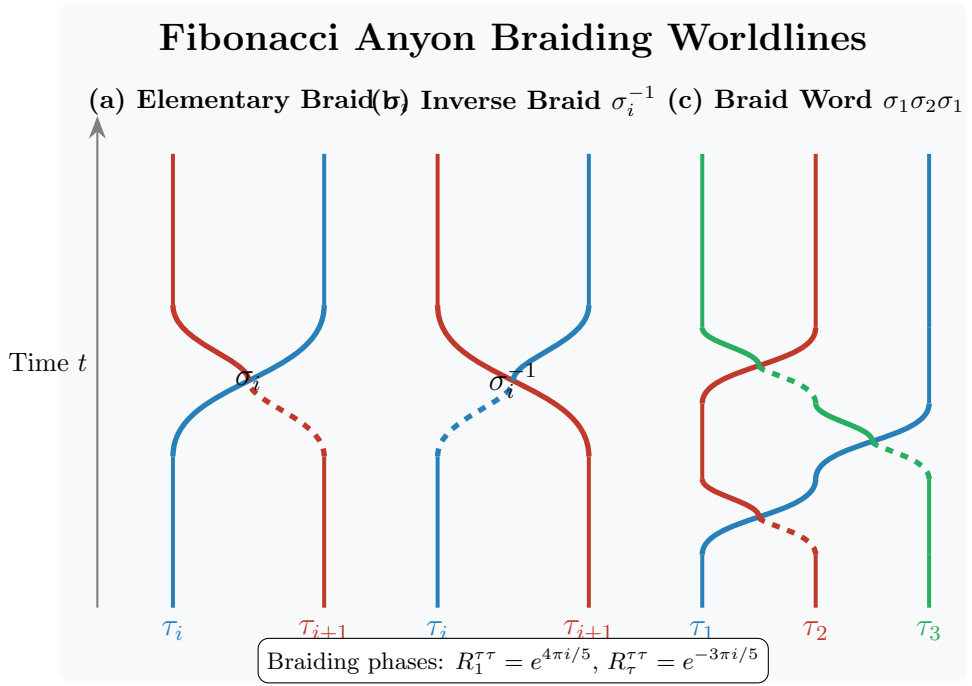
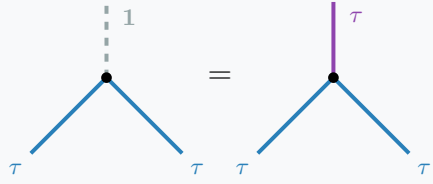
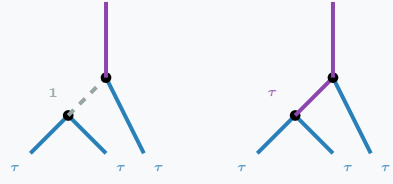

Fibonacci Anyon Braiding Worldlines
(a) Elementary Braid σ_i
(b) Inverse Braid σ_i^{-1}
(c) Braid Word $\sigma_1\sigma_2\sigma_1$
Time t
σ_i
σ_i^{-1}
τ_i
τ_{i+1}
τ_i
τ_{i+1}
τ_1
τ_2
τ_3
Braiding phases: $R_1^{\tau\tau} = e^{4\pi i/5}$, $R_\tau^{\tau\tau} = e^{-3\pi i/5}$

Fibonacci Anyon Fusion Trees

(a) Fusion Rule: $\tau \times \tau = \mathbf{1} + \tau$

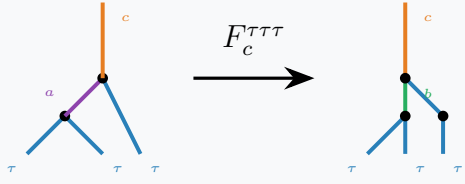


(b) Four-Anyon Fusion Space (dim = 2)



$|0\rangle$ $|1\rangle$

(c) F-Matrix: Basis Change Between Fusion Orders

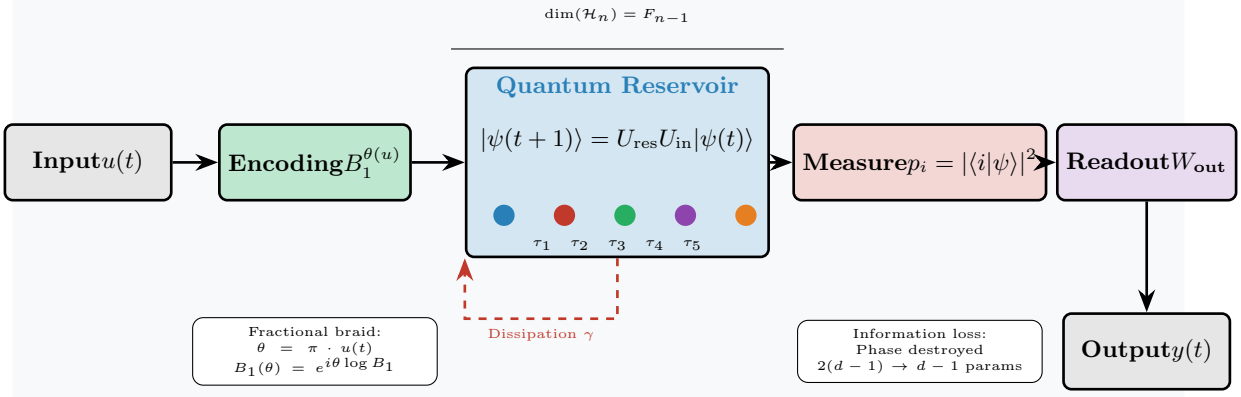


$$F_\tau^{\tau\tau\tau} = \begin{pmatrix} \phi^{-1} & \phi^{-1/2} \\ \phi^{-1/2} & -\phi^{-1} \end{pmatrix}$$

where $\phi = \frac{1+\sqrt{5}}{2} \approx 1.618$

$\dim(\mathcal{H}_n) = F_{n-1}$: $\quad n = 4 \to 2, \quad n = 6 \to 5, \quad n = 8 \to 13$

Topological Quantum Reservoir Computing Architecture



The Fundamental Tension: Unitarity vs. Echo State Property