🧪 MU Test Plan — Test 10 (Hierarchy Sweep: Varying Q-gap)

Goal

- To map explicitly how the **relative weight ratio** $w_{\text{fast}}/w_{\text{slow}}$wfast/wslow depends on the difference in action costs (ΔQ = Q_fast − Q_slow).
- This will give us the first **quantitative suppression law** of MU.

Parameters

- $\hbar$ = 0.1 (fixed)
- γ = 1.0 (fixed)
- β = 9.0 (fixed, in the survival window)
- Paths:
  - Slow path: r_slow(t) = 0.25·t (fixed baseline)
  - Fast path family: r_fast(t) = offset + slope·t, with slope varied so that Q_fast ranges from *slightly above Q_slow* to *much larger*.
    - Example slopes: 0.26, 0.35, 0.50, 0.75, 1.0
- Selector: T(r) = 1/(1+|r−r_c|), r_c=0.25

Predictions

- When ΔQ is small → ratio $w_{\text{fast}}/w_{\text{slow}}$wfast/wslow ≈ order 1 → nearly equal coexistence.
- As ΔQ grows → ratio drops exponentially → clear **hierarchy** emerges.
- Expect log-suppression law:

$$\log \frac{w_{\text{fast}}}{w_{\text{slow}}} \sim -\frac{\Delta Q}{\hbar}.$$

- This would mean MU assigns **continuous weights** to branches, not binary survival vs death.

What We're Looking For

- The curve of $w_{\text{fast}}/w_{\text{slow}}$wfast/wslow vs ΔQ.
- If exponential suppression fits, that's our **Hierarchy Law**.
- This would give MU a formal statement:
  - **Degenerate branches** → coexist.
  - **Non-degenerate branches** → coexist with exponential hierarchy.