

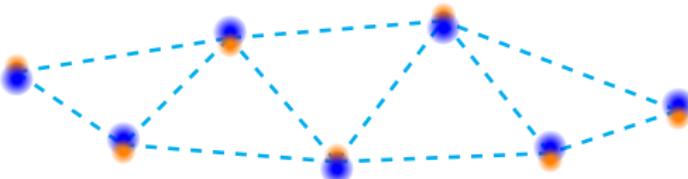
Manipulating single NaCs in optical tweezers

Yichao Yu

Lee Liu, Dr. Jon Hood

Ni Group/Harvard

April 04, 2018

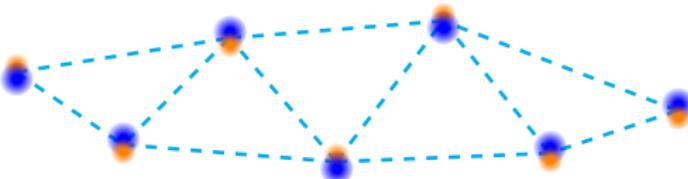


Optical tweezer

- Single site detection
- Single site control
- Flexible geometry

NaCs molecule

- Strong dipole interaction
Dipole moment: 4.6 Debye
- Made from alkali atoms



Optical tweezer

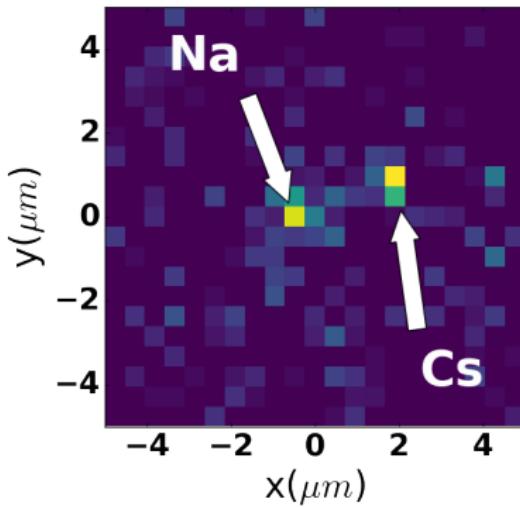
- Single site detection
- Single site control
- Flexible geometry

NaCs molecule

- Strong dipole interaction
Dipole moment: 4.6 Debye
- Made from alkali atoms

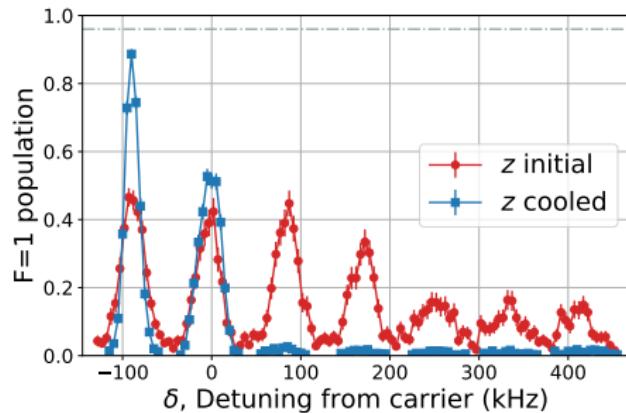


Loading



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

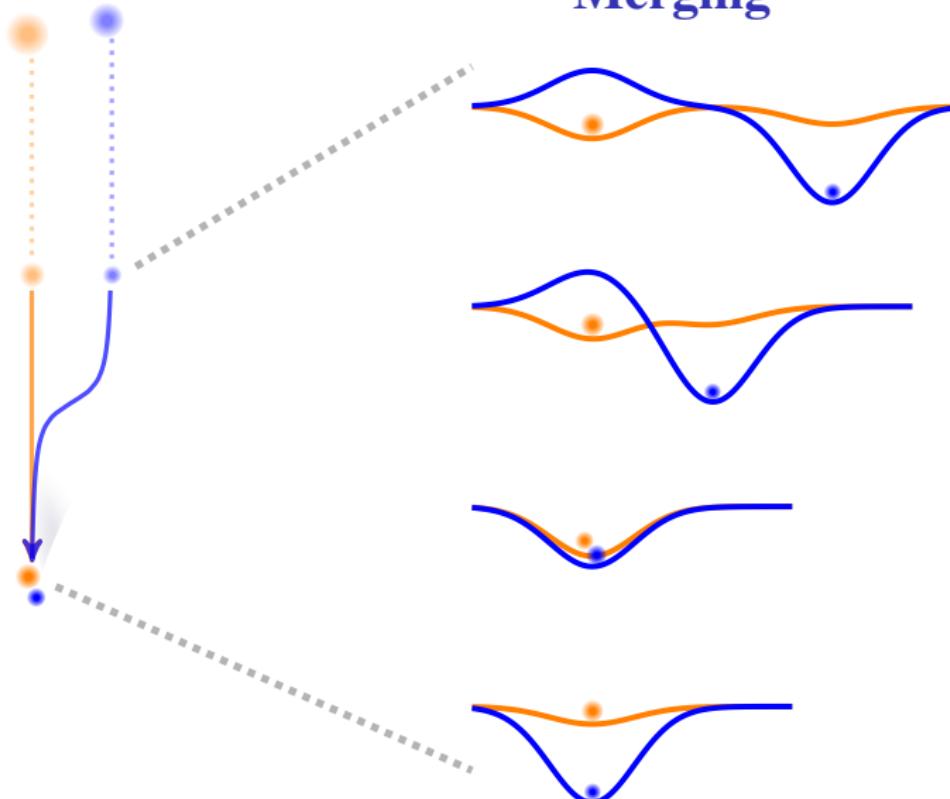
Cooling



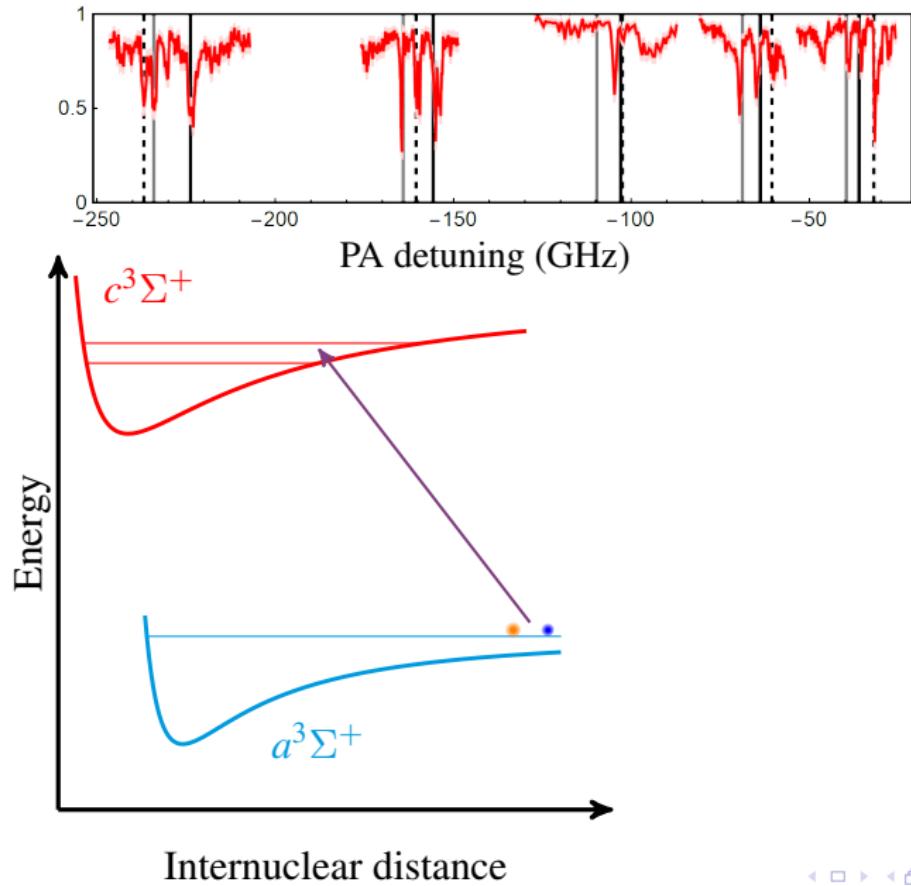
Cs: 96% ground state

Na: 94% ground state

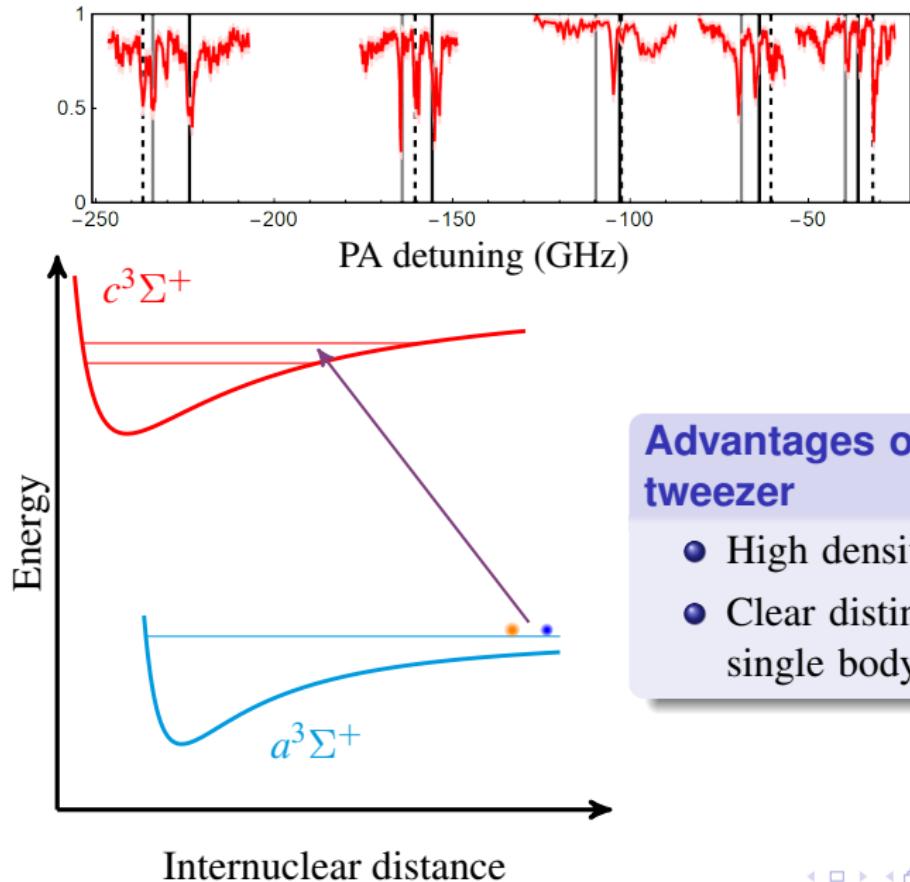
Merging



Photoassociation (PA)



Photoassociation (PA)



Advantages of optical tweezer

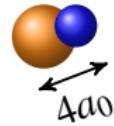
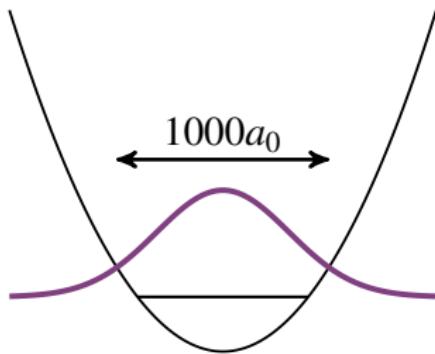
- High density
- Clear distinction from single body loss

Getting to ground state

- Full control of internal state
- Stronger interaction

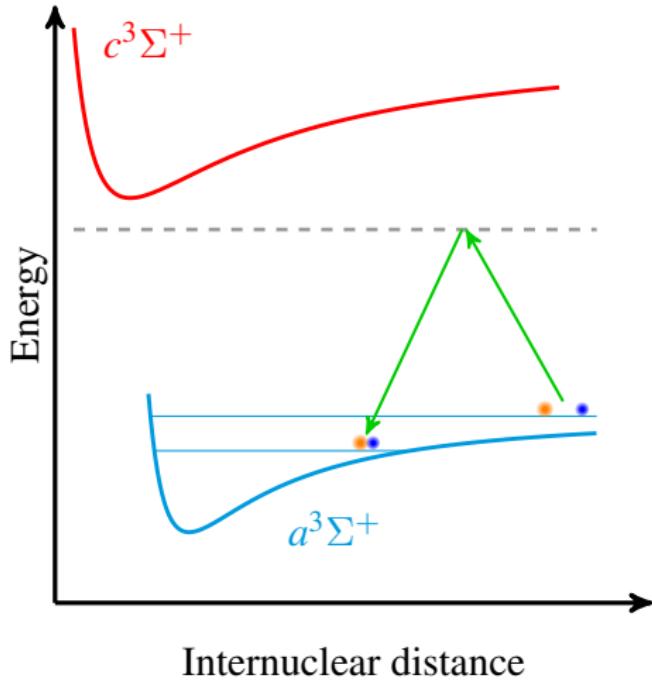
Getting to ground state

- Full control of internal state
- Stronger interaction

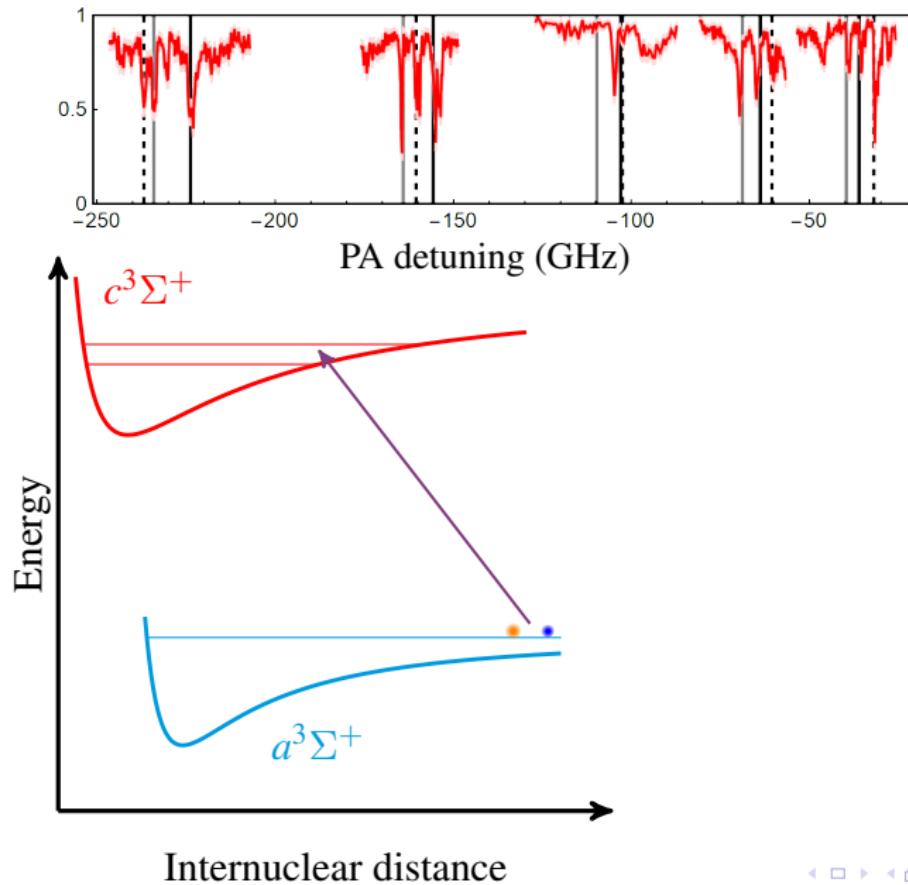


Getting to ground state

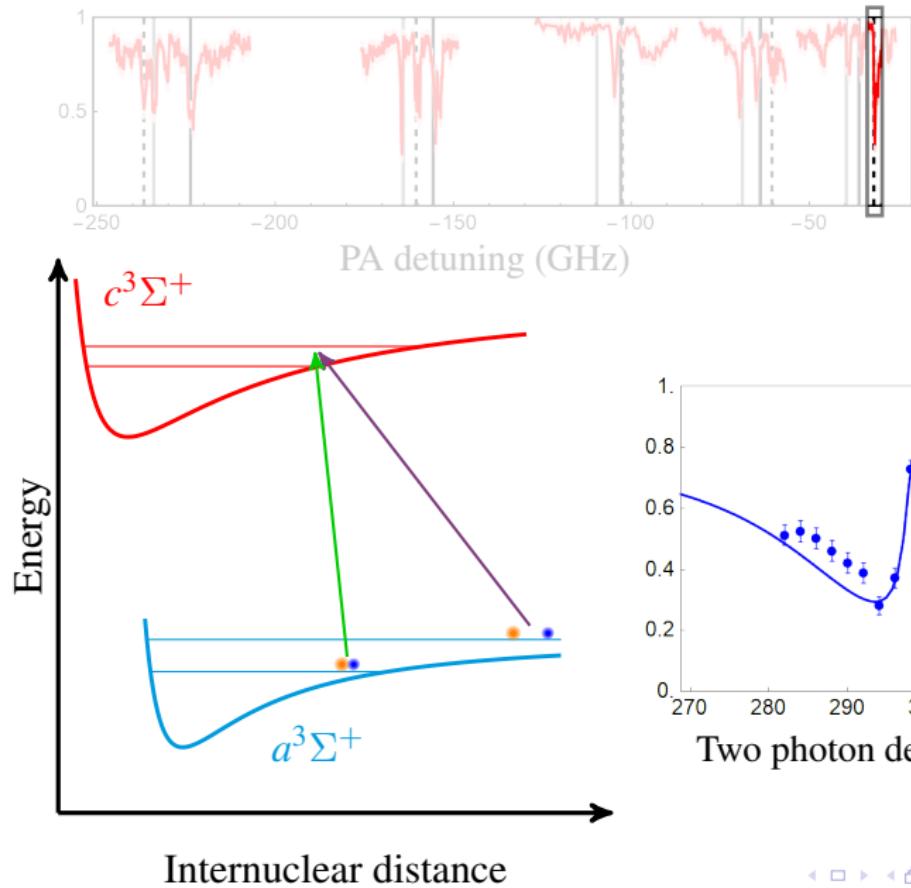
- Full control of internal state
- Stronger interaction



Photoassociation (PA)



Electromagnetically Induced Transparency (EIT) spectroscopy



Next step

Make ground state molecules!!

Next step

Make ground state molecules!!

Thank you for your attention.

