

Collision between single atoms in optical tweezers

Yichao Yu

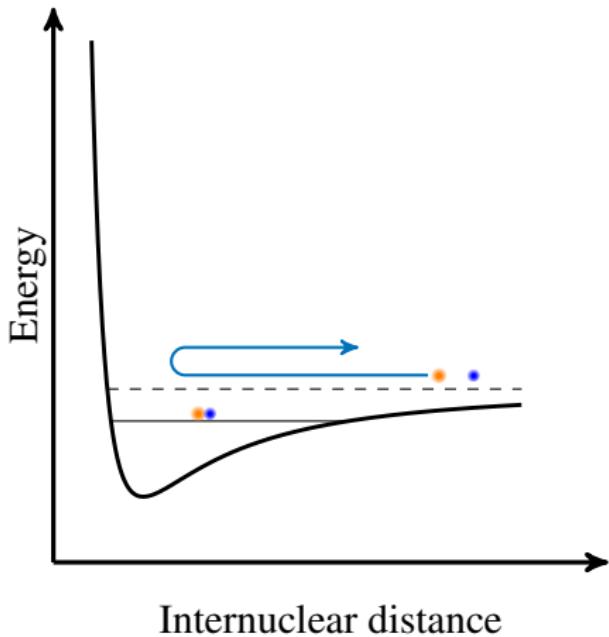
Lee Liu, Lewis Picard, Kenneth Wang, Dr. Jon Hood

Ni Group/Harvard

March 27, 2019

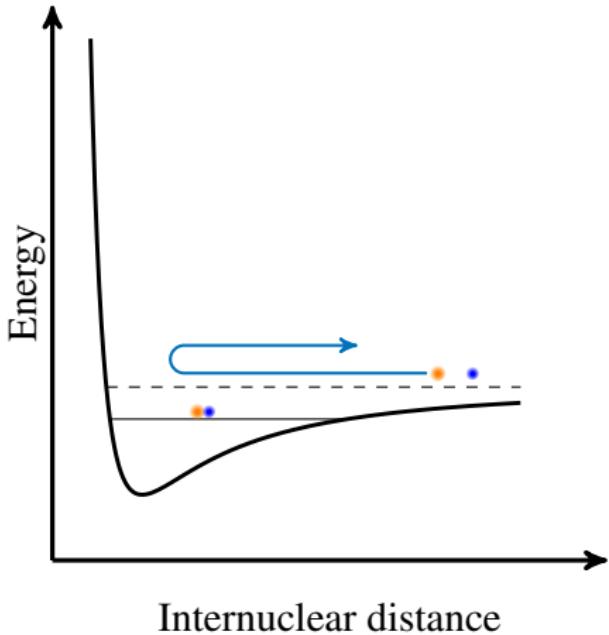
Scattering length a

- Binding energy
- Molecular potential
- Feshbach resonance
- Molecule formation
- ⋮



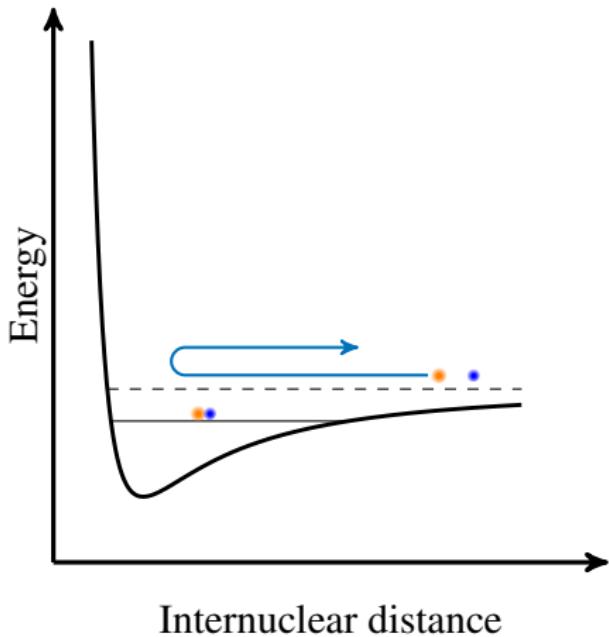
Scattering length a

- Binding energy
- Molecular potential
- Feshbach resonance
- Molecule formation
- ⋮



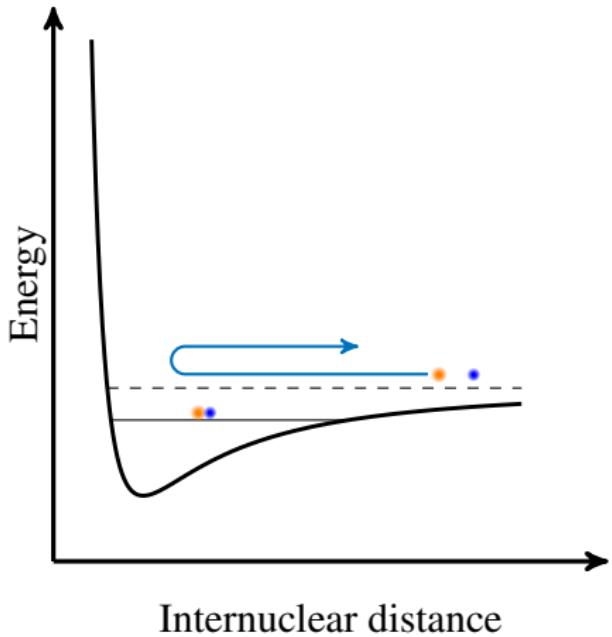
Scattering length a

- Binding energy
- Molecular potential
- Feshbach resonance
- Molecule formation
- ⋮



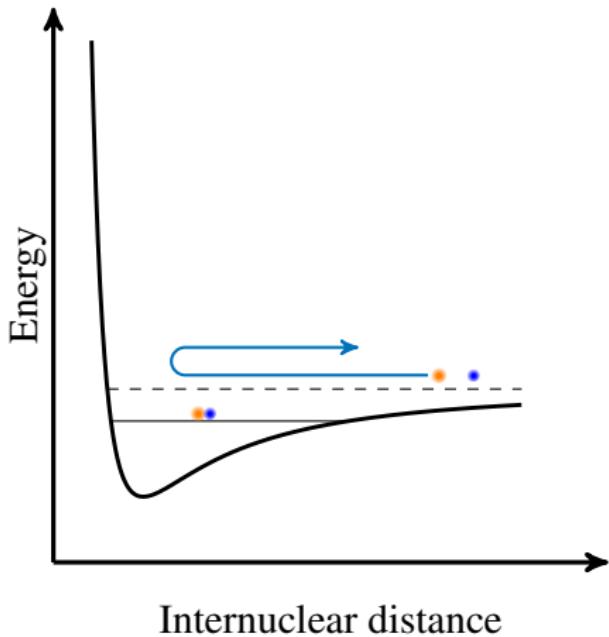
Scattering length a

- Binding energy
- Molecular potential
- Feshbach resonance
- Molecule formation
- ⋮

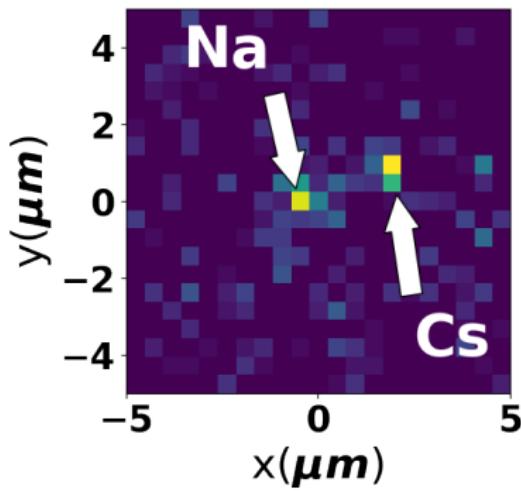


Scattering length a

- Binding energy
- Molecular potential
- Feshbach resonance
- Molecule formation
- ⋮

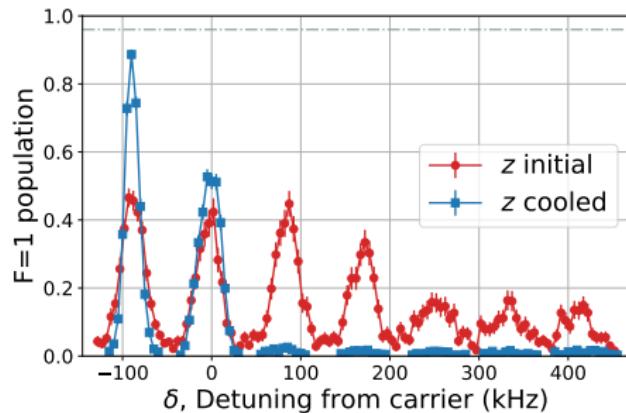


Loading



Loading probability per site: 60%
Post select on initial and final state.

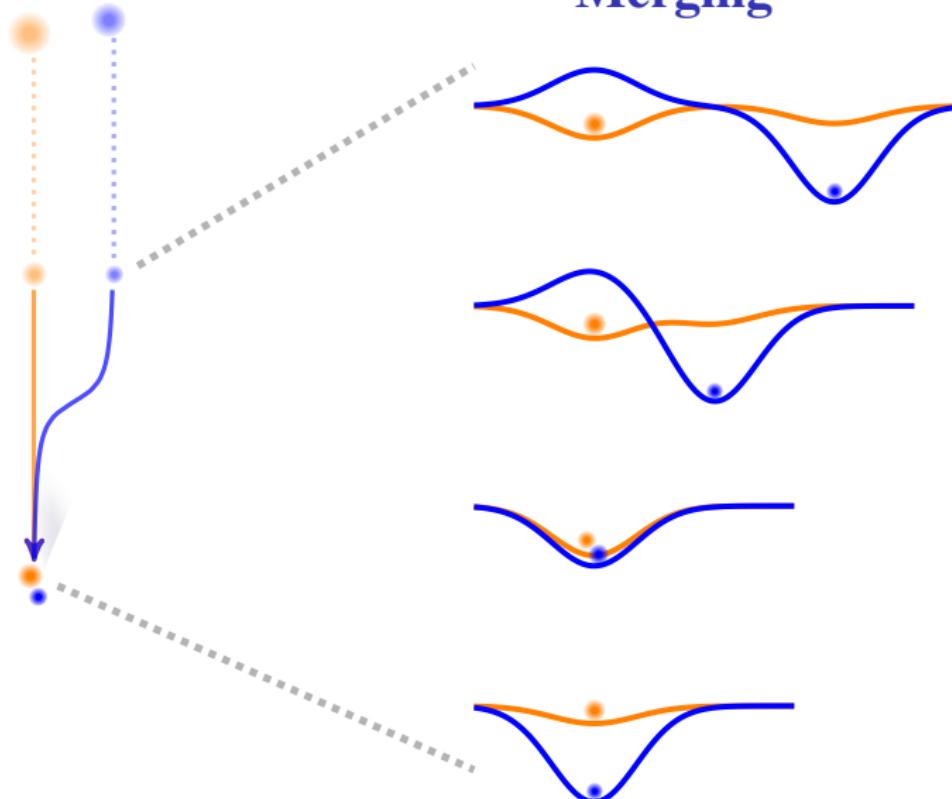
Cooling



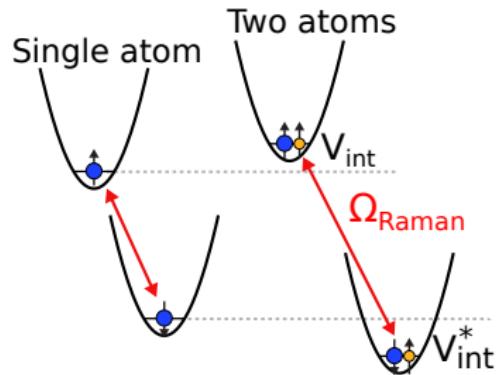
Cs: 96% ground state

Na: 94% ground state

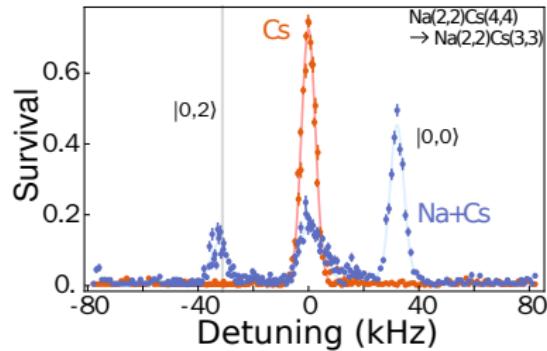
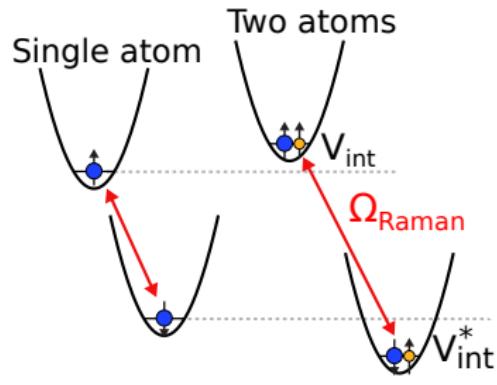
Merging



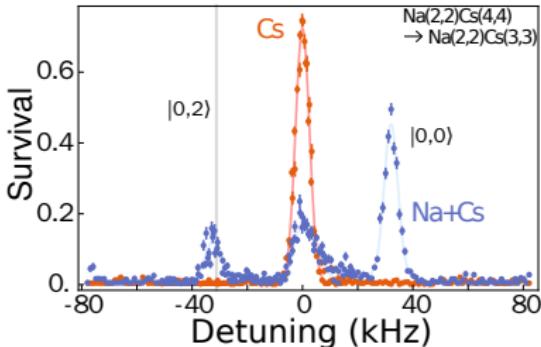
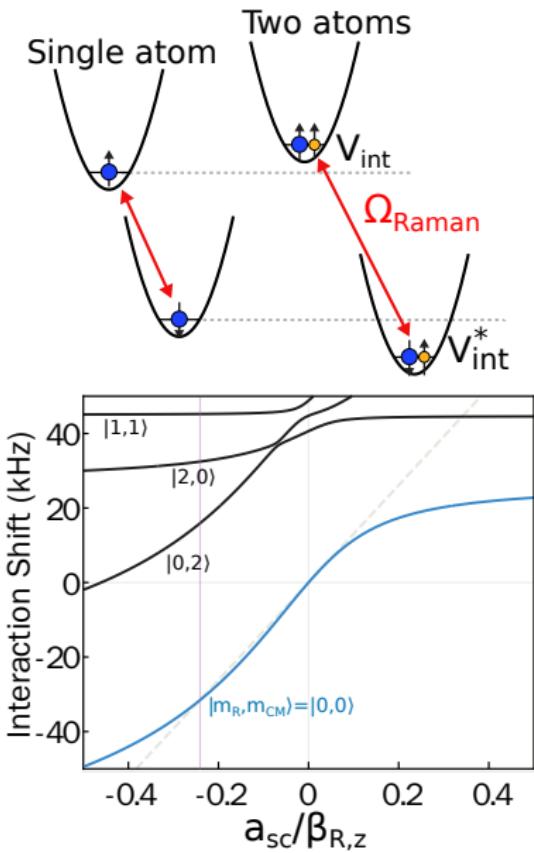
Interaction shift



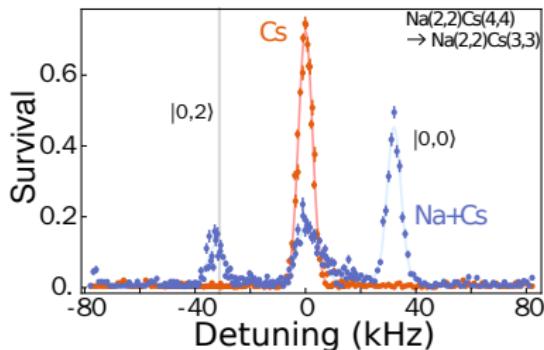
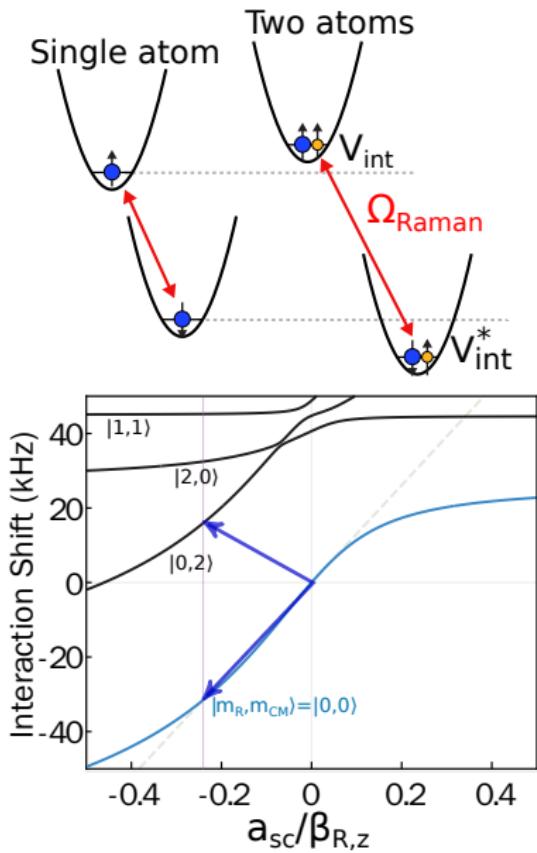
Interaction shift



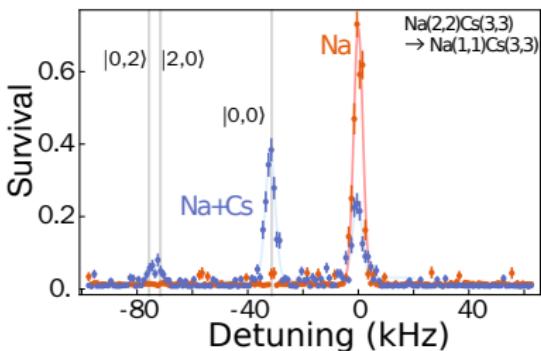
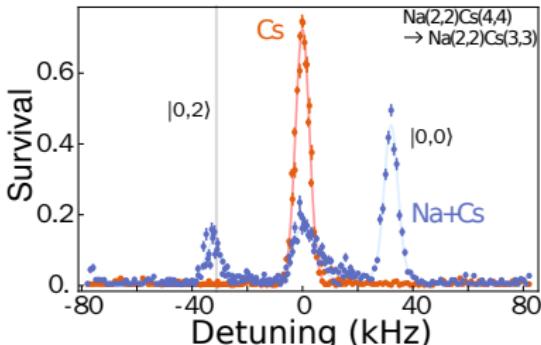
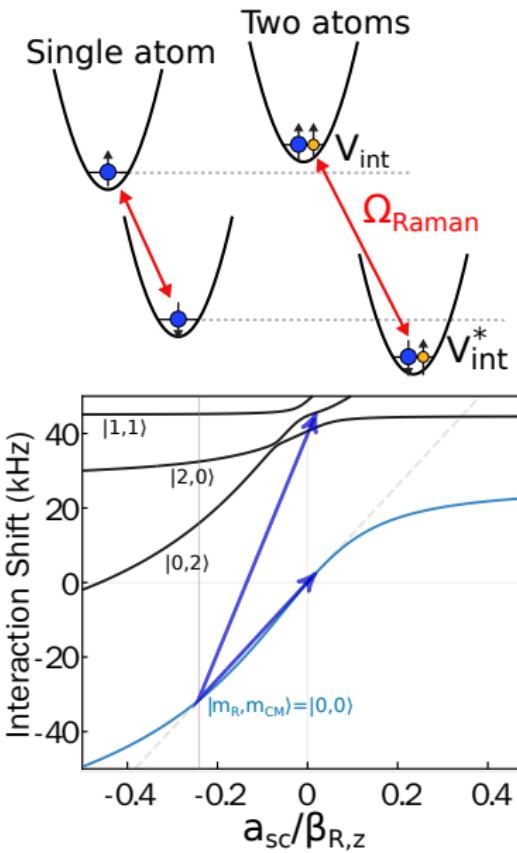
Interaction shift



Interaction shift



Interaction shift

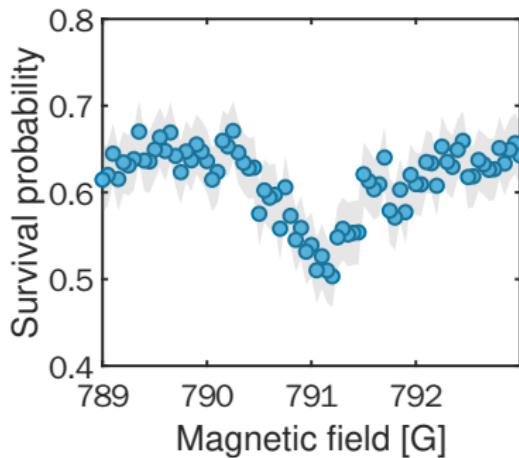
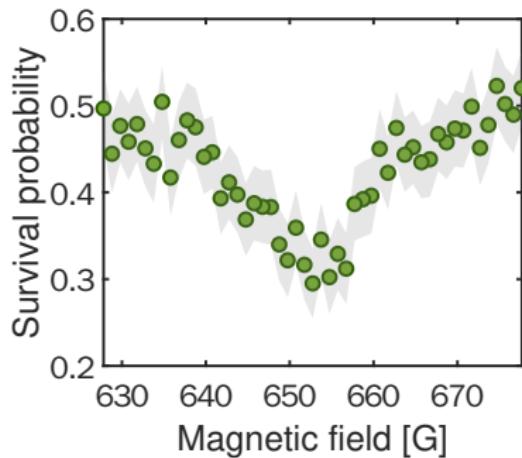


Feshbach resonance

	<i>s</i> -wave	<i>p</i> -wave
Predicted (MQDT)	663 G	799 G

Feshbach resonance

	<i>s</i> -wave	<i>p</i> -wave
Predicted (MQDT)	663 G	799 G
Measured	652(3) G	791.2(2) G



Next step

- Make Feshbach molecules
- Take advantage of the large scattering length to enhance molecule formation

Next step

- Make Feshbach molecules
- Take advantage of the large scattering length to enhance molecule formation

Thank you for your attention.