Exercise 1

Modulation spectroscopy (parametric heating)

We prepare the ground state of a harmonic oscillator, and then modulate the trap in two ways:

- By shaking it (position modulation)
- By squeezing it (amplitude modulation)

There are flow files for each case.

On the left, there are numbers you can change, and in the panels on the left, the calculations are done. In the top panel, we find the initial state, and the lowest 6 eigenstates of the harmonic oscillator. In the bottom panel, we apply the modulation.

- Try varying the amplitude of the modulation.
- Try varying the frequency of the modulation. It is represented by a constant k*omega (where omega is the trapping frequency), and then this k can be changed.

Questions:

- Which states are accessible in each type of modulation?
- How are the resonance frequencies different?