

Quantum Measurement and Tau-Lock

*Measurement = Tau-Address Selection; Born Rule from Tau-Probability;
Decoherence = TEQ Entanglement*

Stephen Daubney | The Daubney Foundation | 2026

The measurement problem — why does the quantum wavefunction appear to 'collapse' upon measurement? — is dissolved in the Universal Force of Time framework. Measurement = tau-address selection: the measuring apparatus selects one tau-register address from the quantum superposition. The Born rule (probability = $|\psi|^2$) follows from the tau-node density at each address. Decoherence = TEQ entanglement of the quantum system with the environment's tau-register. There is no mysterious collapse — only a tau-lock event in which the system register address becomes bound to the apparatus register address.

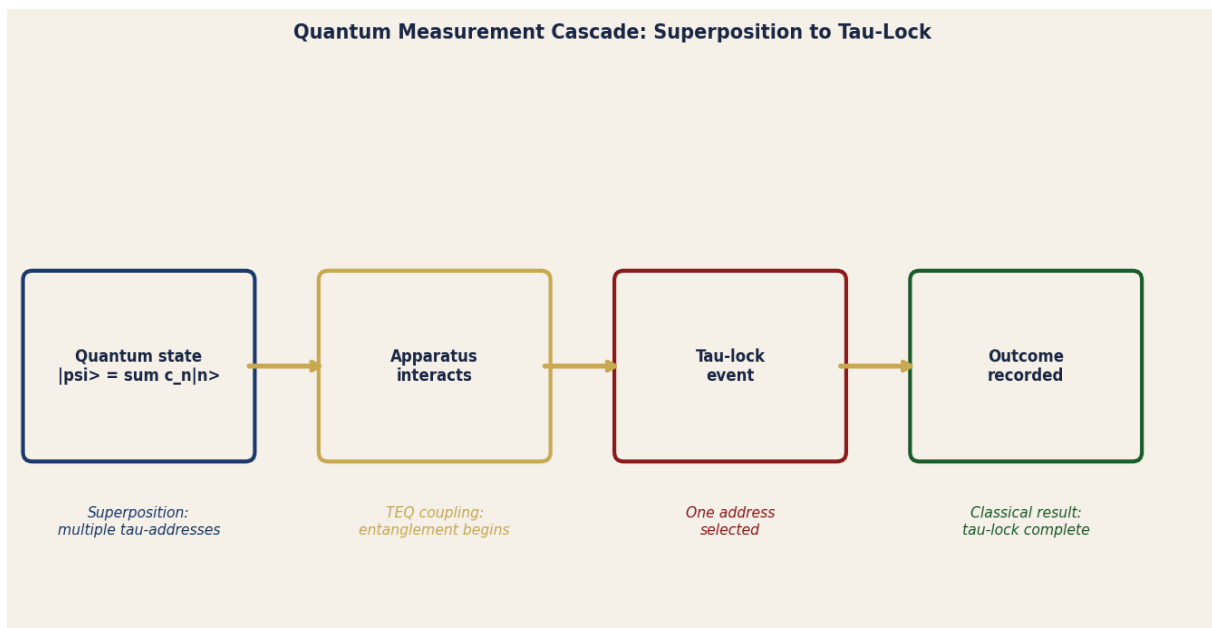


Figure 1. Measurement cascade from quantum superposition to classical outcome. Each stage is a tau-register event. No mysterious collapse — only progressive tau-lock.

1. Tau-Lock and the Born Rule (P-QM-1 to P-QM-3)

P-QM-1 — Measurement = Tau-Address Selection

In UFOT: a quantum state $|\psi\rangle = \sum_n c_n |n\rangle$ is a superposition of tau-register addresses $|n\rangle$. The measuring apparatus has its own tau-register address $|A\rangle$. Tau-lock = the TEQ coupling event in which the apparatus register $|A\rangle$ preferentially selects one quantum address $|n_0\rangle$ from the superposition. The selection probability is determined by the tau-node density: $P(n_0) = |c_{n_0}|^2$ = the Born rule. After tau-lock, the composite system register is $|n_0\rangle \times |A(n_0)\rangle$ — one definite state.

P-QM-2 — Born Rule from Tau-Node Density

Born rule: $P(n) = |c_n|^2$. UFOT derivation: the tau-node density at register address $n = |\psi(n)|^2 = |c_n|^2$. The measuring apparatus samples the tau-node density when the TEQ coupling begins. The probability of tau-locking to address n is proportional to the tau-node density there. Normalisation: $\sum_n |c_n|^2 = 1$ = total tau-node count in the superposition (conservation of tau-nodes). The Born rule is not a postulate — it is a consequence of tau-node conservation.

P-QM-3 — Decoherence = TEQ Register Entanglement with Environment

Decoherence: quantum superpositions appear to 'collapse' rapidly in macroscopic environments. UFOT: decoherence = TEQ entanglement of the quantum system register with the environment's tau-register. The environment has $\sim 10^{23}$ degrees of freedom — it provides 10^{23} simultaneous tau-lock events. Once the system register is entangled with 10^{23} environmental registers, recovering the superposition requires reversing all 10^{23} entanglements simultaneously — practically impossible. Decoherence time = $1/(N_{\text{env}} \times k_{\text{TEQ}})$ where N_{env} = environmental register density.

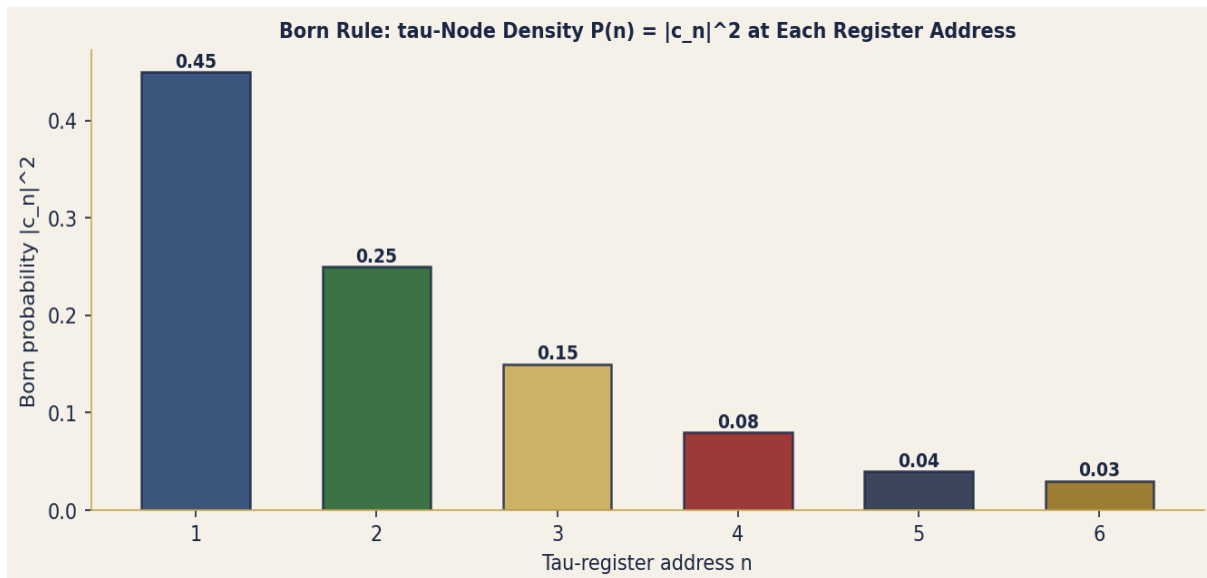


Figure 2. Example Born probability distribution across 6 tau-register addresses. Sum = 1.00 (tau-node conservation). Tau-lock selects $n=1$ with probability 0.45.

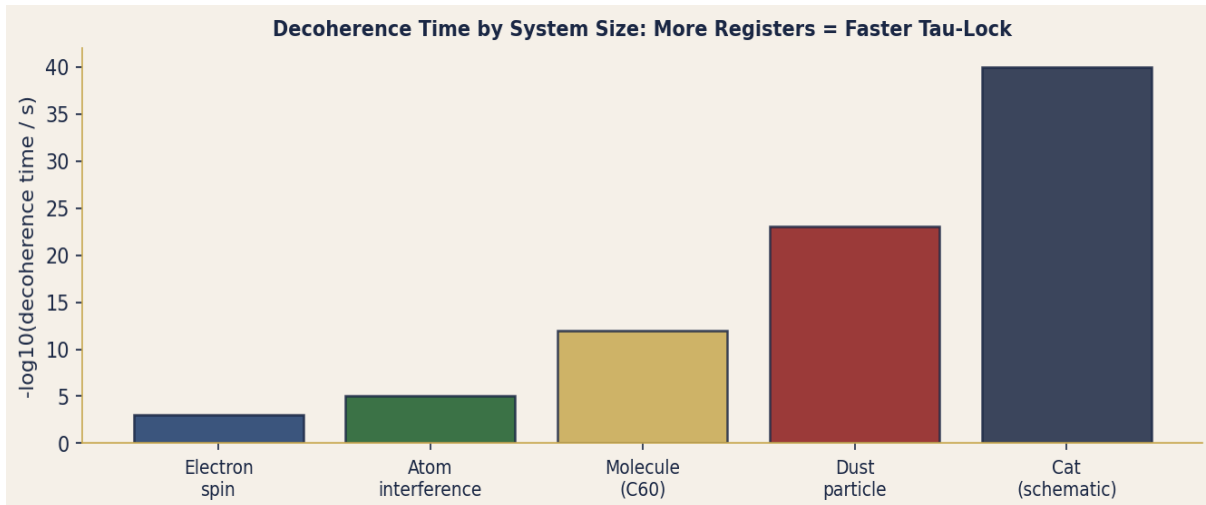


Figure 3. Decoherence time (log scale, inverted) vs system size. Electron spin: \sim ms coherence. Cat: $\sim 10^{-40}$ s — instantly classical. Decoherence rate proportional to environmental register density.

2. Tau-Lock Selection Schematic (P-QM-4)

P-QM-4 — Tau-Lock: No Many-Worlds, No Hidden Variables

UFOT provides a third interpretation distinct from Copenhagen and Many-Worlds. Copenhagen: wavefunction collapses (no mechanism given). Many-Worlds: all branches exist (un-testable). UFOT Tau-Lock: one tau-register address is selected via TEQ coupling. The others de-couple, not because they cease to exist, but because the apparatus register is locked to one address. Hidden variables: not needed — the tau-node density IS the probability, with no further underlying variables. UFOT is a complete theory at the register level — no hidden structure below the tau-lattice.

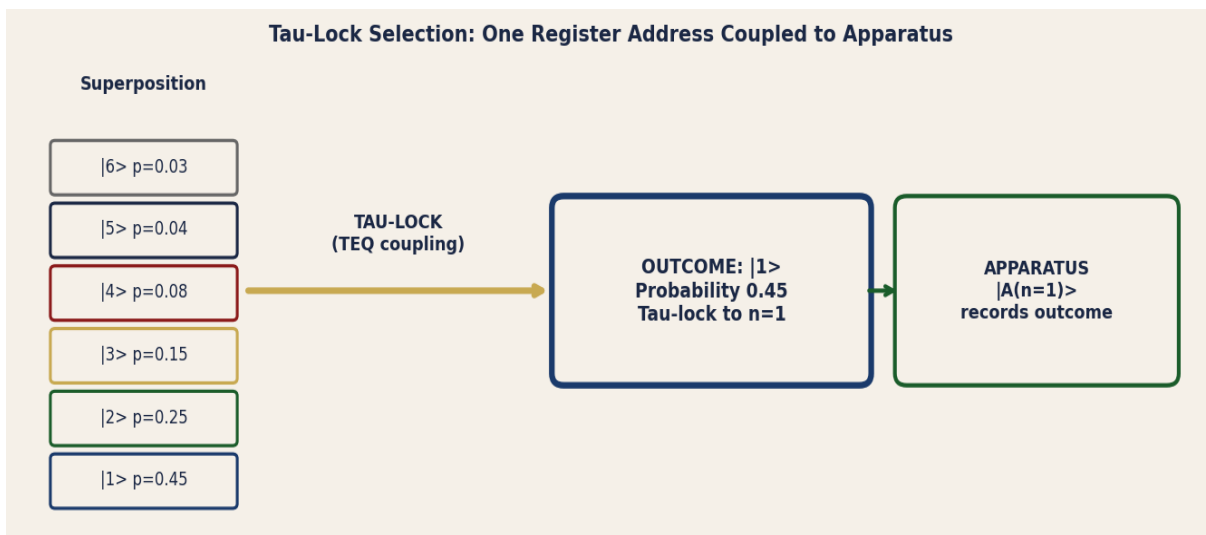


Figure 4. Tau-lock selection schematic. Left: 6-state superposition. Centre: TEQ coupling event. Right: apparatus locked to $|1\rangle$ (probability 0.45). Other states de-couple — not destroyed.

tau - THE UNIVERSAL FORCE OF TIME - STEPHEN DAUBNEY - THE DAUBNEY FOUNDATION - 2026
All propositions and derivations (c) Stephen Daubney. Academic use permitted with attribution.