^2 + |\mathcal{A}_{long}^{\Delta\Gamma}|^2 = 1$$

$$|\mathcal{A}_T^{dir}|^2 + |\mathcal{A}_T^{mix}|^2 + |\mathcal{A}_T^{\Delta\Gamma}|^2 = 1 \Leftrightarrow \mathcal{A}_\parallel^{dir} \mathcal{A}_\perp^{dir} + \mathcal{A}_\parallel^{\Delta\Gamma} \mathcal{A}_\perp^{\Delta\Gamma} + \mathcal{A}_\parallel^{mix} \mathcal{A}_\perp^{mix} = 1$$

$$\mathcal{A}_\parallel^{dir} = \sqrt{1 - |\mathcal{A}_\parallel^{\Delta\Gamma}|^2 - |\mathcal{A}_\parallel^{mix}|^2}$$

$$\mathcal{A}_\perp^{dir} = \sqrt{1 - |\mathcal{A}_\perp^{\Delta\Gamma}|^2 - |\mathcal{A}_\perp^{mix}|^2}$$

[1]Considerando un ϕ_s distinto para cada amplitud: $\phi_0, \phi_\parallel, \phi_\perp$