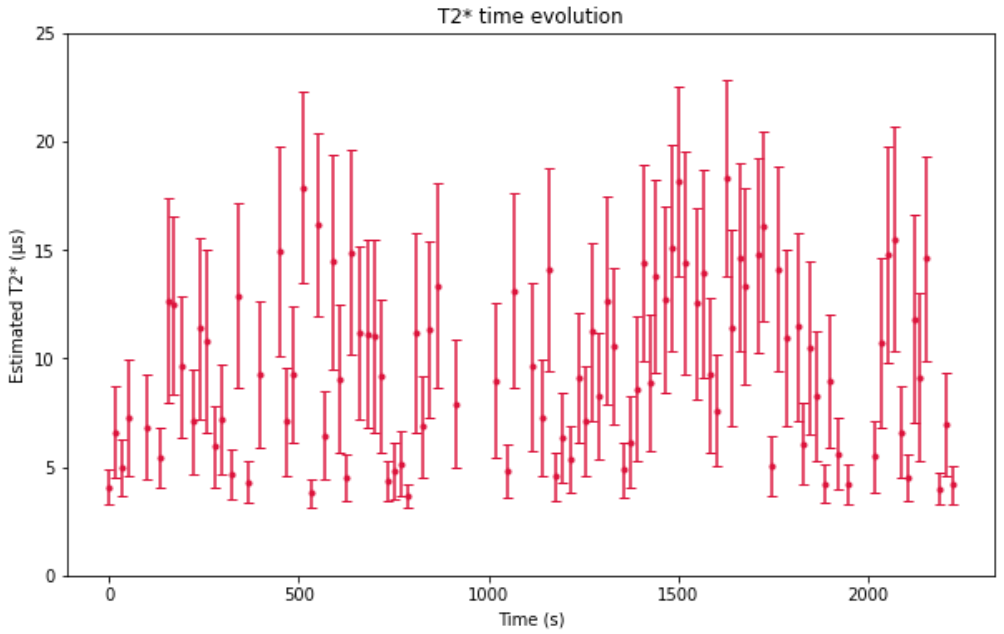
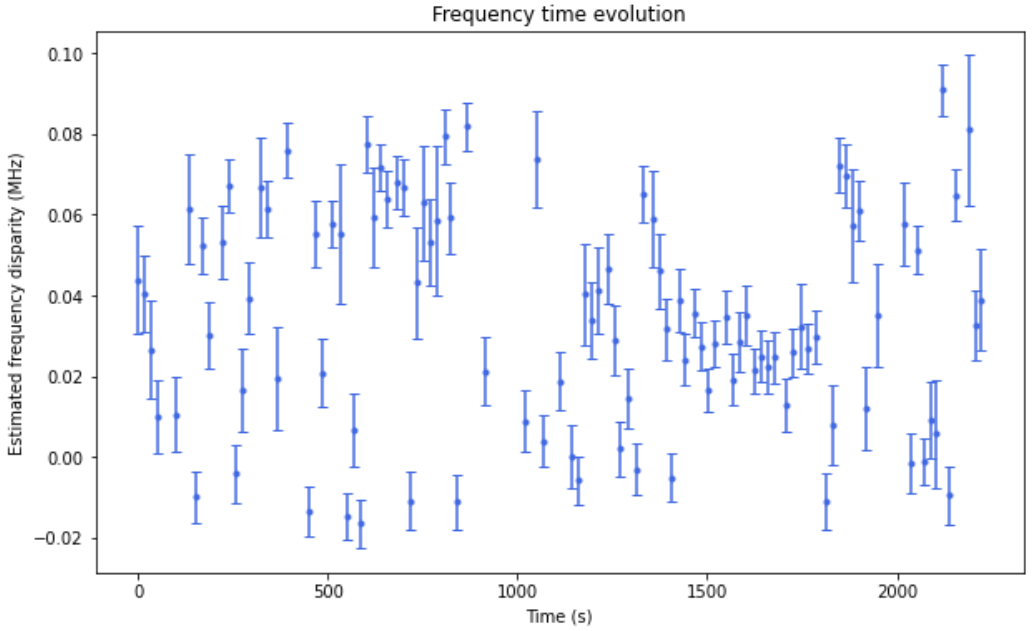
Time evolution of the characteristic coherence time and frequency shift estimates

Over 100 sequential runs, each with :

- 75 measurement times × 2 shots *(so 150 SMC steps)*
- 15^2 particles
- Prior on $\delta, T_2^* \in]0{,}5[MHz \times]0{,}25[ms$
- Detuning $\delta = 1.83MHz$ *(relative to backend estimate)*

...on IBMQ device Armonk



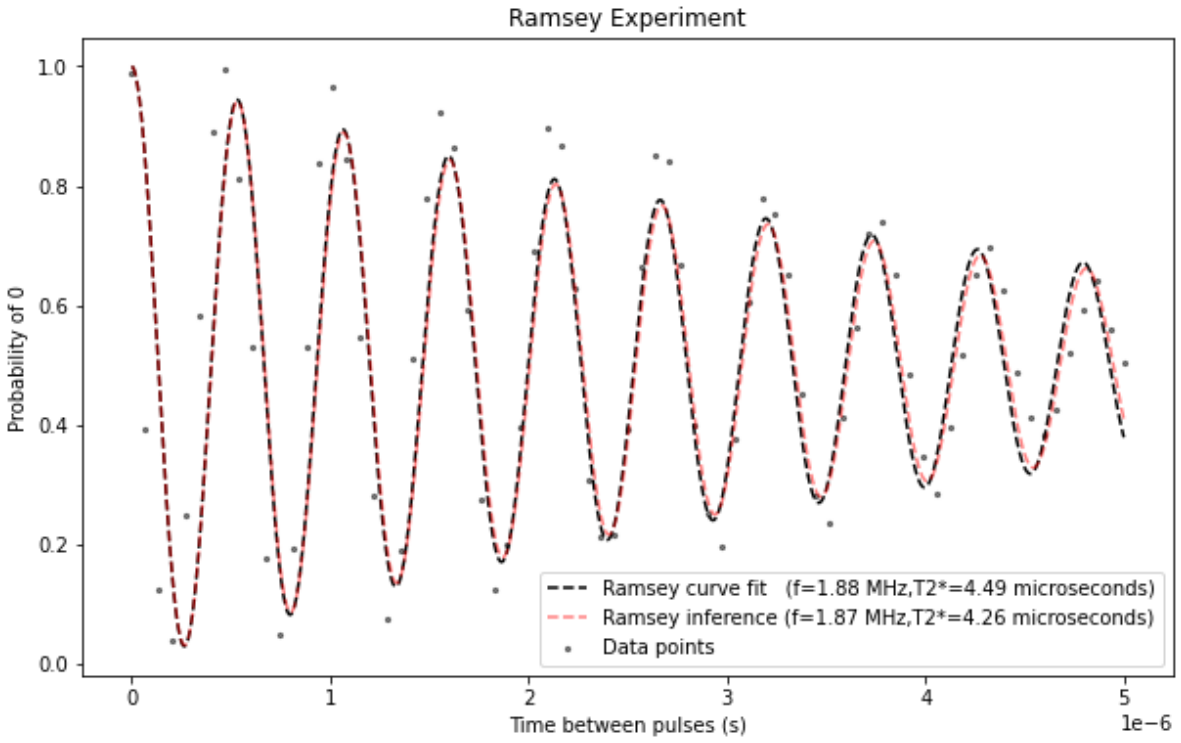


(The x-coordinate is the starting time of the pulse schedule execution)

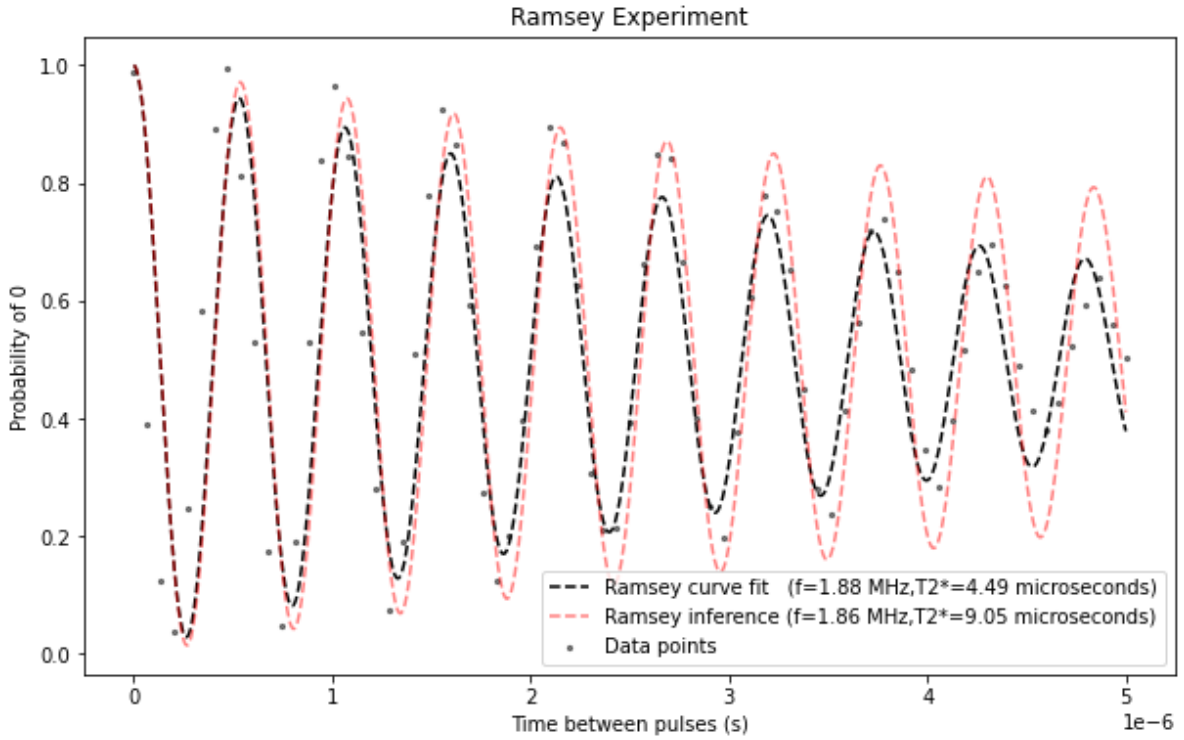
Comparison of data points and curve fit results with the inference prediction

*1 curve fit (75 times × 512 shots, **same for both graphs**)*

followed by 100 inference runs (75 times × 2 shots each)

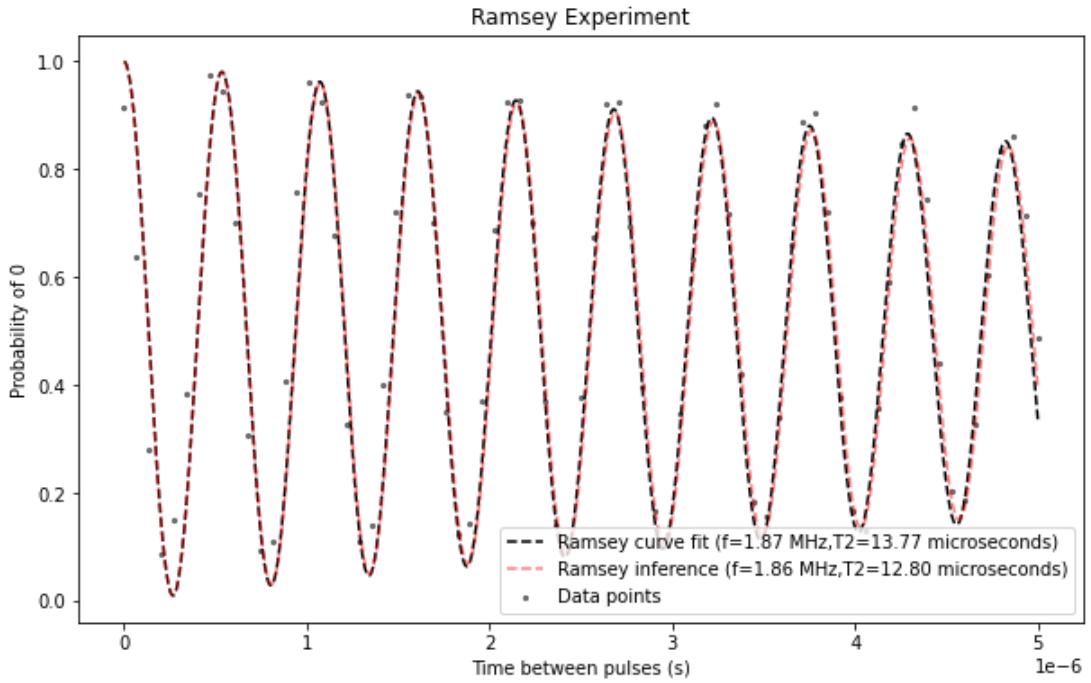


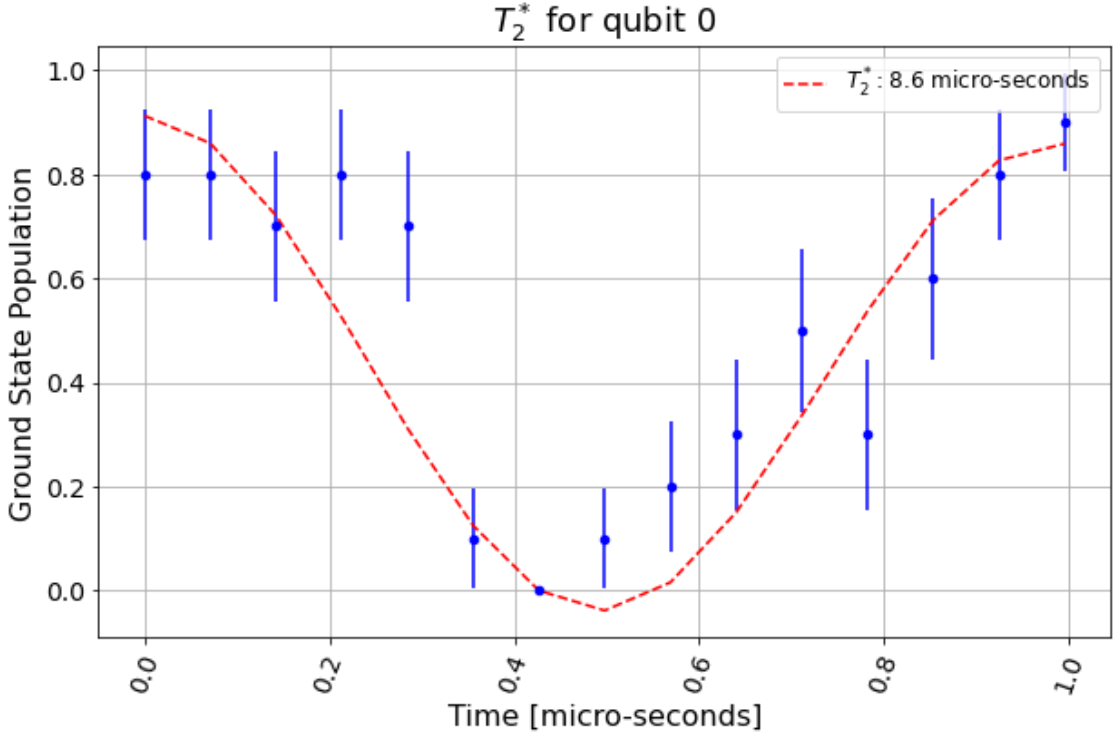
Closest time proximity of data collection
(i.e. median inference results for several runs, but only on the first dataset of the hundred)



Median inference results over the 100 datasets

Inference (L) vs. Qiskit fitter (R) for matched experiment count





$\sigma = 6\mu s$

both: 150 total shots
(but not same times)

$\sigma = 30\mu s$

Data points (scatter): 512 shots
Reference fit (dashed): based on data points

Adaptive time choices vs. evenly spaced times

(approximately 1d estimation)

Adaptive time choices:
$\sigma^2 = 0.016\ MHz^2$
$\Delta f = 2.0 \pm 0.1\ MHz$

Non-adaptive:
$\sigma^2 = 1.0\ MHz^2$
$\Delta f = 2 \pm 1\ MHz$

20 guesses, perturbed by
$N(1/\sigma_{curr},\ (0.25 \cdot 1/\sigma_{curr})^2)$

Both:

- Median results over 100 runs (shaded areas are interquartile ranges)
- 15 measurement times × 1 shot *(so 15 SMC steps)*
- 100 particles
- Prior on $\delta \in]0,10[MHz$
- Detuning $\delta = 1.83MHz$ *(relative to backend estimate)*

...on IBMQ device Armonk