

Collision between single atoms in optical tweezers

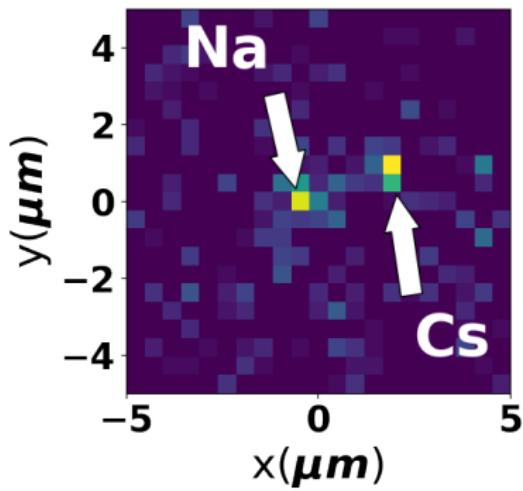
Yichao Yu

Lee Liu, Kenneth Wang, Lewis Picard, Jonathan Hood
Jessie Zhang, Eliot Fenton, Yen-Wei Lin

Ni Group/Harvard

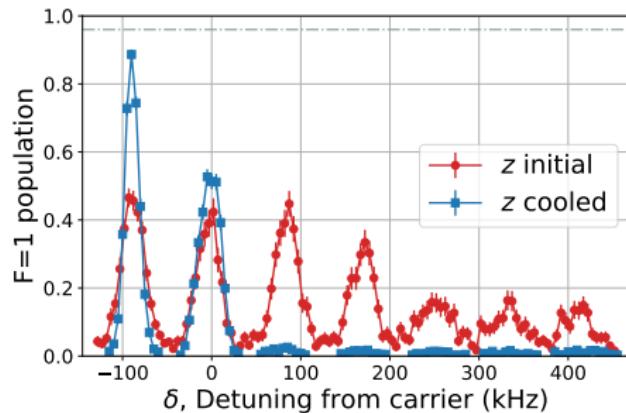
March 27, 2019

Loading



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

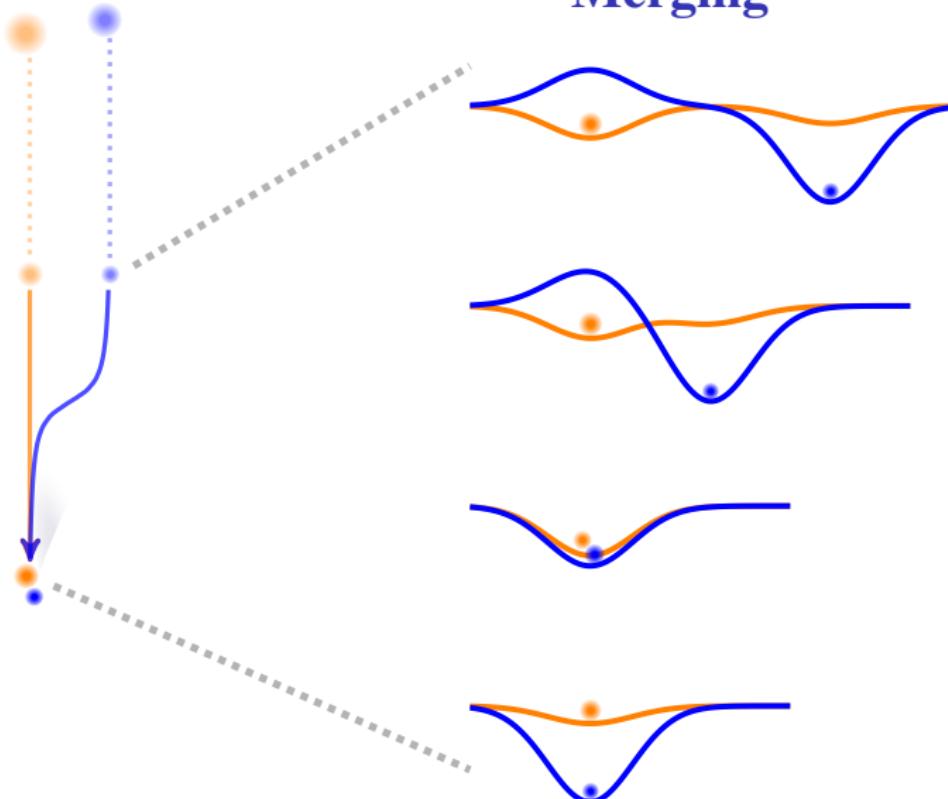
Cooling



Cs: 96% ground state

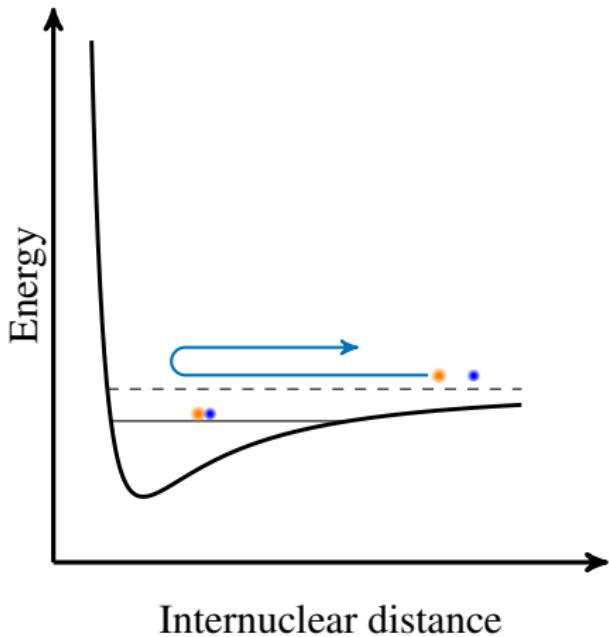
Na: 94% ground state

Merging



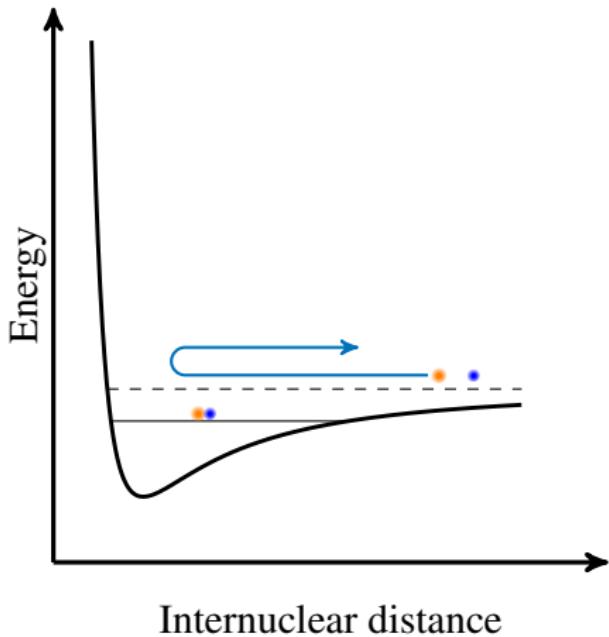
Scattering length a

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



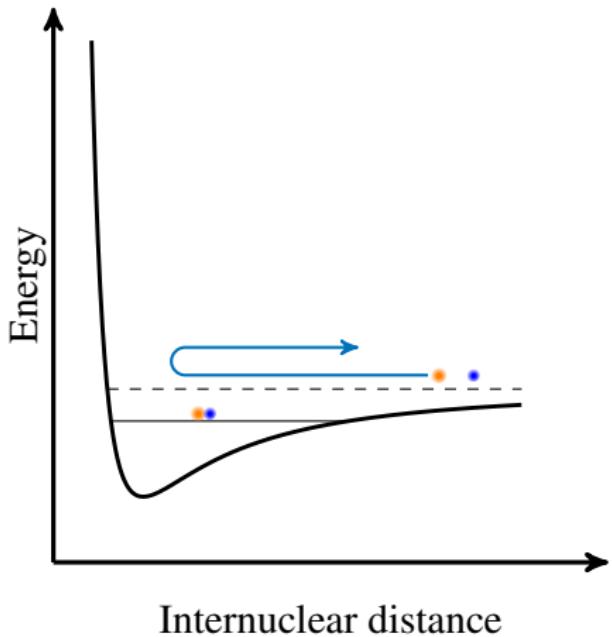
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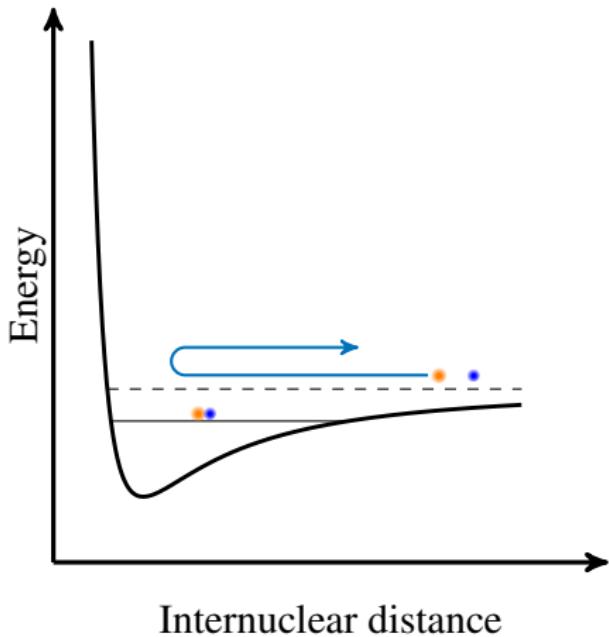
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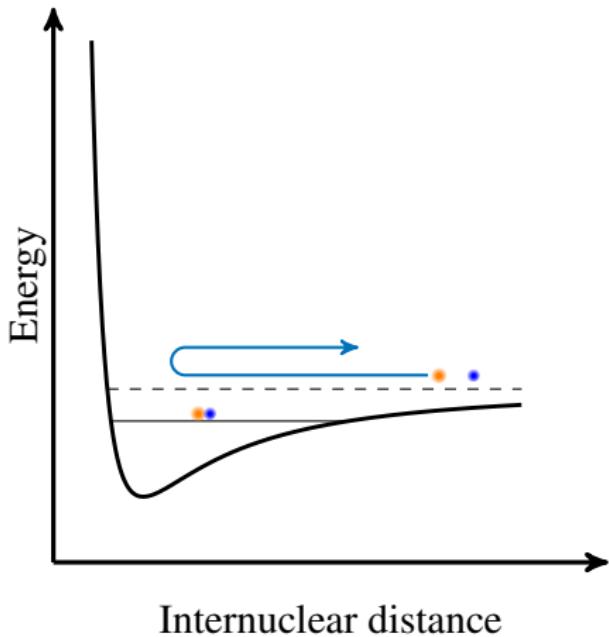
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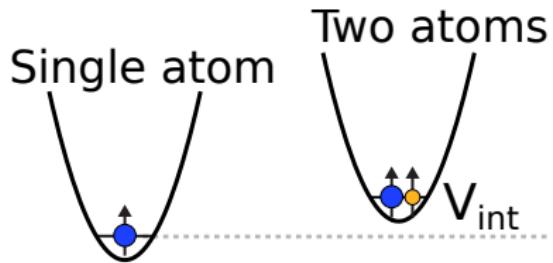


Scattering length a

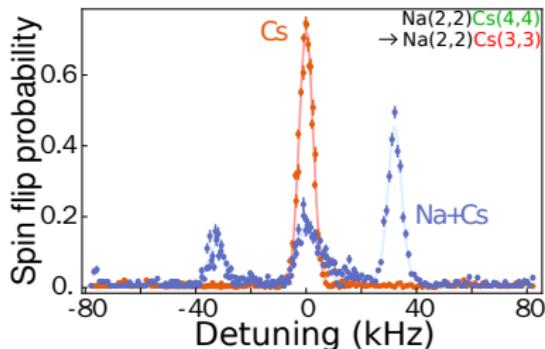
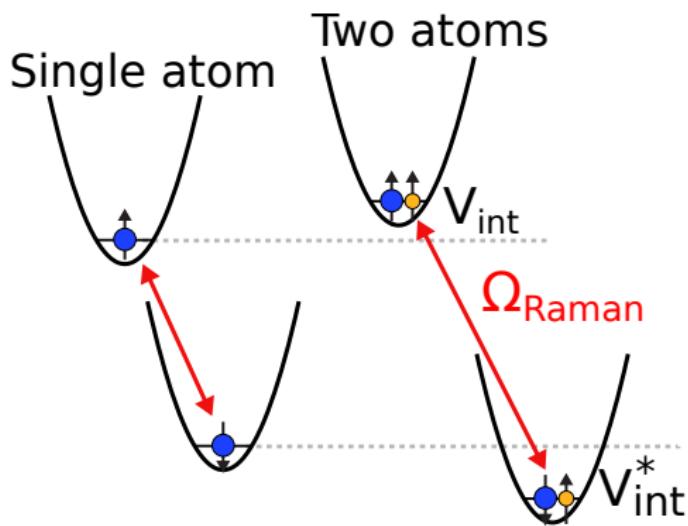
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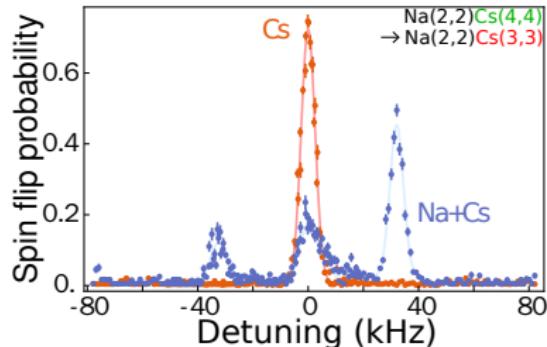
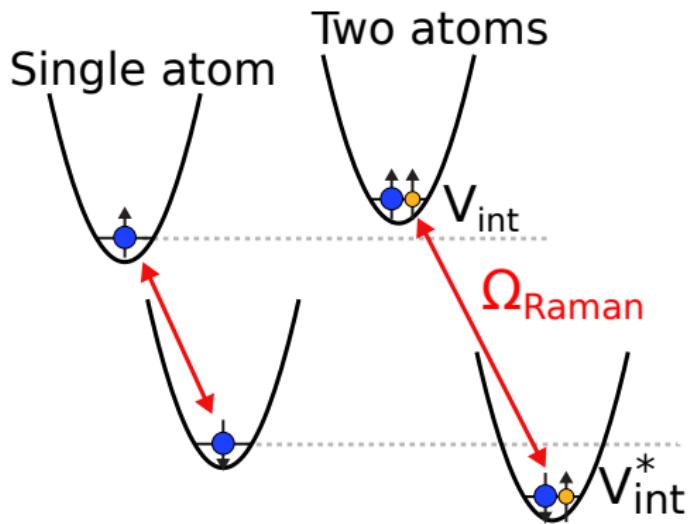
Interaction shift



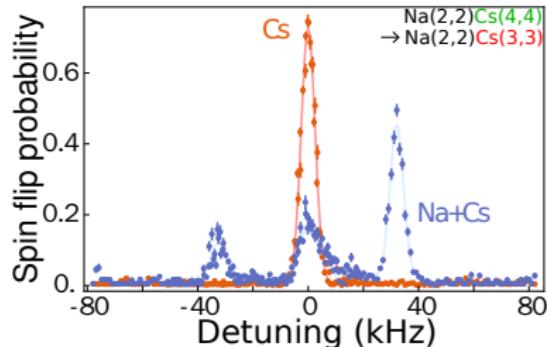
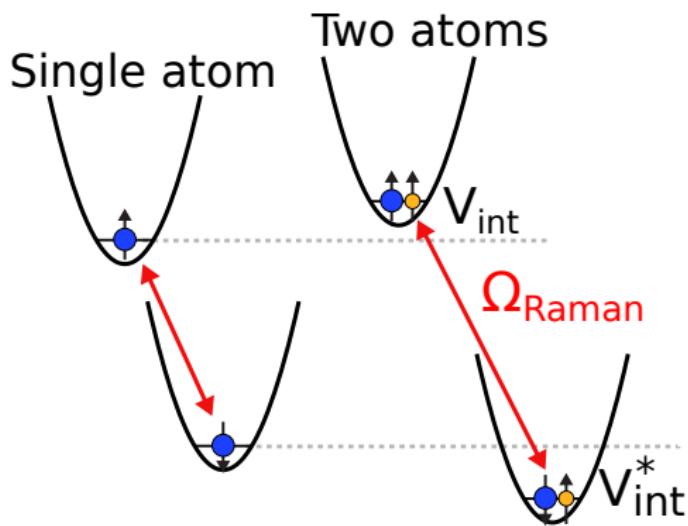
Interaction shift



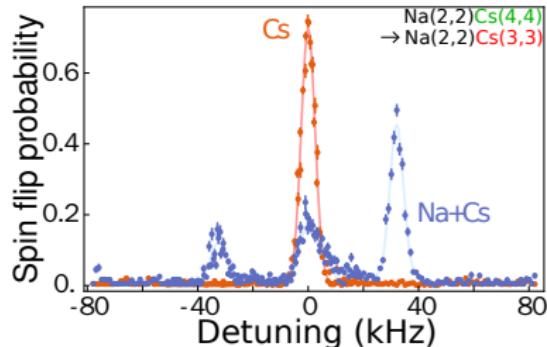
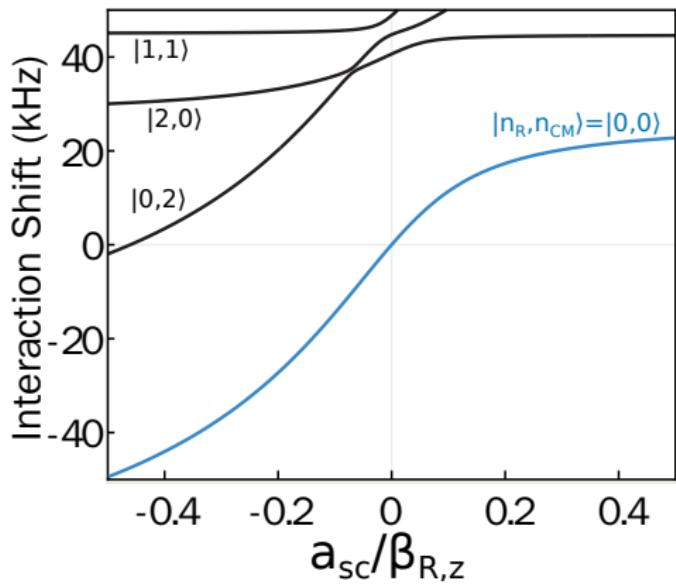
Interaction shift



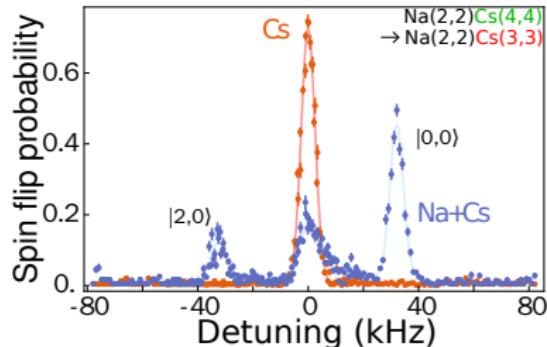
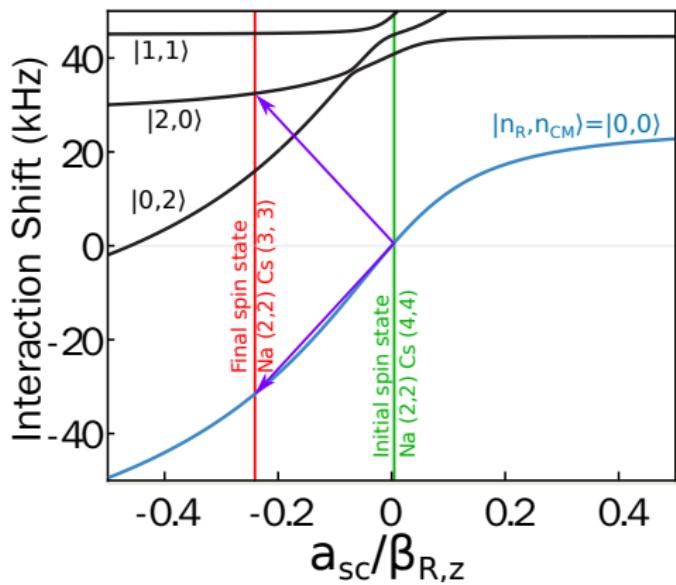
Interaction shift



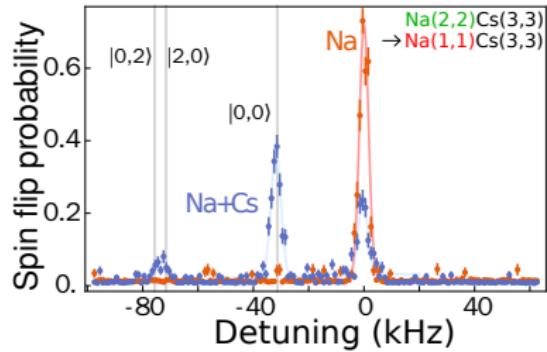
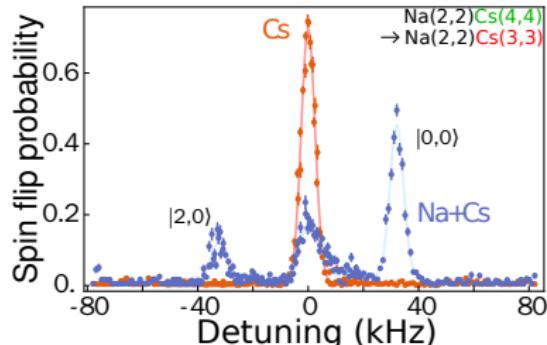
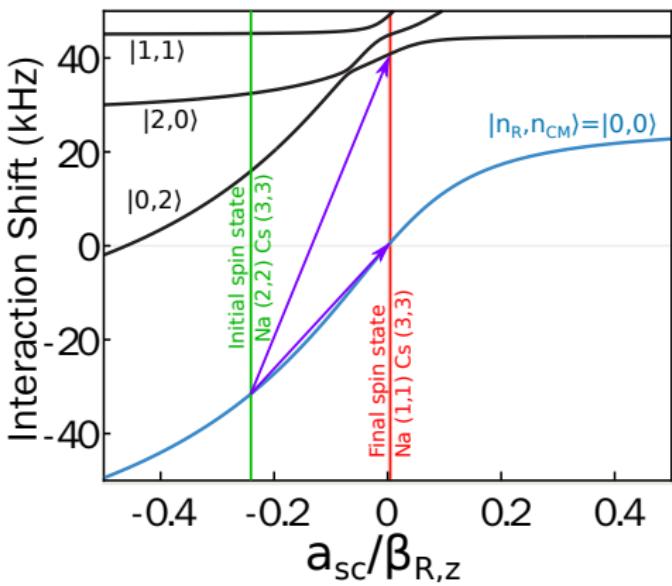
Interaction shift



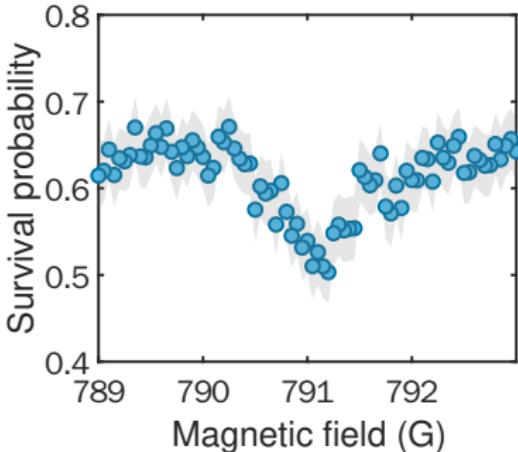
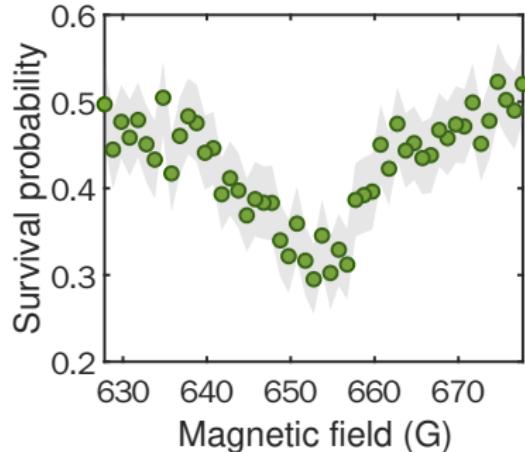
Interaction shift



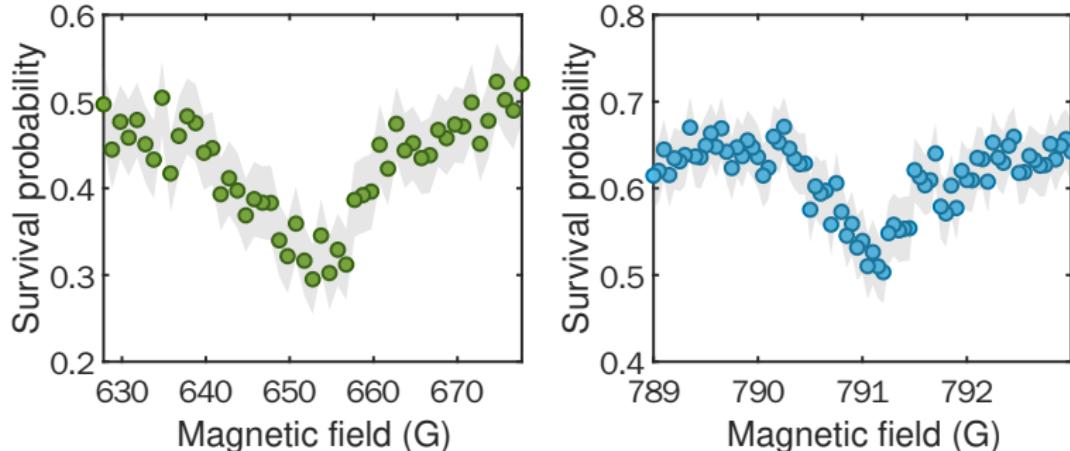
Interaction shift



Na (1, -1) Cs (3, -3) Feshbach resonance



Na (1, -1) Cs (3, -3) Feshbach resonance



	<i>s</i> -wave	<i>p</i> -wave
Predicted (based on interaction shift) ¹	663 G	799 G
Measured	652(3) G	791.2(2) G

¹In collaboration with Bo Gao

Next step

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

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Thank you for your attention.