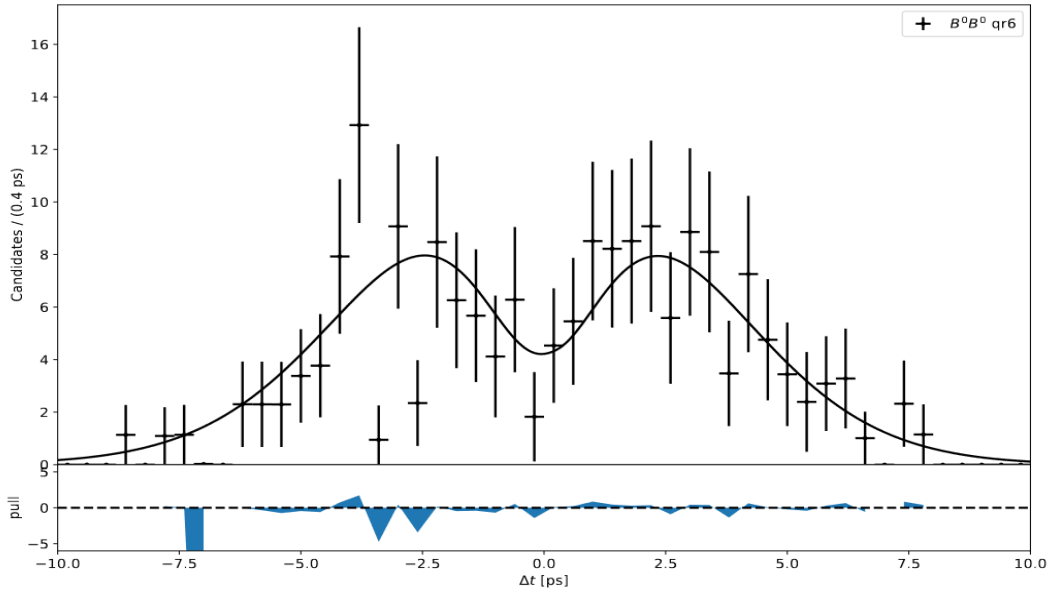
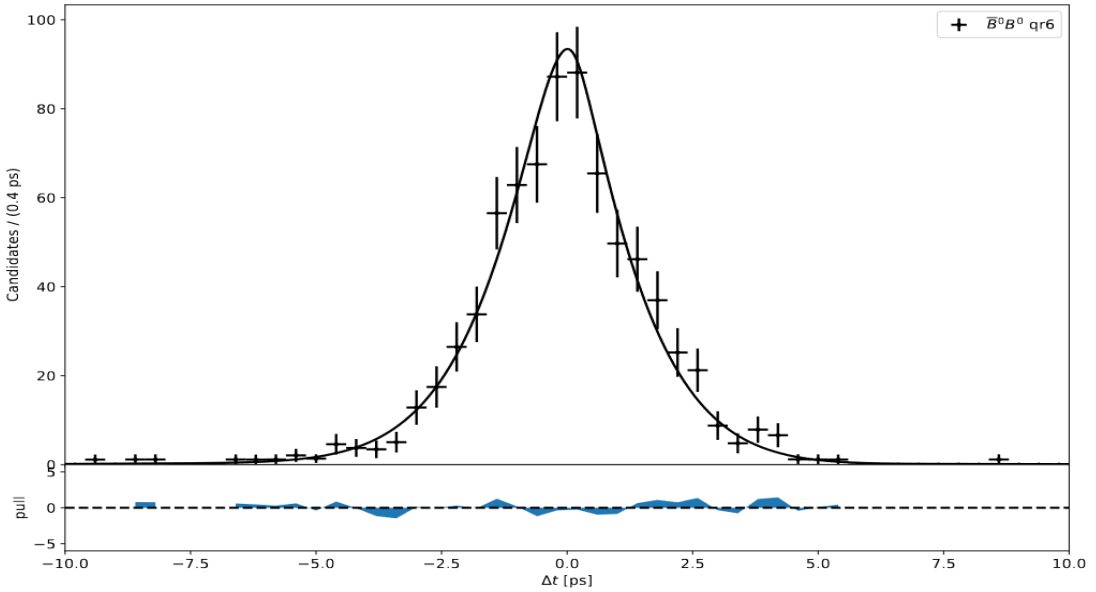
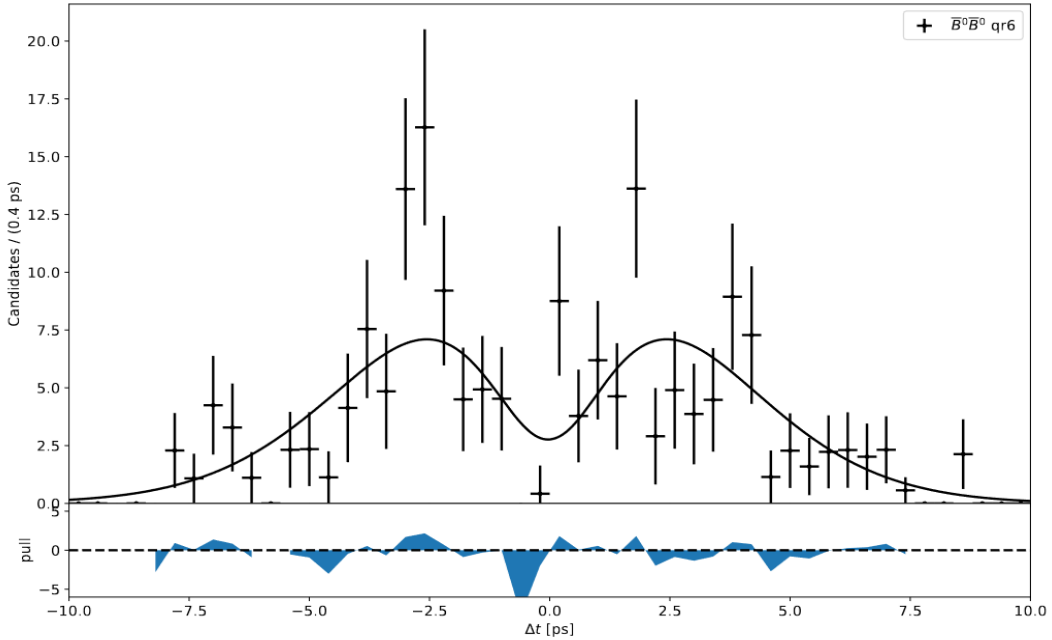
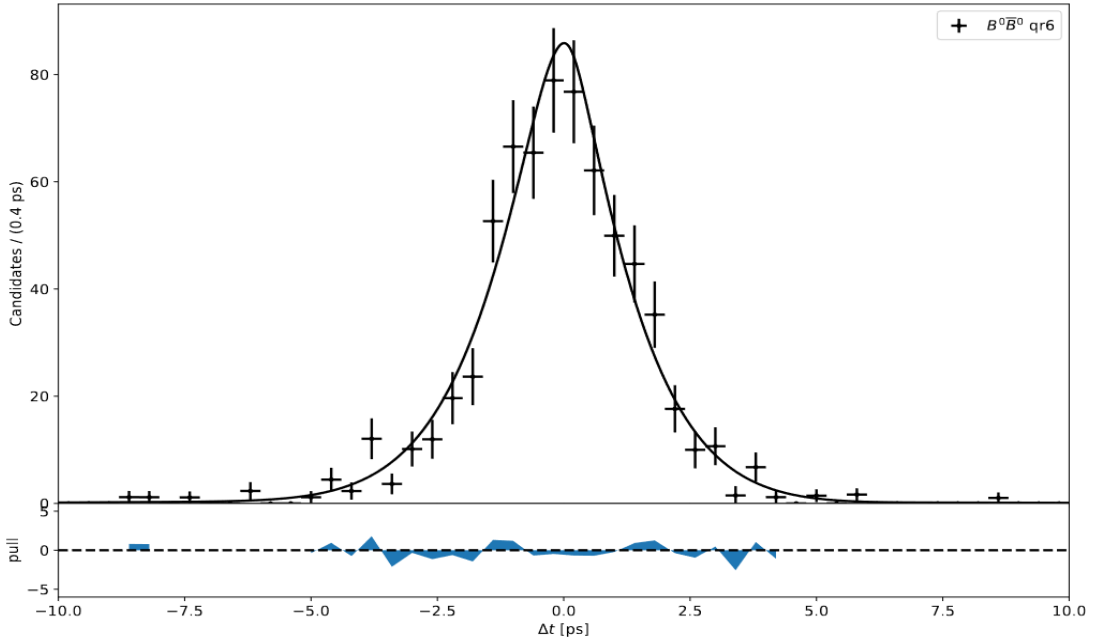
Reproduced Results – Thibaud's original analysis









Spontaneous Decoherence PDF

$$P_{det}(\Delta t) = \frac{1}{4\tau}\, e^{-\frac{\Delta t}{\tau}} \cdot \varepsilon\, [\, 2 - q_{tag}\Delta w + q_{tag}\, \cdot \mu(1-2w)$$

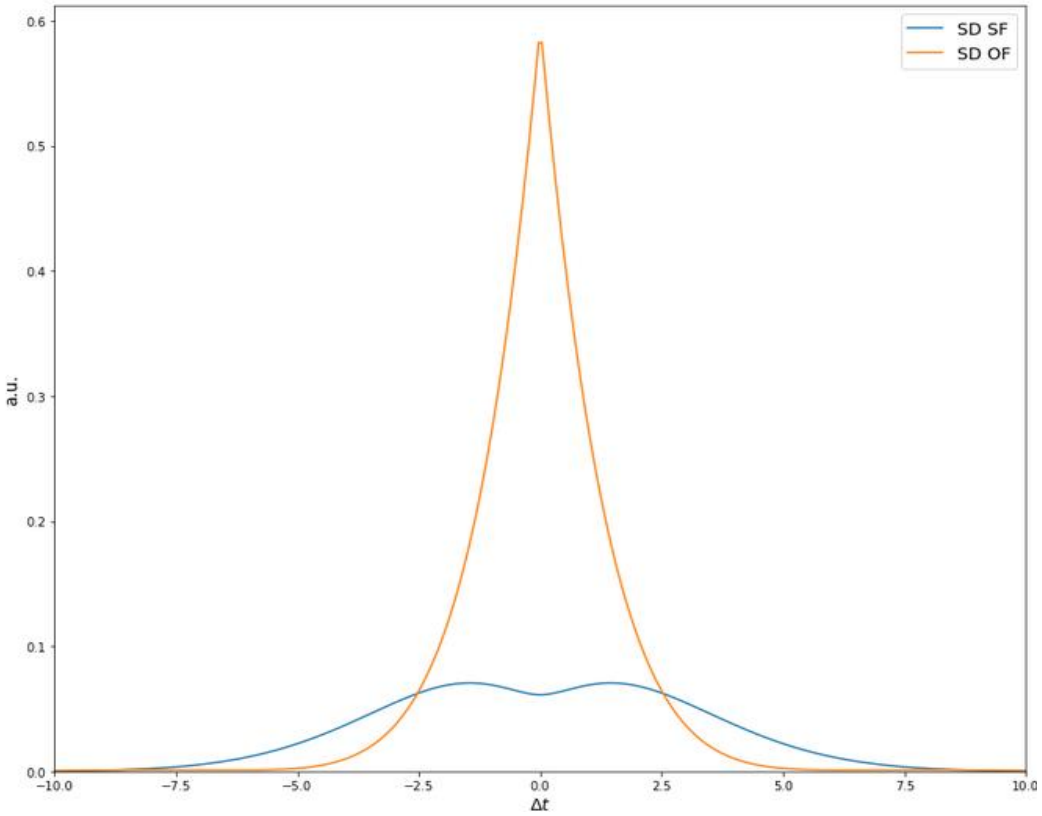
$$-\left(q_{tag}(1-2w) + \mu\left(1 - q_{tag}\Delta w\right)\right) q_{sig} \times \left[\left(1 + \frac{1}{1+\tau^2\Delta m^2}\right)\cos(\Delta m \Delta t) - \left(\frac{\tau\Delta m}{1+\tau^2\Delta m^2}\right)\sin(\Delta m \Delta t)\, \right]$$

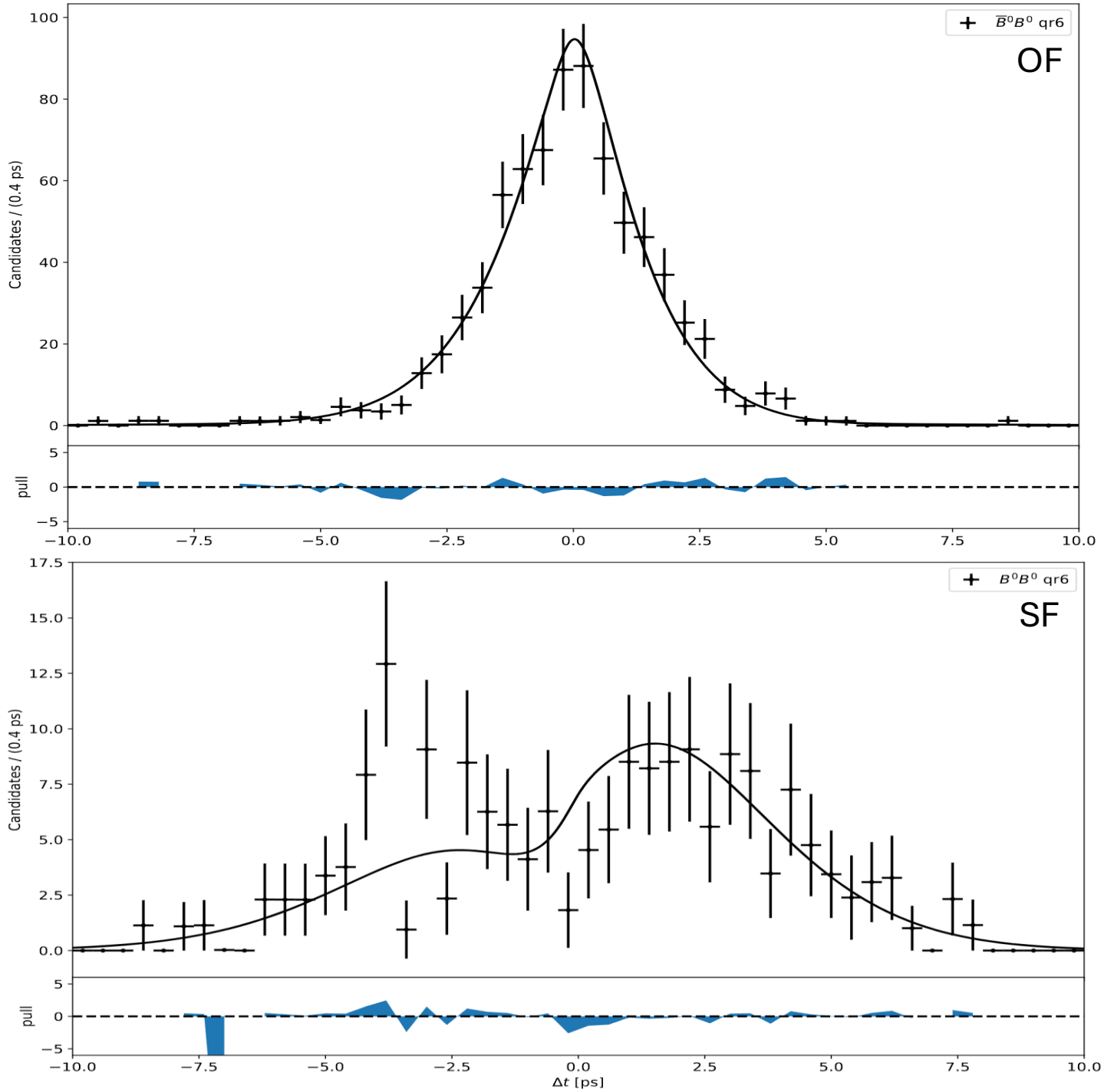
$$f_{sin}(\sin(\Delta m \Delta t) \cdot \Theta(\Delta t)\ - \sin(\Delta m |\Delta t|) \cdot \Theta(-|\Delta t|))$$

- Introducing $|\Delta t|$ changes the convolution with Resolution function slightly for negative values (solved by hand)
- Also, since there is the option to turn f_{sin} on in fitter, analytical convolutions should be possible for models introducing a sine-term

Spontaneous Decoherence PDF

$$P^{SD}_{physics}(\Delta t) \rightarrow P^{SD}_{obs}(\Delta t)$$





TO DOs

- Create Toy MCs to test new PDF and fitting process
- Introduce Decoherence Parameter ζ as free parameter: $P_{physics}(\Delta t) = (1-\zeta) \cdot P_{QM}(\Delta t) + \zeta \cdot P_{SD}(\Delta t)$
- Generate Decoherent MC Data for Analysis - mix with coherent MC Data to test sensitivity
- Explore new Decoherence Models – is there a need to switch to numerical convolutions?