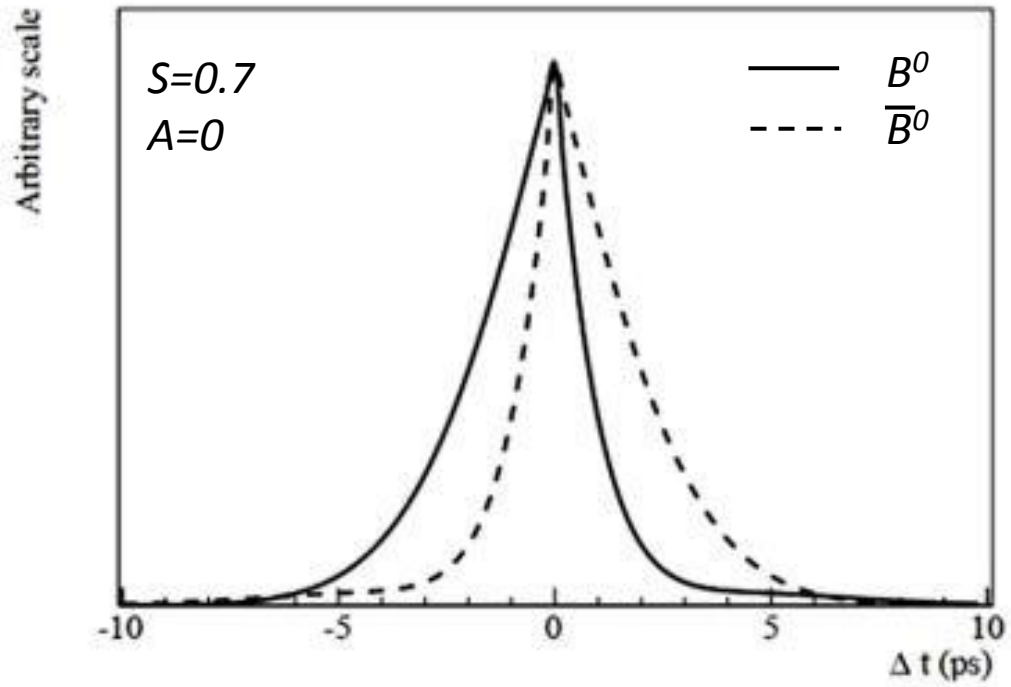
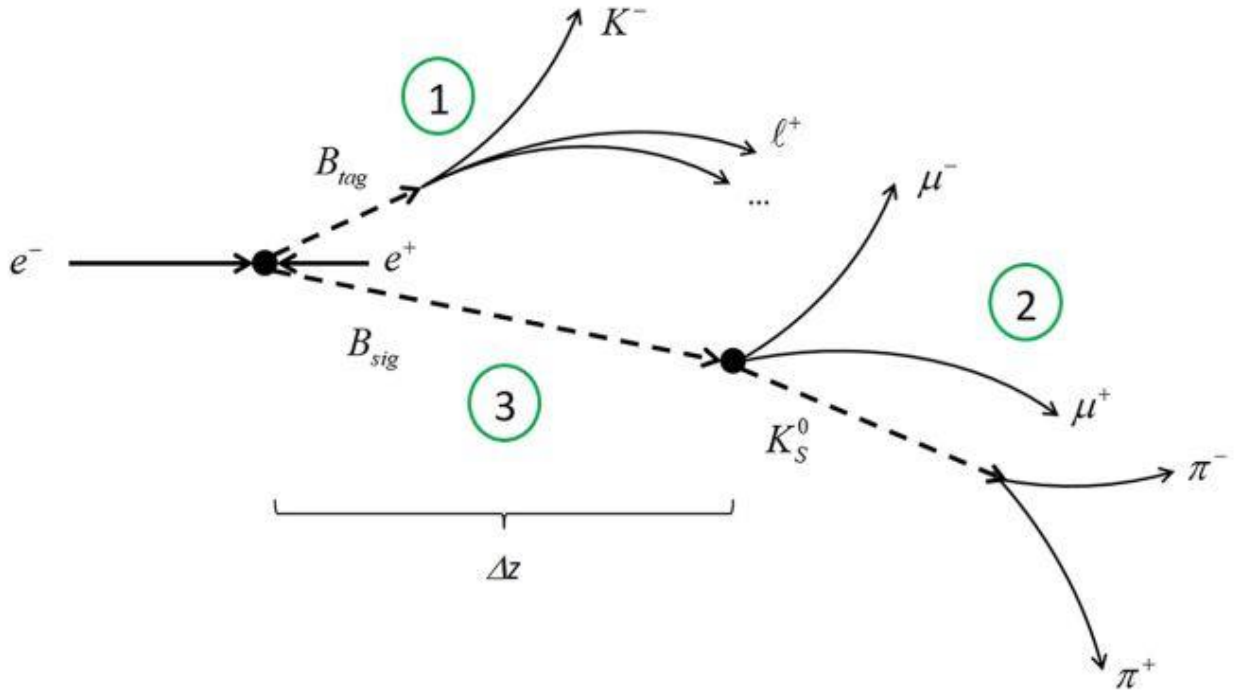
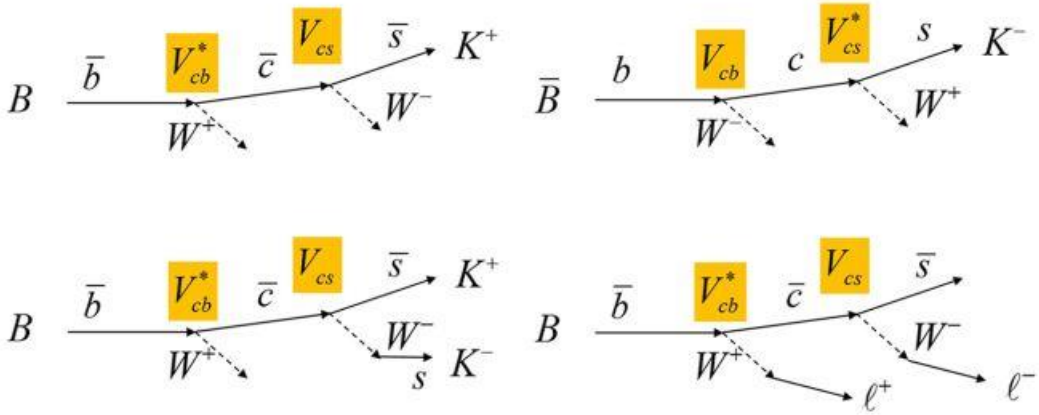
$$\frac{d\Gamma(P^0 \to f_{CP})}{d(\Delta t)} = \frac{1}{2}|A_f|^2(1+|\lambda|^2)\mathcal{N}e^{-\Gamma|\Delta t|} \times \left[1 + \frac{1-|\lambda|^2}{1+|\lambda|^2}\cos(\Delta m \Delta t) - \overbrace{2\frac{\mathrm{Im}(\lambda)}{1+|\lambda|^2}}^{S}\sin(\Delta m \Delta t)\right]$$

$$\frac{d\Gamma(\bar{P}^0 \to f_{CP})}{d(\Delta t)} = \frac{1}{2}|A_f|^2(1+|\lambda|^2)\left|\frac{p}{q}\right|^2\mathcal{N}e^{-\Gamma|\Delta t|} \times \left[1 - \underbrace{\frac{1-|\lambda|^2}{1+|\lambda|^2}}_{A}\cos(\Delta m \Delta t) + 2\frac{\mathrm{Im}(\lambda)}{1+|\lambda|^2}\sin(\Delta m \Delta t)\right]$$

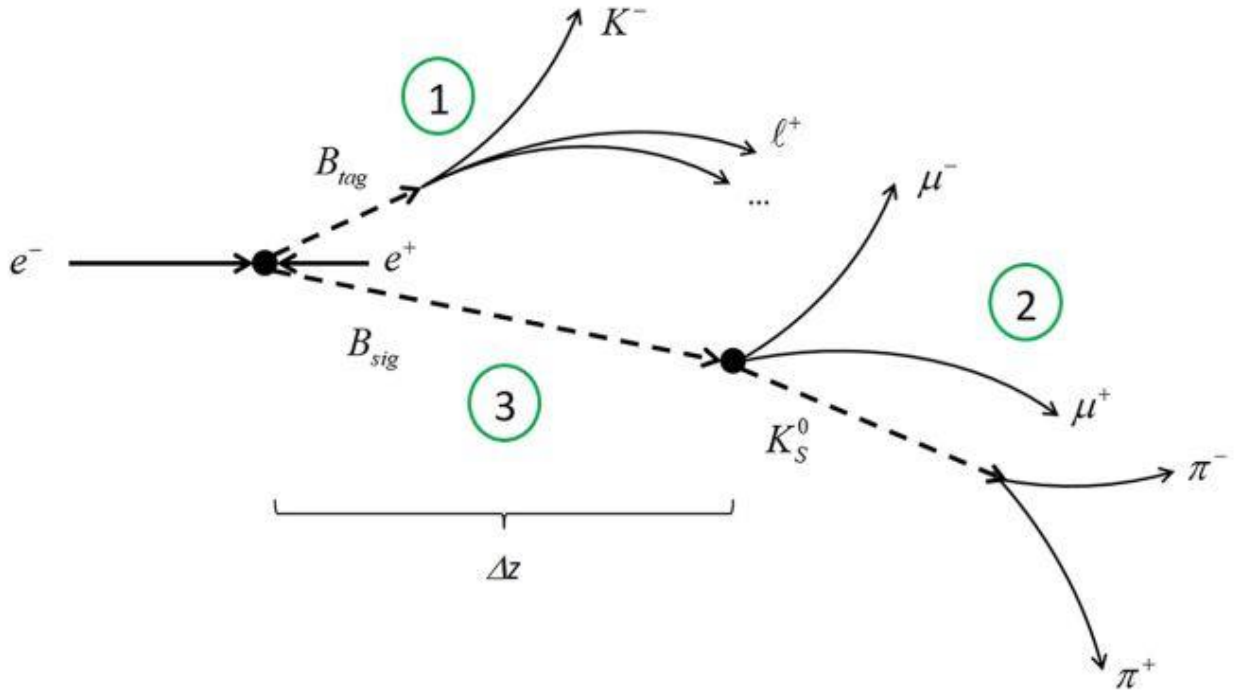




1 determine flavor of decaying B^0 from its decay products (tagging)

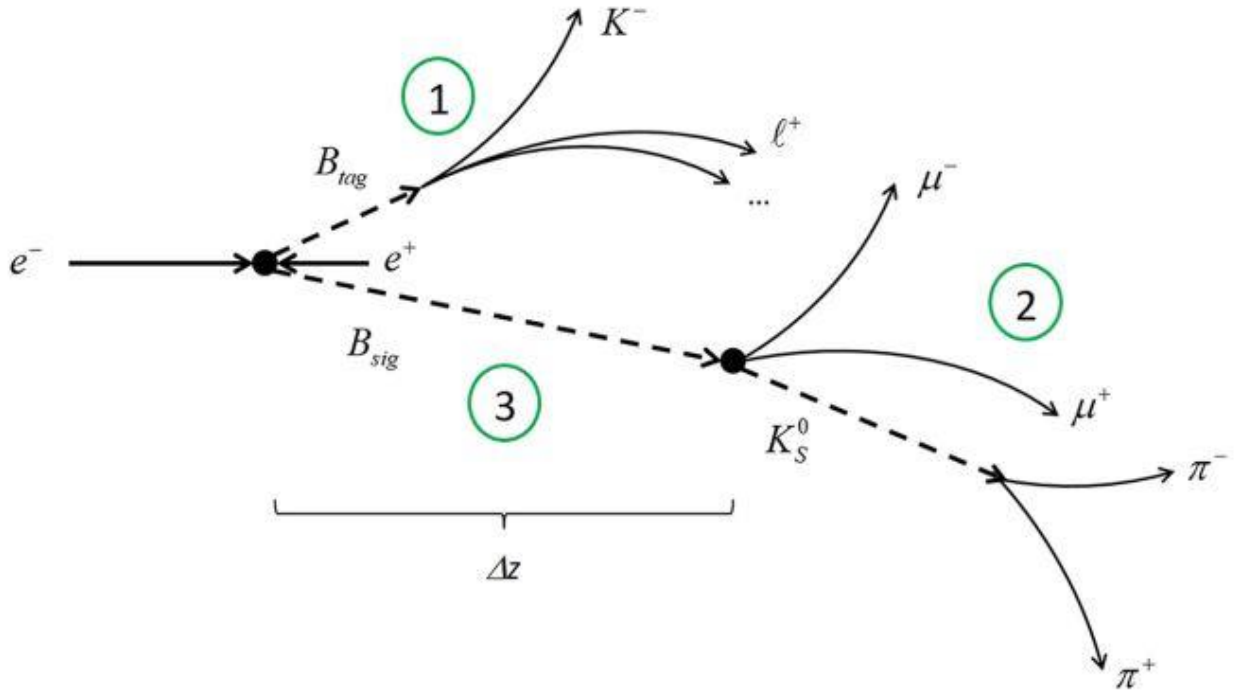


$|V_{cb}|$~0.04
$|V_{cs}|$~1

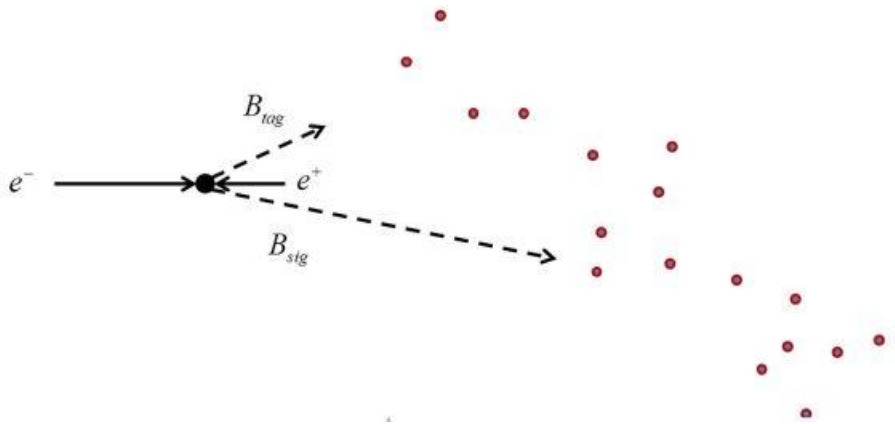


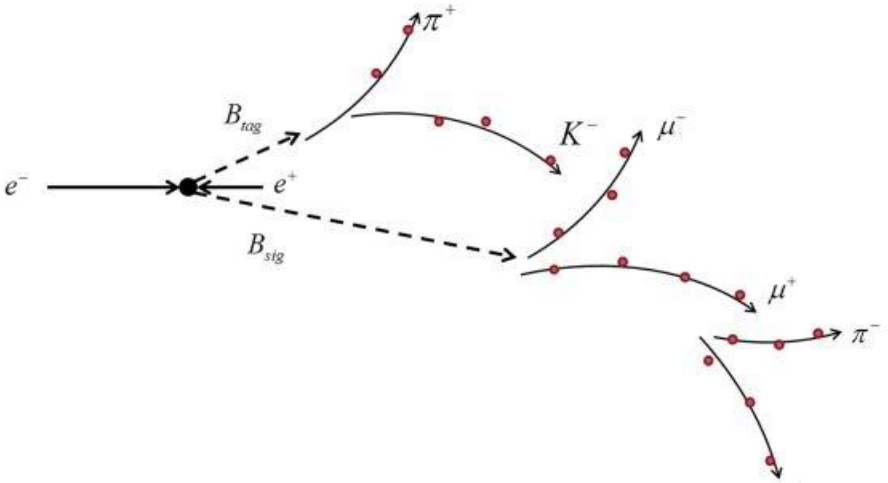
2 reconstruct other B^0

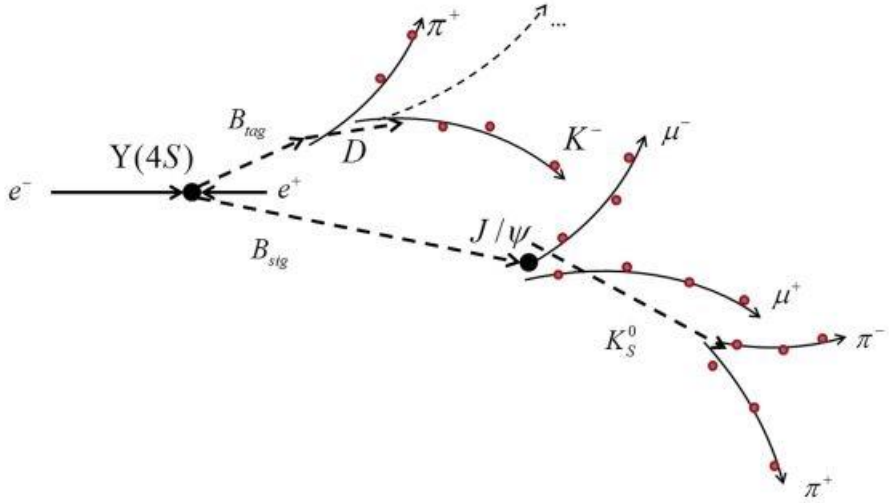
$$m^2 = \sqrt{\left(\sum_i E_i\right)^2 - \left(\sum \vec{p}_i\right)^2} \approx m_B^2$$

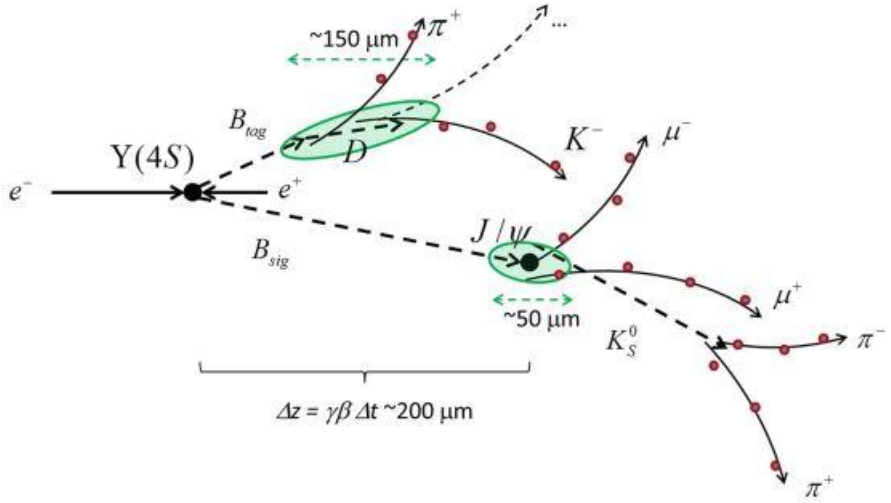


3 determine Δt




π^+
B_{tag}
K^-
μ^-
e^-
e^+
B_{sig}
μ^+
π^-


π^+
...
B_{tag}
D
K^-
μ^-
Y(4S)
e^-
e^+
J/ψ
B_{sig}
μ^+
K_S^0
π^-
π^+

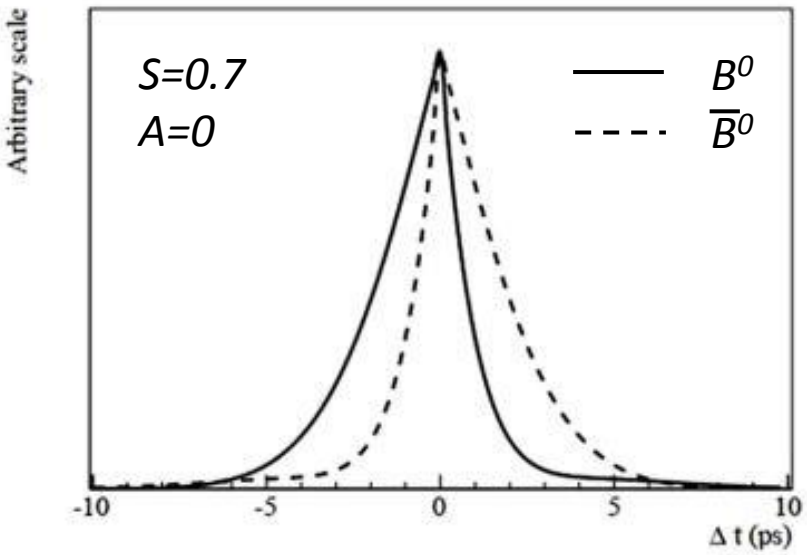

~150 μm
π^+
...
B_{tag}
D
K^-
μ^-
Y(4S)
e^-
e^+
J/ψ
B_{sig}
μ^+
~50 μm
K_S^0
π^-
$\Delta z = \gamma\beta\,\Delta t$ ~200 μm
π^+

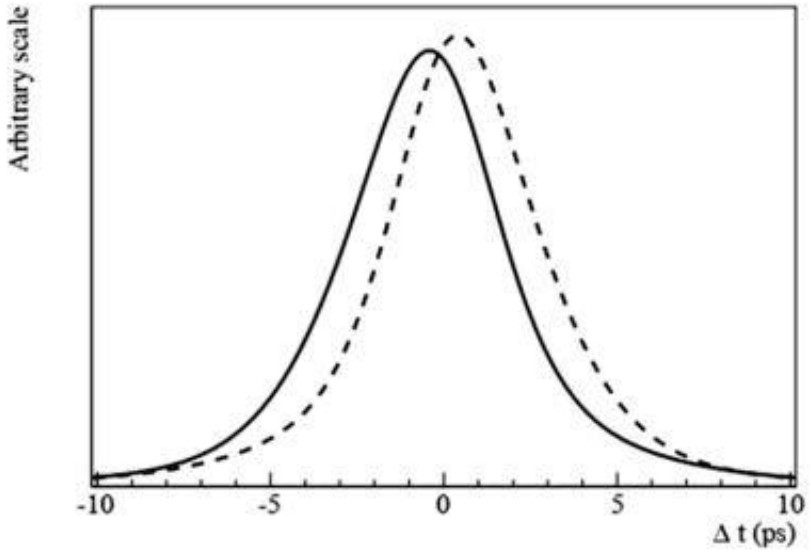
$$\frac{d\Gamma(P^0 \to f_{CP})}{d(\Delta t)} = \frac{1}{2}|A_f|^2(1+|\lambda|^2)\mathcal{N}e^{-\Gamma|\Delta t|} \times \left[1 + \frac{1-|\lambda|^2}{1+|\lambda|^2}\cos(\Delta m \Delta t) - 2\frac{\mathrm{Im}(\lambda)}{1+|\lambda|^2}\sin(\Delta m \Delta t)\right]$$

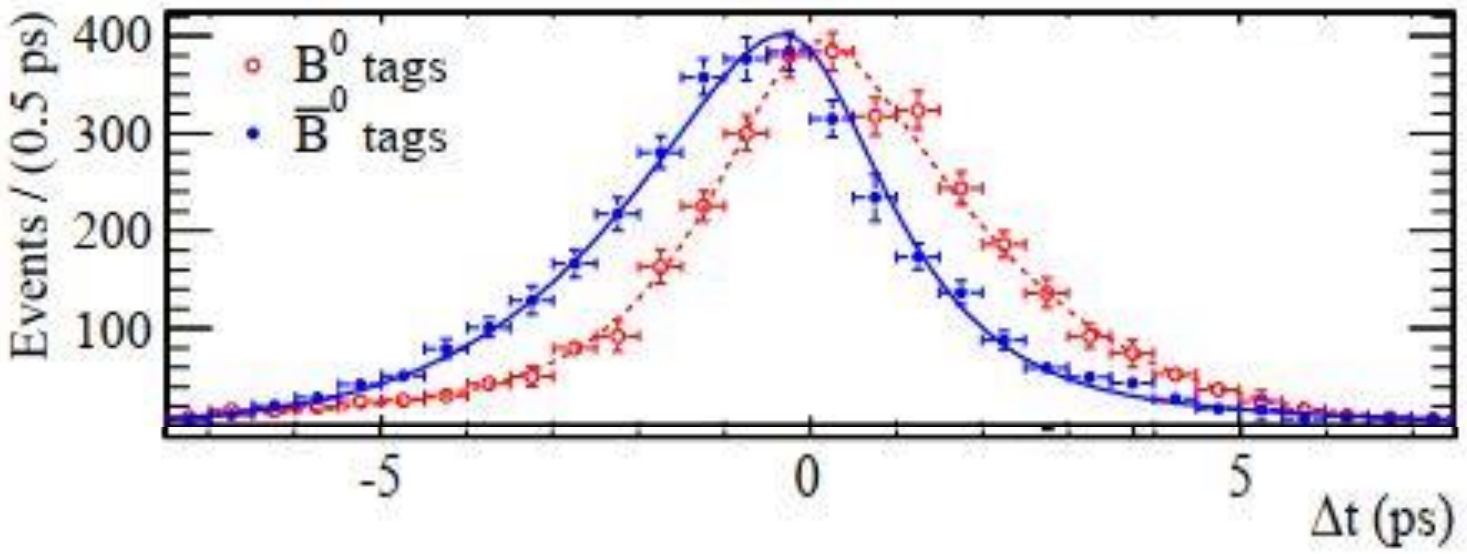
$$\frac{d\Gamma(\bar{P}^0 \to f_{CP})}{d(\Delta t)} = \frac{1}{2}|A_f|^2(1+|\lambda|^2)|\frac{p}{q}|^2\mathcal{N}e^{-\Gamma|\Delta t|} \times \left[1 - \frac{1-|\lambda|^2}{1+|\lambda|^2}\cos(\Delta m \Delta t) + 2\frac{\mathrm{Im}(\lambda)}{1+|\lambda|^2}\sin(\Delta m \Delta t)\right].$$

convolution with

$$\frac{1}{\sqrt{2\sigma_{\Delta t}}} e^{-(\Delta t - \Delta t')^2/2\sigma_{\Delta t}^2}$$







S=0.677 ±0.020

A=-0.006 ±0.020