

**Question:** *Under what conditions does a quantum state behave classically?*

Let's explore a simple, concrete case: a single particle harmonic oscillator. In what limits – that is, for what kinds of states – will the dynamics be (nearly) classical?

Does your answer depend on what observable is measured? For example, are there operations (observer-applied sequences of measurements and driving Hamiltonians) such that observables after these operations *always* behave classically, regardless of the initial quantum state? Conversely, are there operations on the system such that some observables after these operations *never* appear to be classical, regardless of the initial state?

Since the electromagnetic field modes are harmonic oscillators the questions you just answered tell us when the dynamics of light will be described by the (classical) Maxwell's equations!