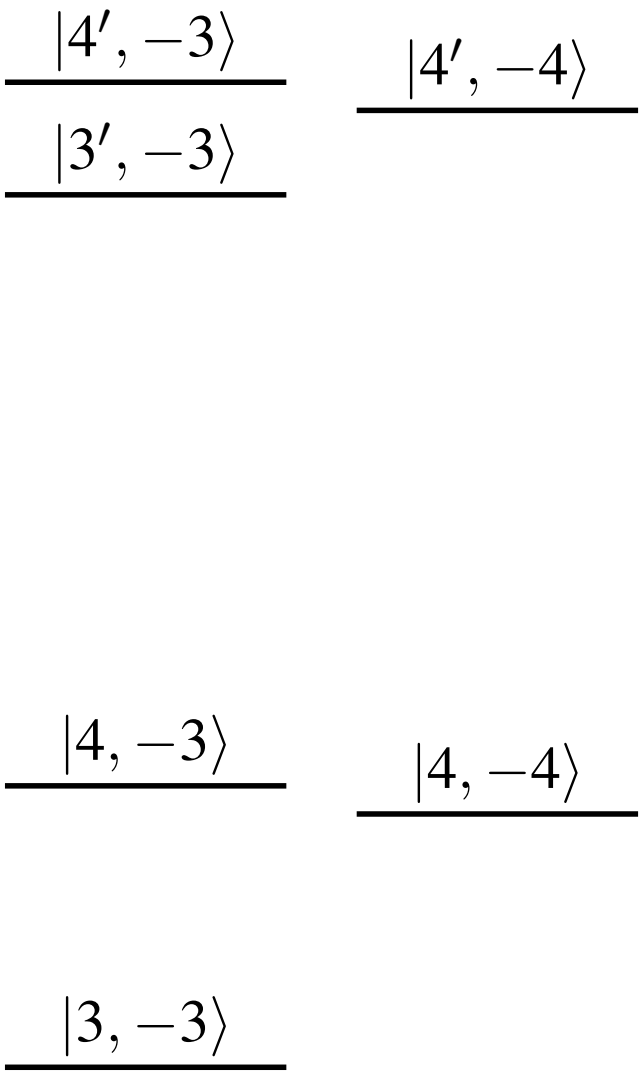
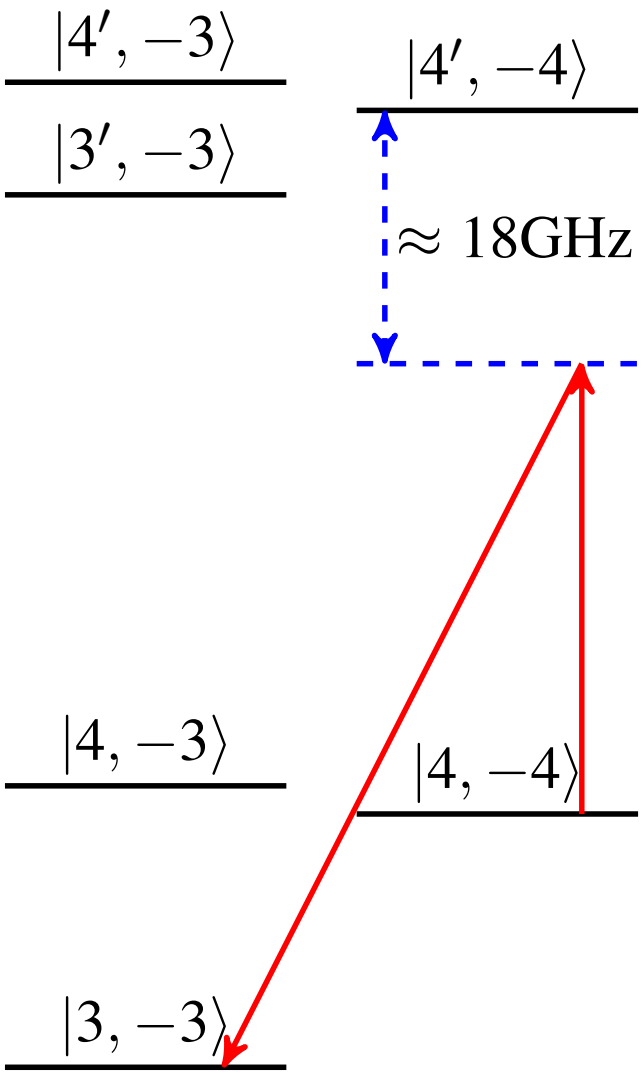
Raman transition on single Cesium Atom

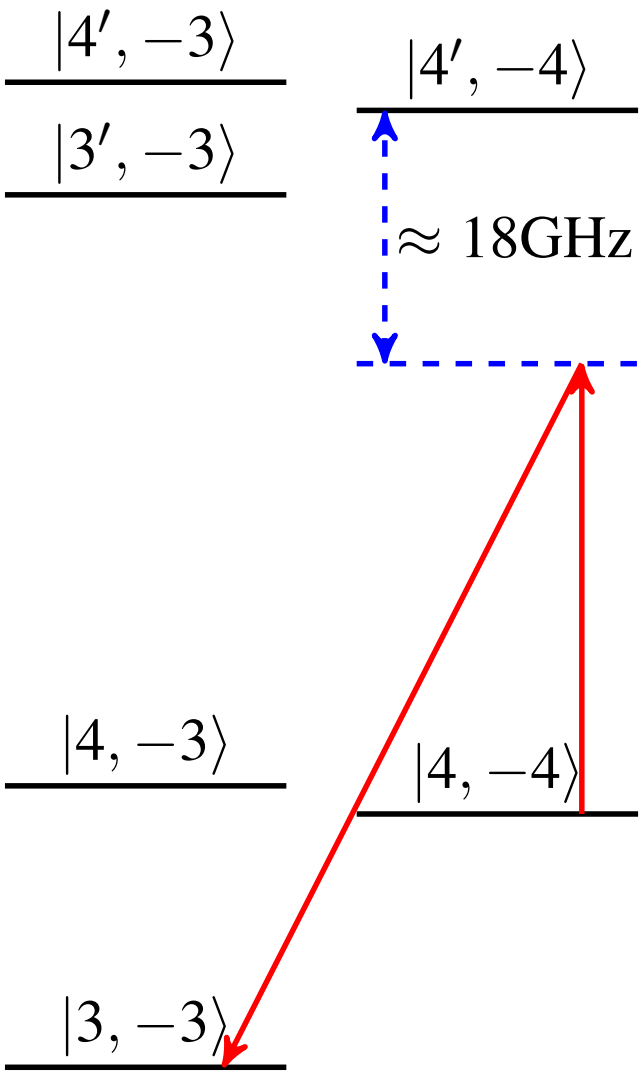
Yichao Yu

Ni Group/Harvard

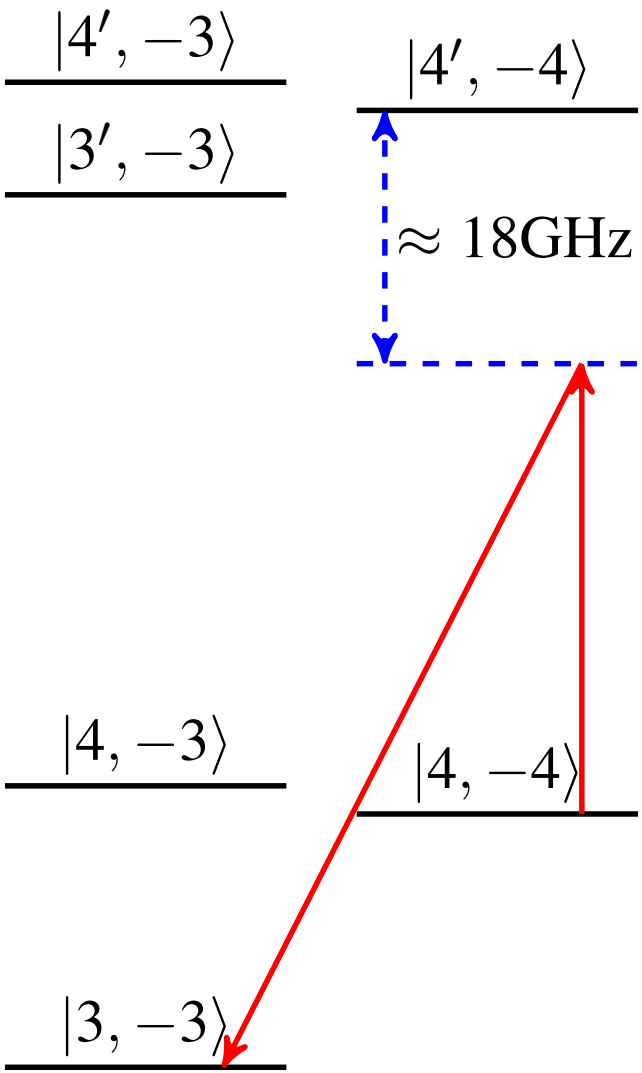
March 2, 2015


$|4', -3\rangle$
$|4', -4\rangle$
$|3', -3\rangle$
$|4, -3\rangle$
$|4, -4\rangle$
$|3, -3\rangle$

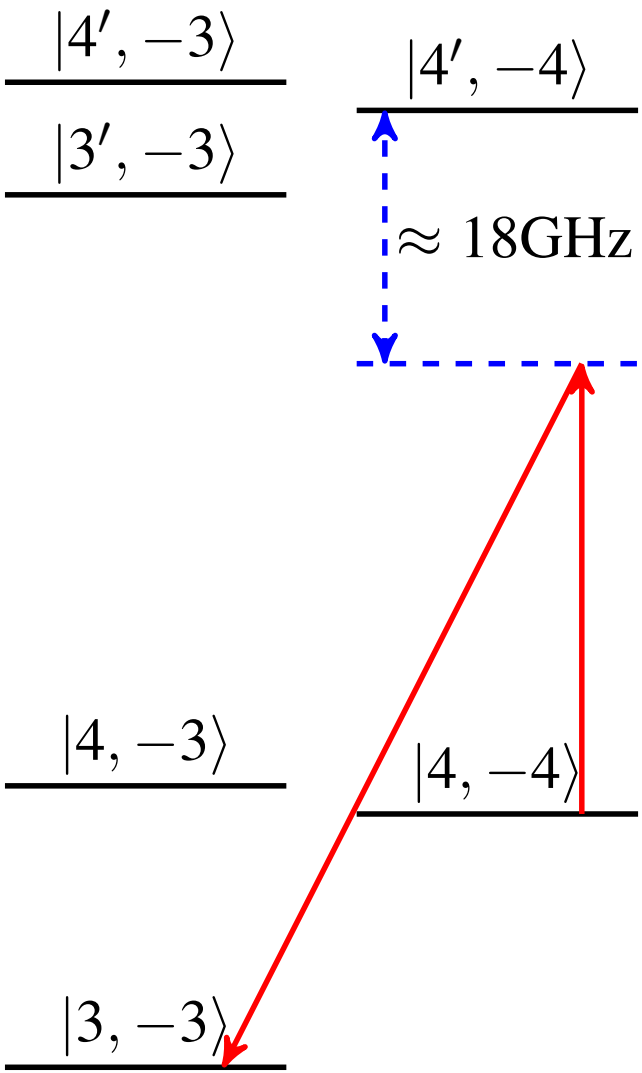

$|4', -3\rangle$
$|4', -4\rangle$
$|3', -3\rangle$
$\approx 18\text{GHz}$
$|4, -3\rangle$
$|4, -4\rangle$
$|3, -3\rangle$



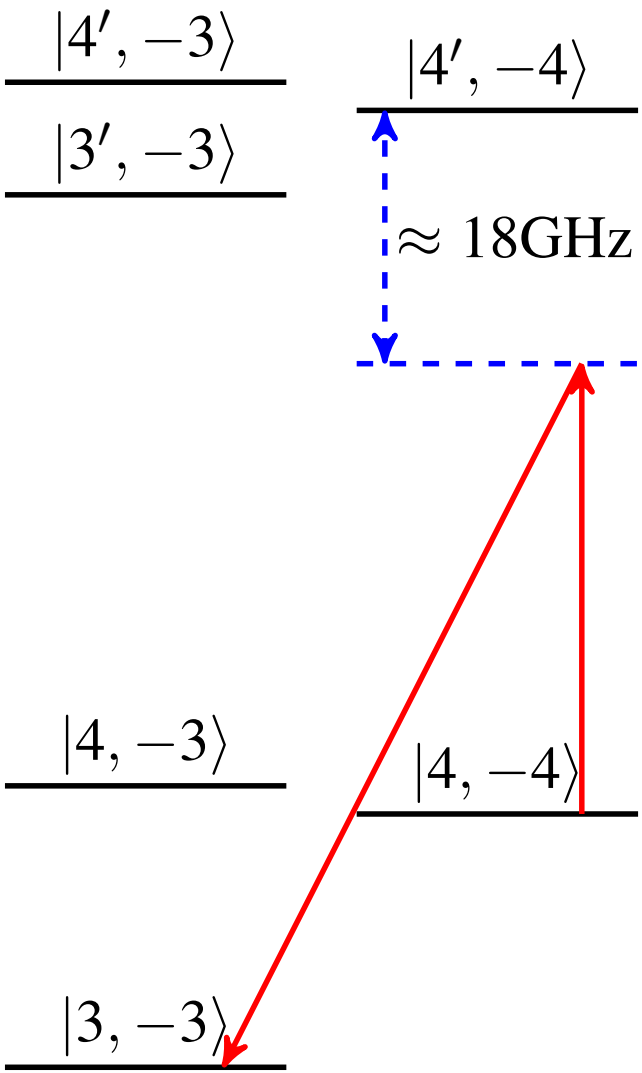
- Use single atom
- Light
  - Power
  - Frequency
- State



- Use single atom
- Light
  - Power
  - Frequency
- State

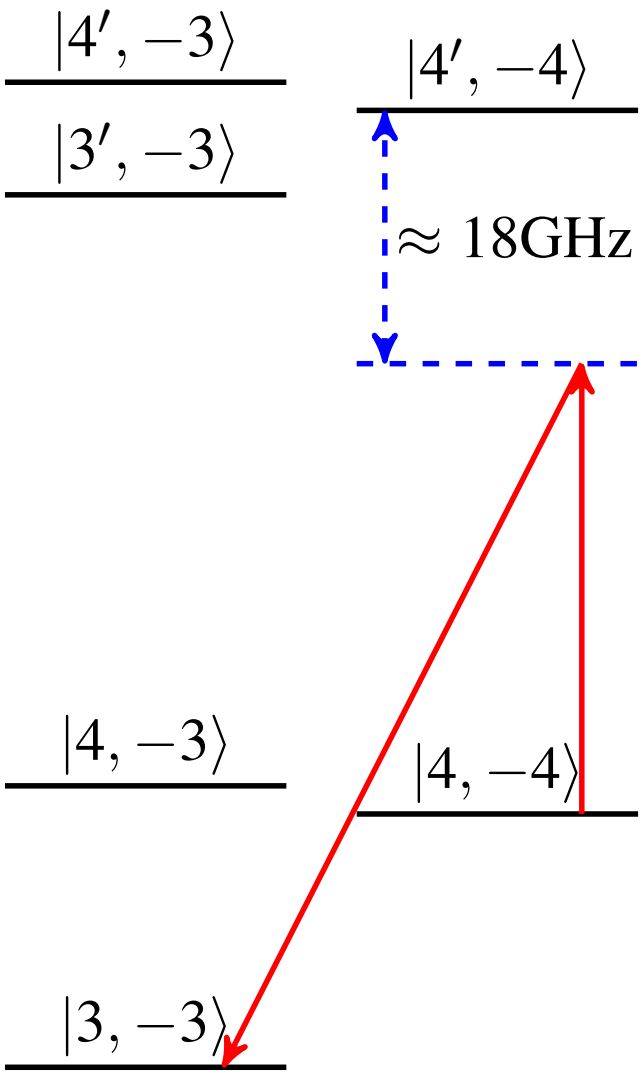


- Use single atom
- Light
  - Power
  - Frequency
- State



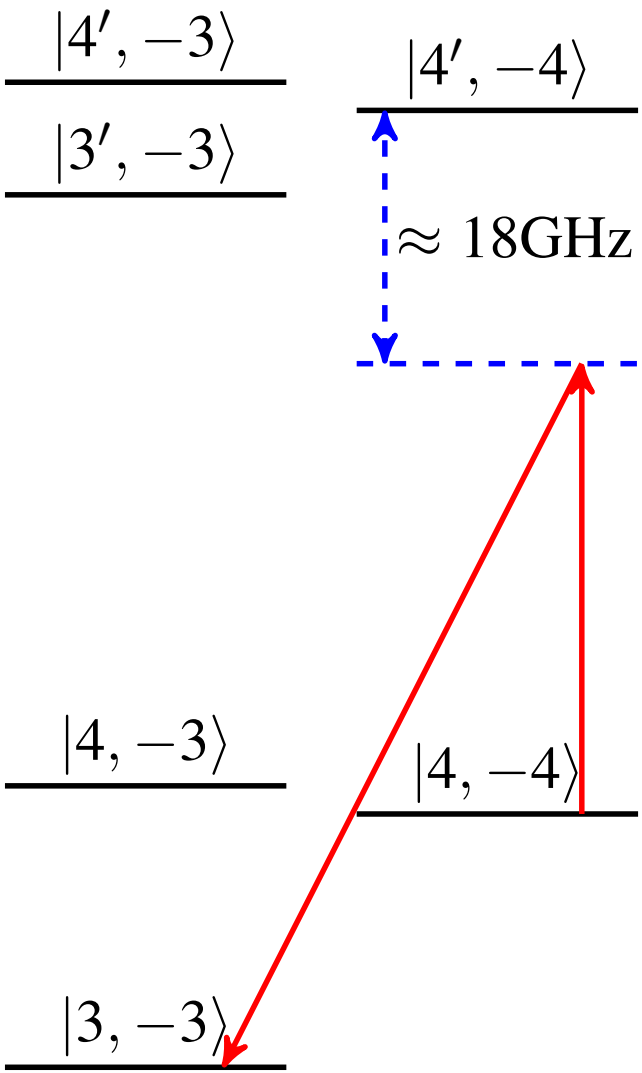
- Use single atom
- Light
  - Power
  - Frequency
- State

- Shrink size
- Alignment
- Scattering measurement



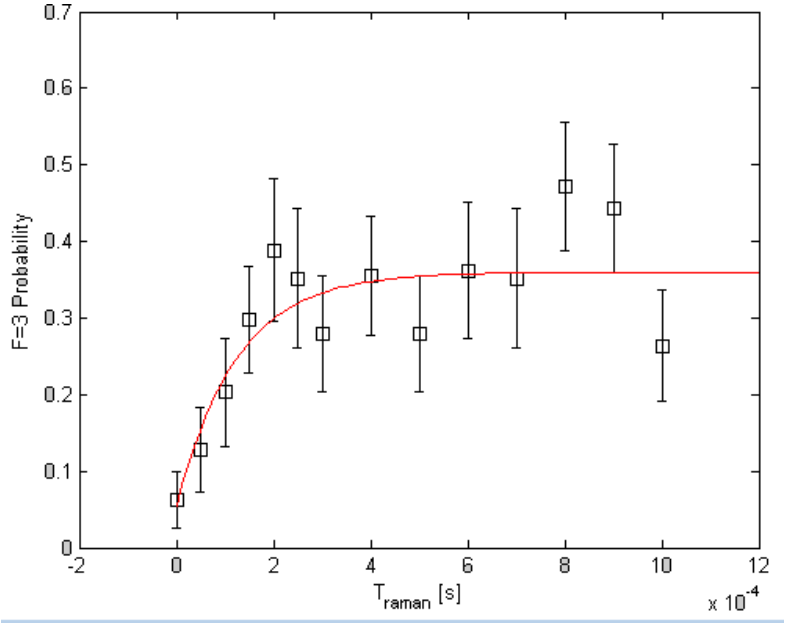
- Use single atom
- Light
  - Power
  - Frequency
- State

- Shrink size
- Alignment
- Scattering measurement



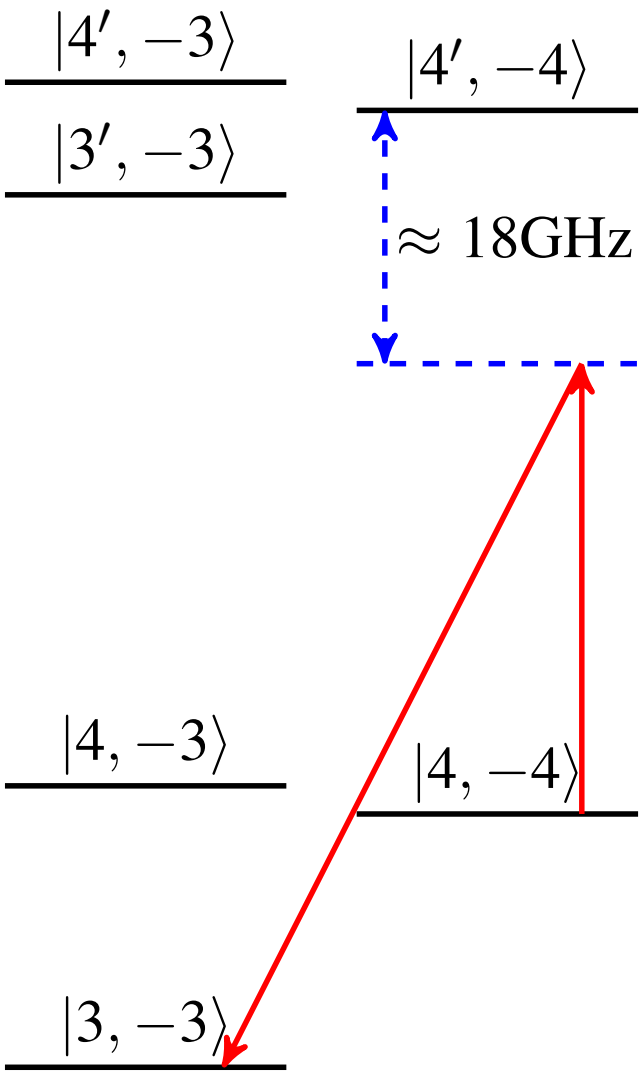
- Use single atom
- Light
  - Power
  - Frequency
- State

- Shrink size
- Alignment
- Scattering measurement



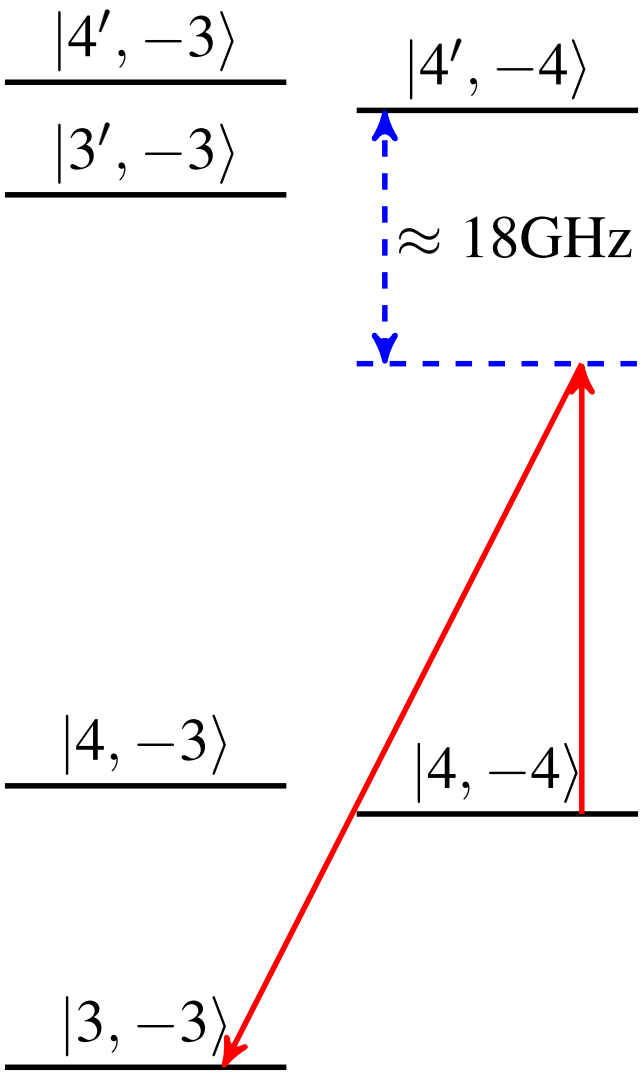
- Use single atom
- Light
  - Power
  - Frequency
- State

- Shrink size
- Alignment
- Scattering measurement



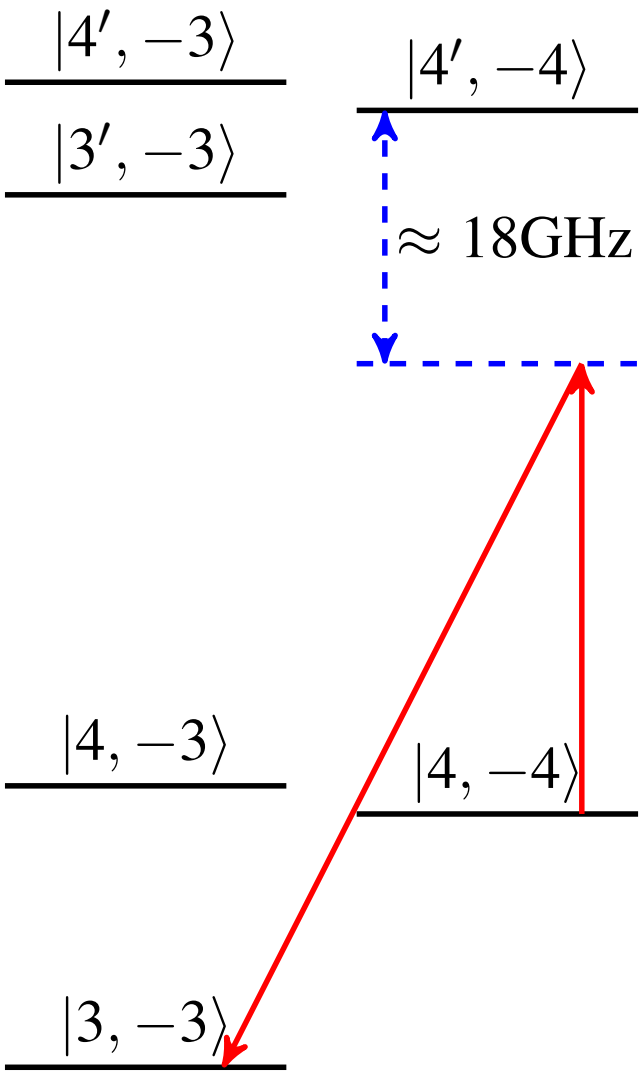
- Use single atom
- Light
  - Power ✓
  - Frequency
- State

- Use co-propagating beams
- Measure beat note

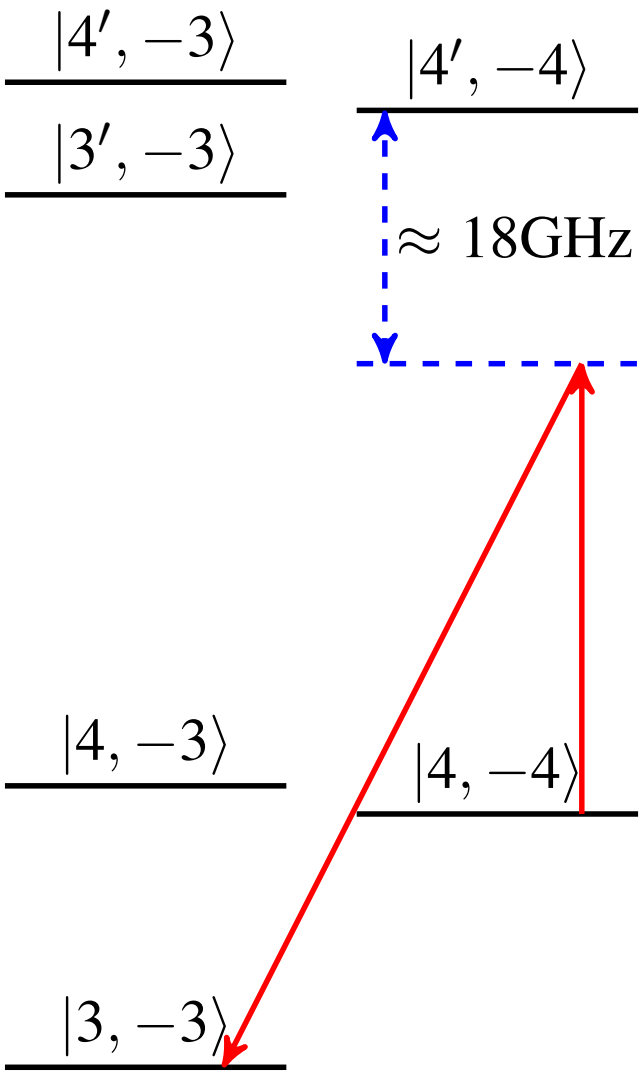


- Use single atom
- Light
  - Power ✓
  - Frequency
- State

- Use co-propagating beams
- Measure beat note

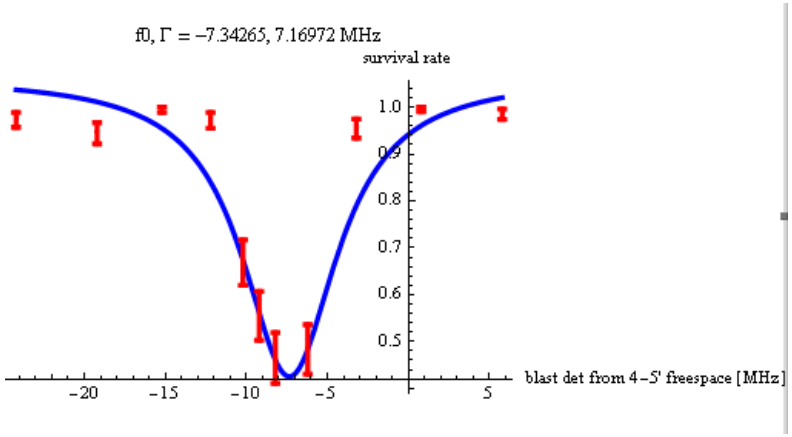


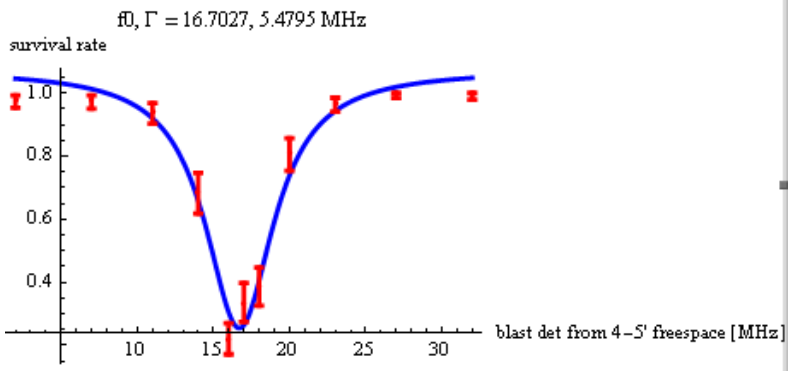
- Use single atom
- Light
  - Power ✓
  - Frequency ✓
- State



- Use single atom
- Light
  - Power ✓
  - Frequency ✓
- State

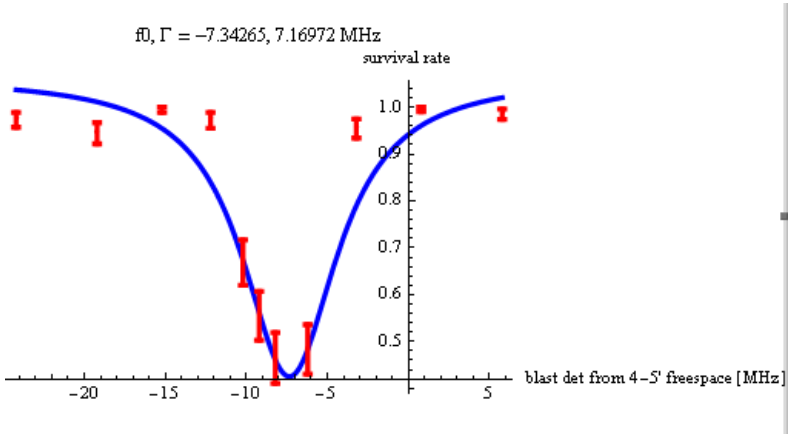
- Dark state pumping
- Cycling transition Zeeman shift

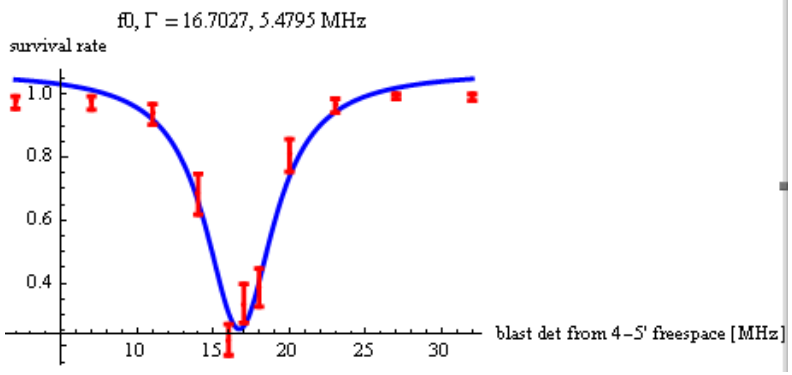




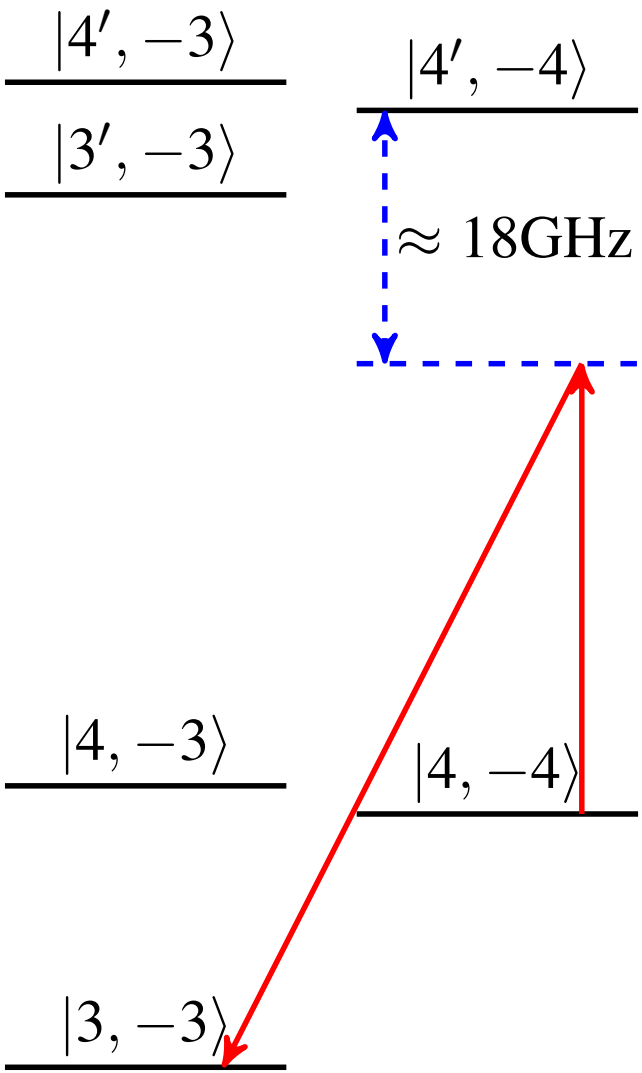
- Use single atom
- Light
  - Power ✓
  - Frequency ✓
- State

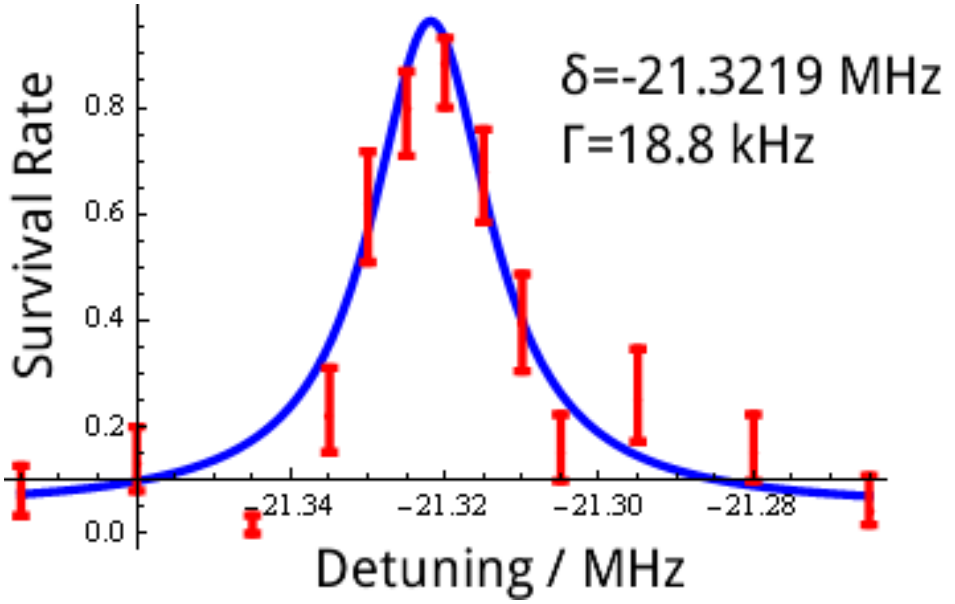
- Dark state pumping
- Cycling transition Zeeman shift



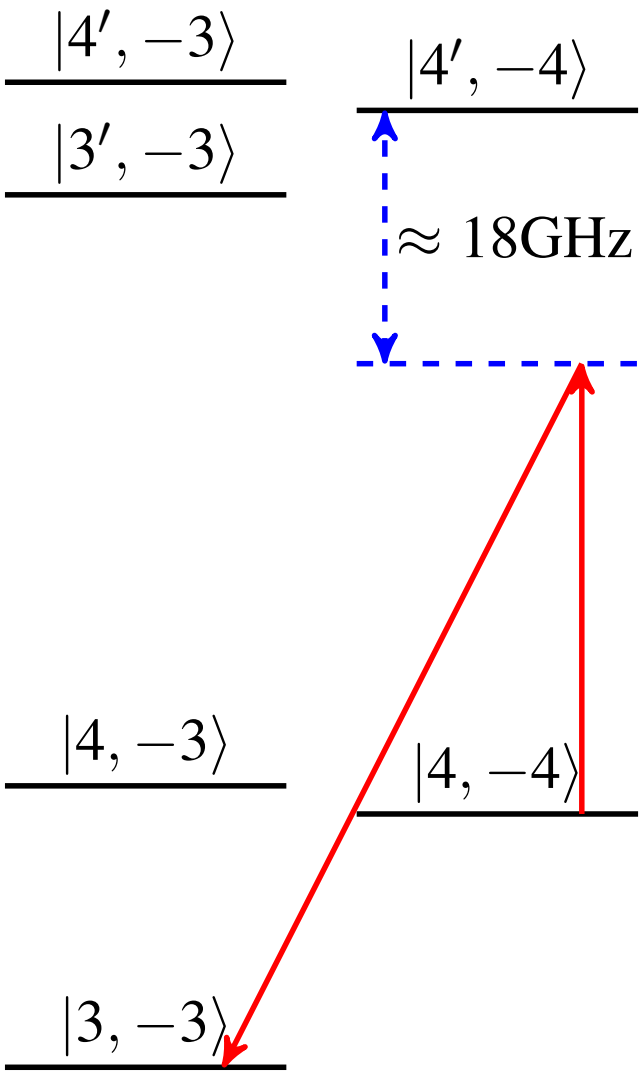


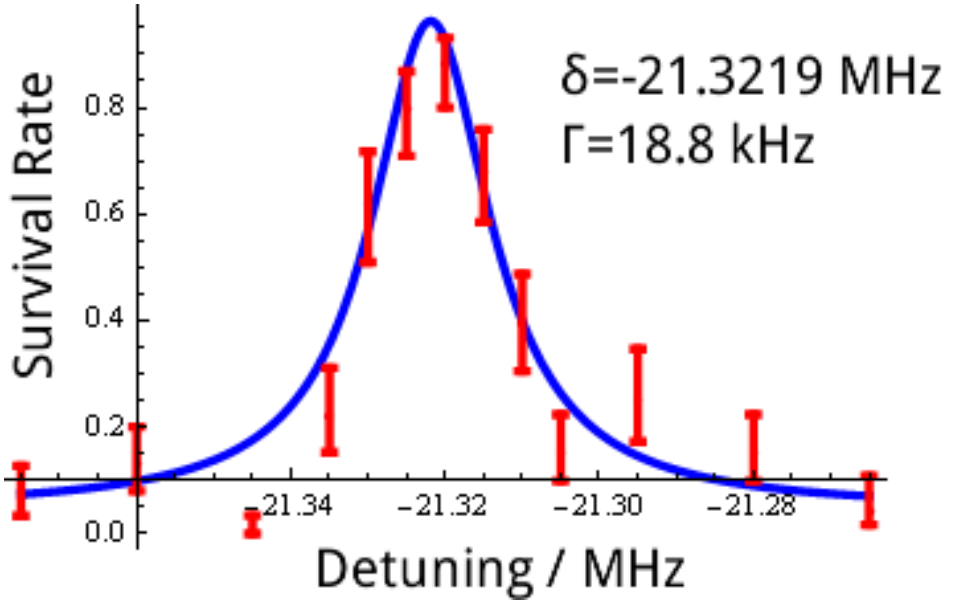
- Use single atom
- Light
  - Power ✓
  - Frequency ✓
- State ✓



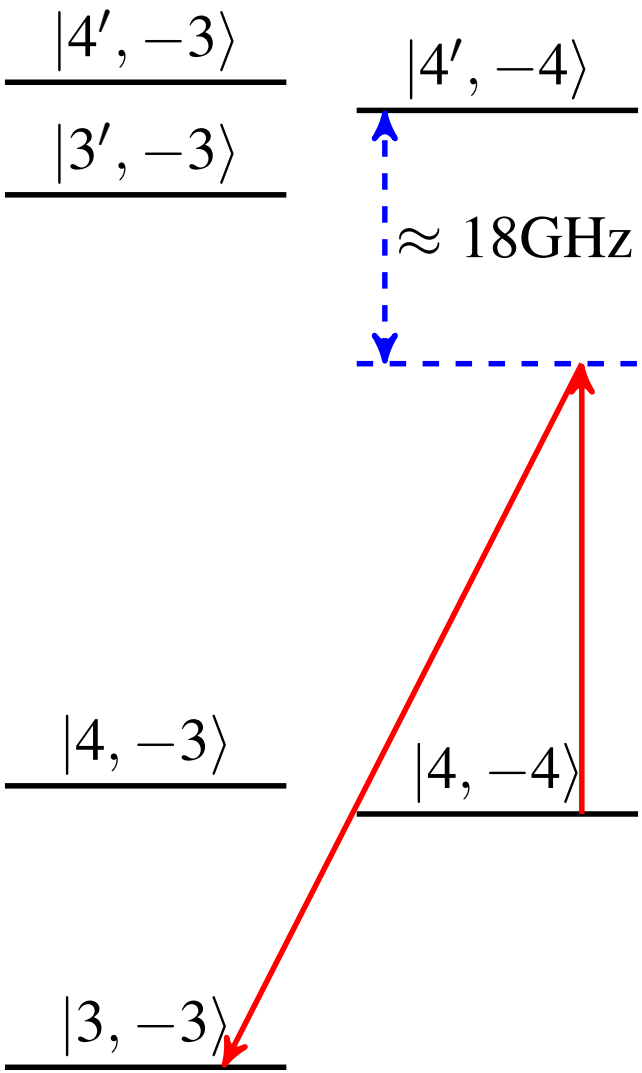


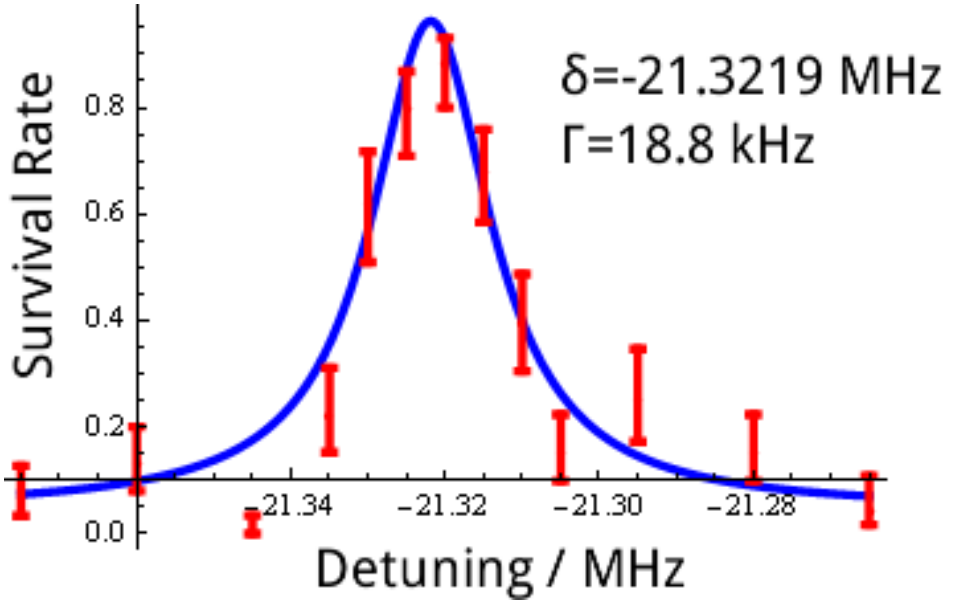
- Zeeman shift $\approx$ 21MHz
- Red shifted (and wider) with higher Raman intensity





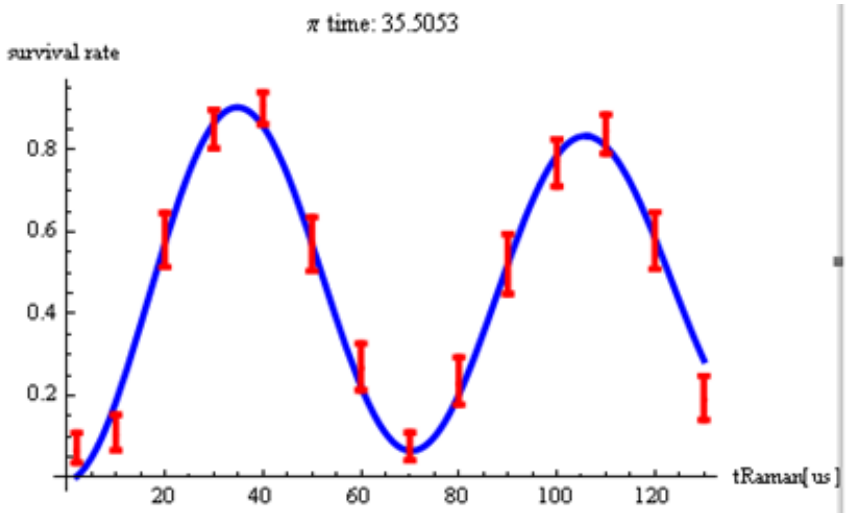
- Zeeman shift $\approx$ 21MHz
- Red shifted (and wider) with higher Raman intensity



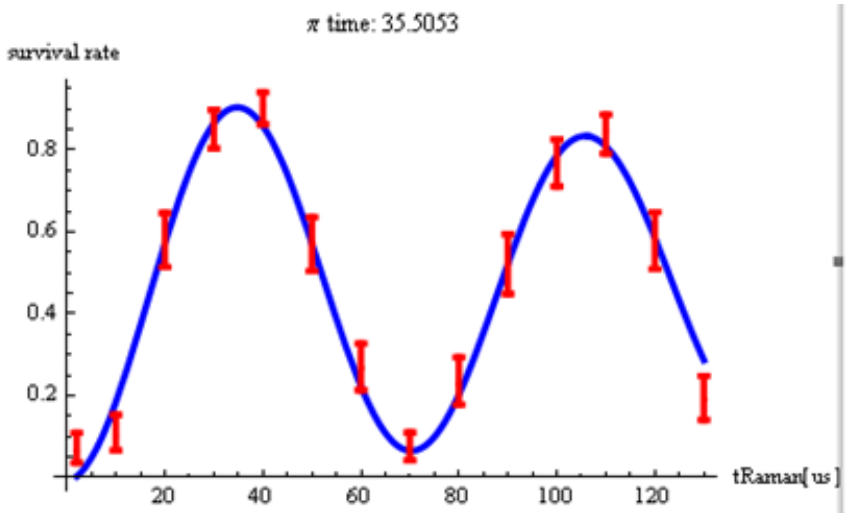


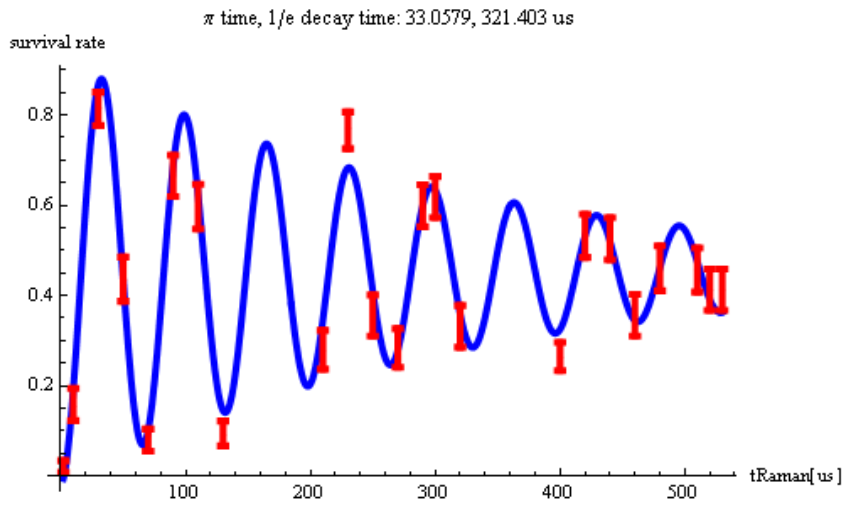
- Zeeman shift $\approx$ 21MHz
- Red shifted (and wider) with higher Raman intensity

Rabi flopping

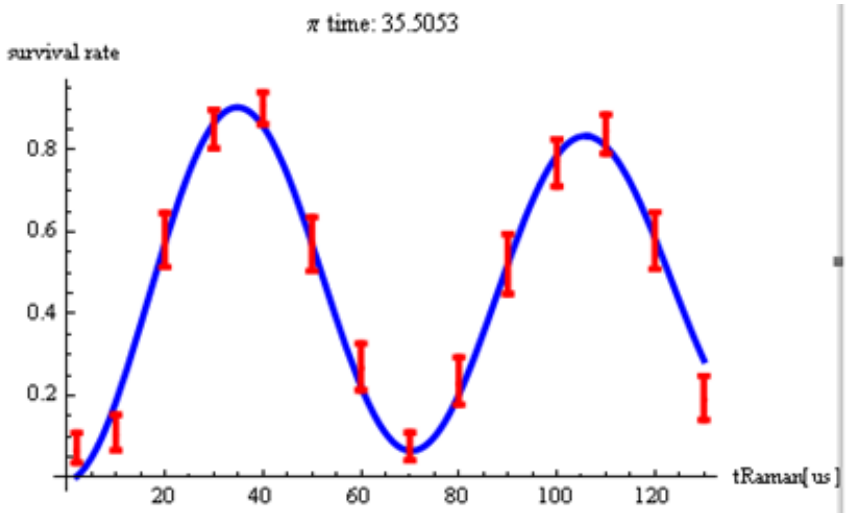


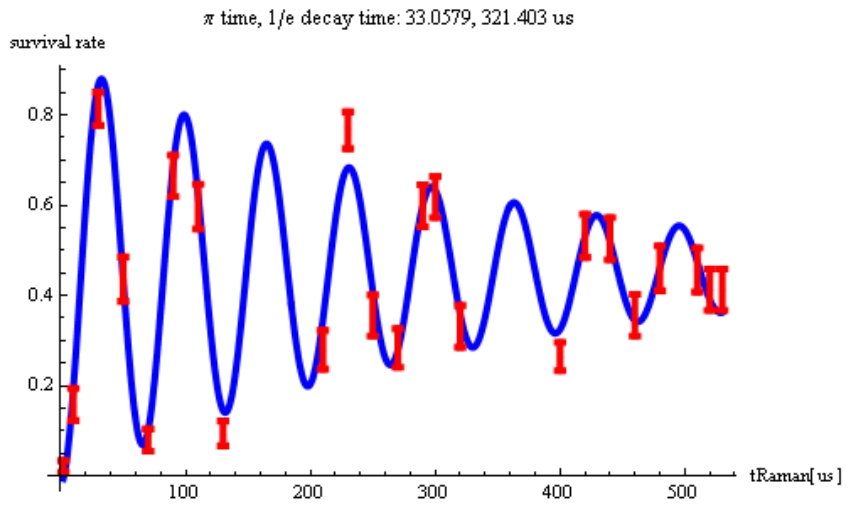
Rabi flopping





Rabi flopping

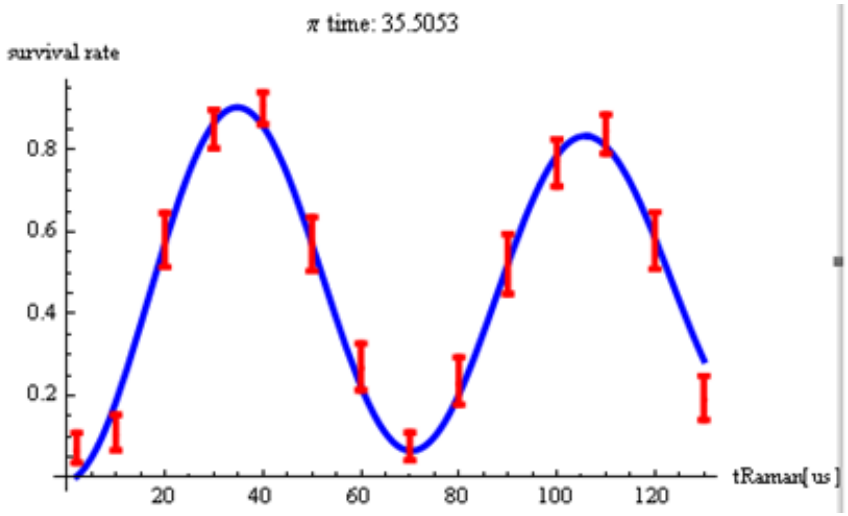


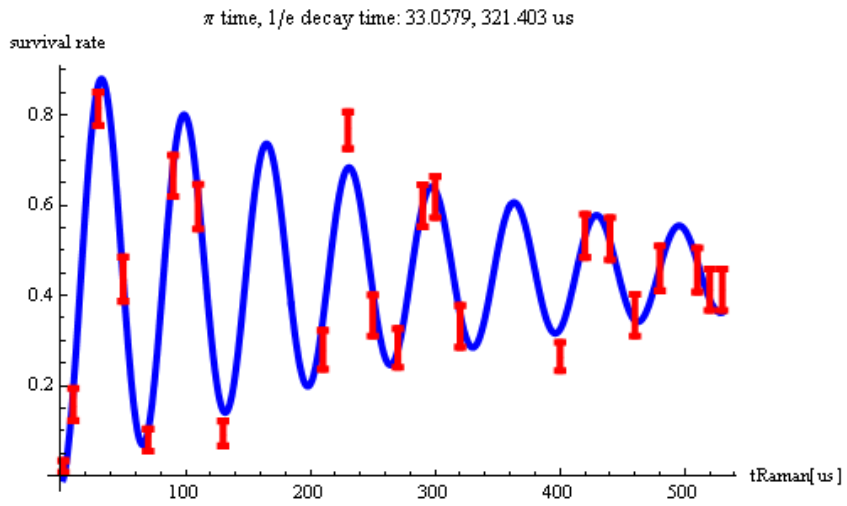


Next

- More characterization (Power, heating, decoherence)
- Drive sideband

Rabi flopping

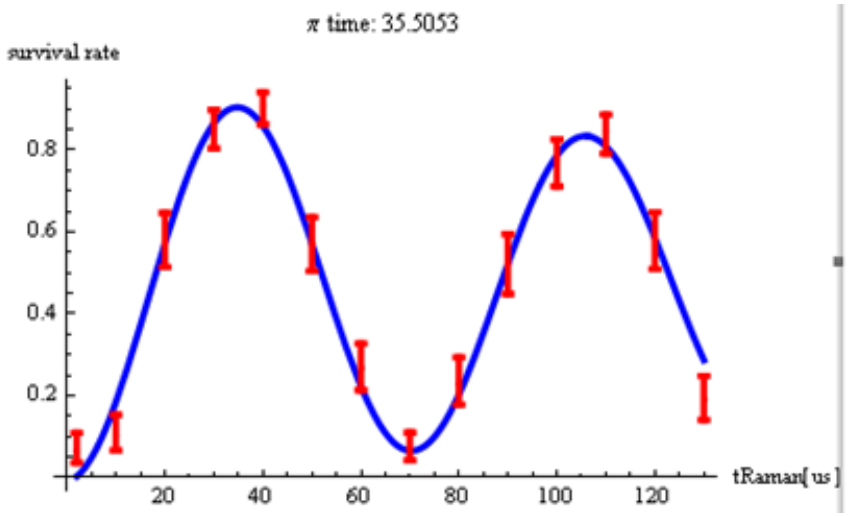


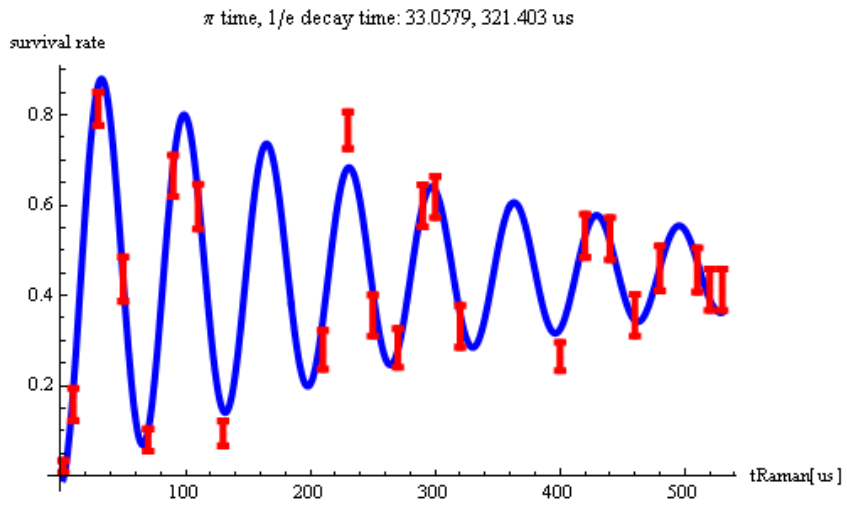


Next

- More characterization (Power, heating, decoherence)
- Drive sideband

Rabi flopping





Next

- More characterization (Power, heating, decoherence)
- Drive sideband