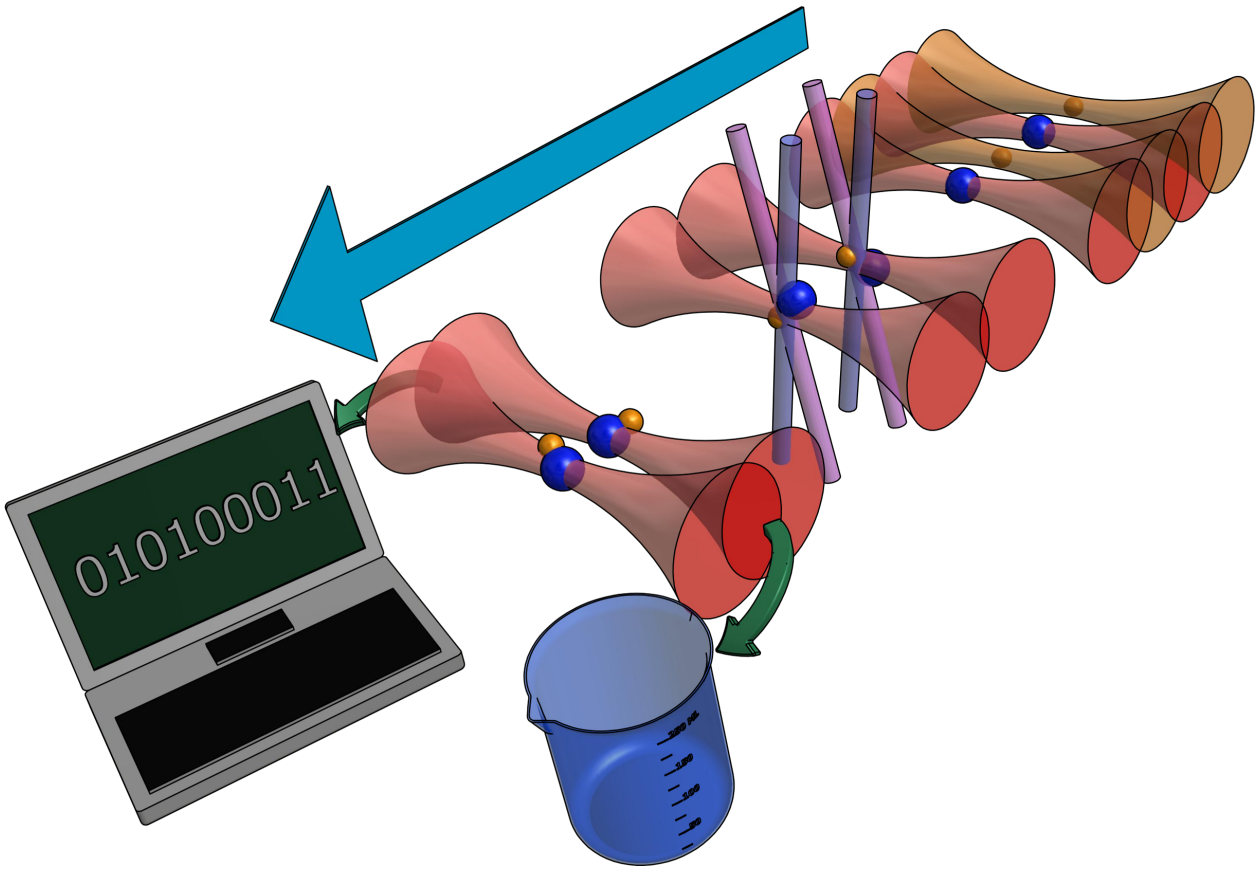
# Trapping and imaging of single atoms in the presence of light shift




Yichao Yu
May 26, 2016
Ni Group/Harvard

**Group members**
Nicholas Hutzler
Lee Liu
Jessie Zhang
**PI**
Kang-Kuen Ni

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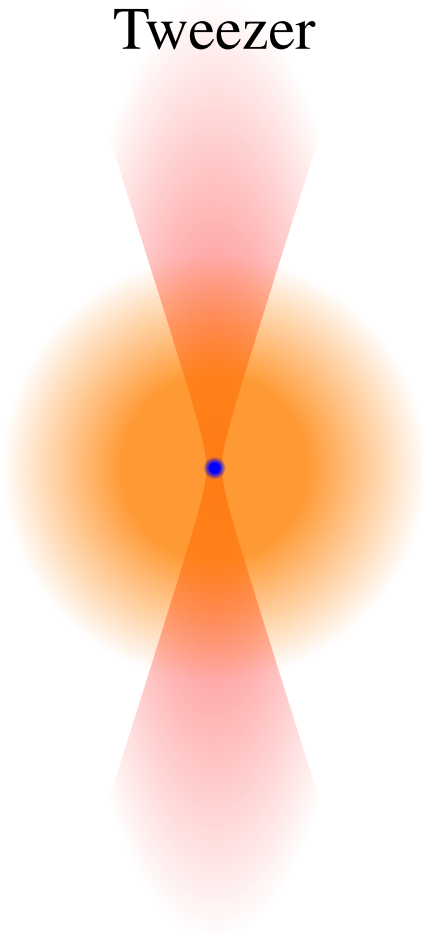

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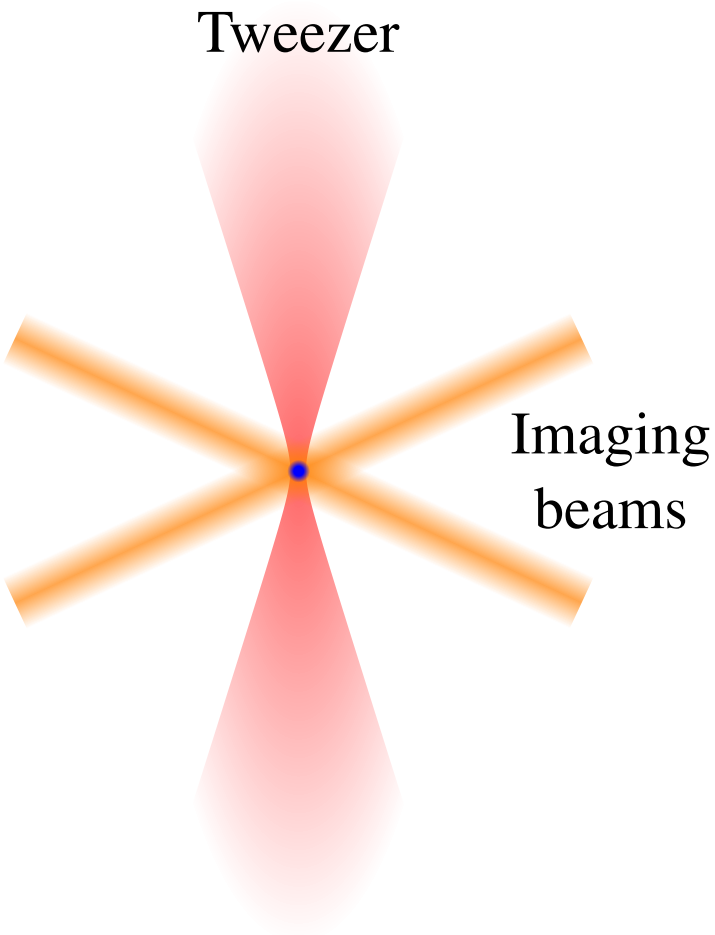

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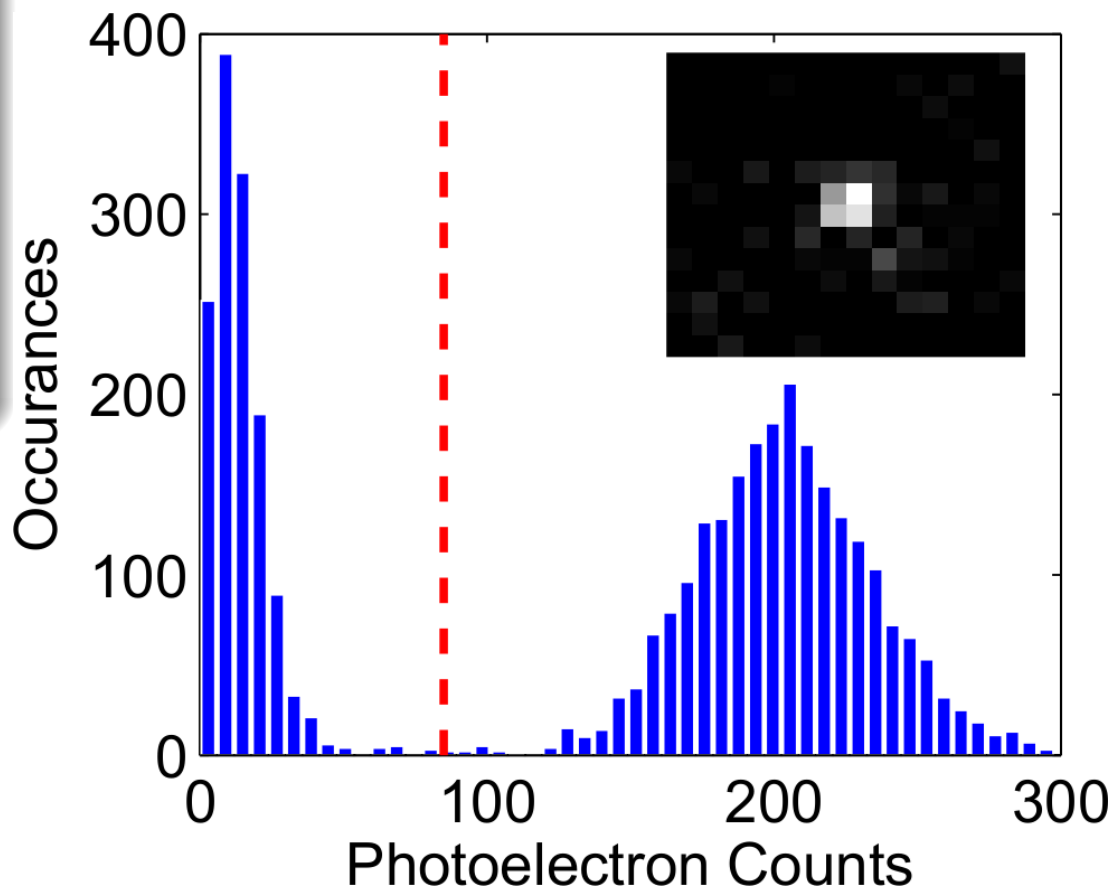

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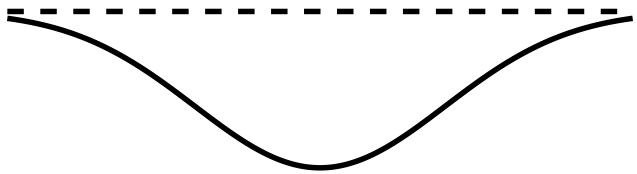

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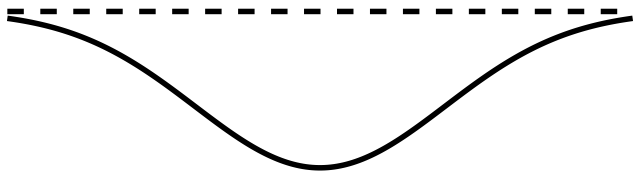

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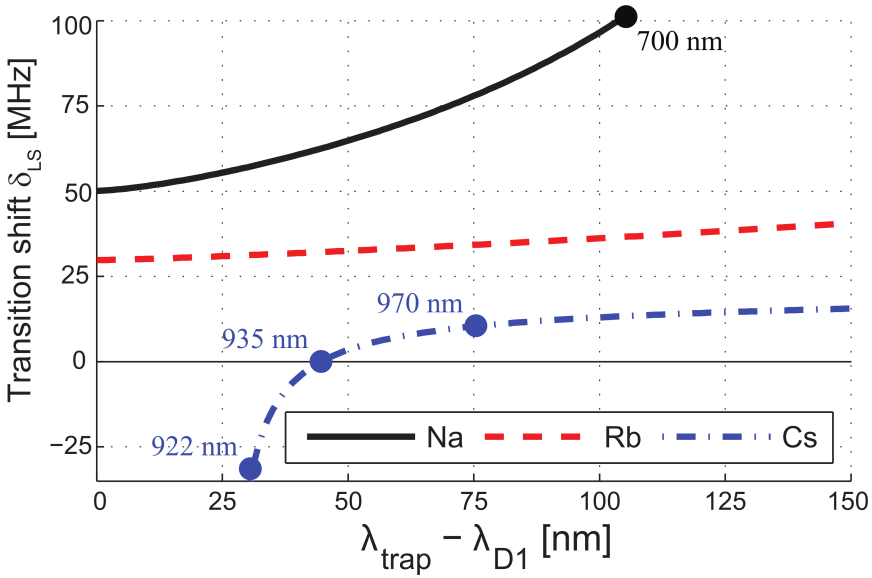


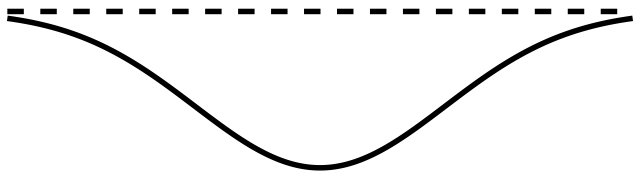

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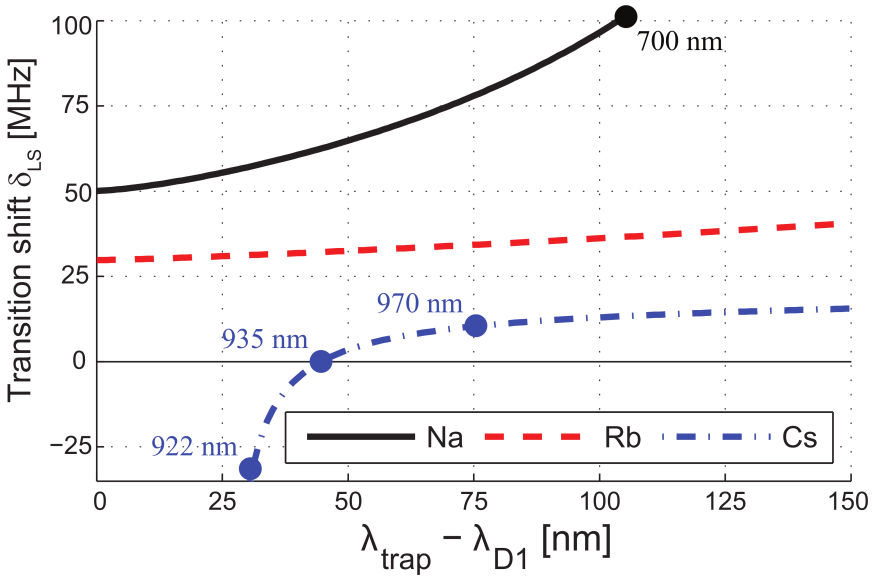


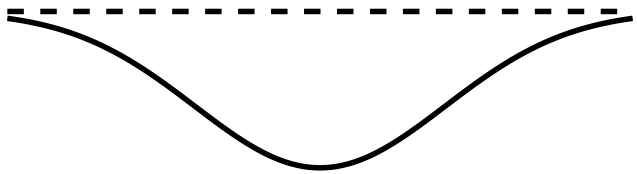

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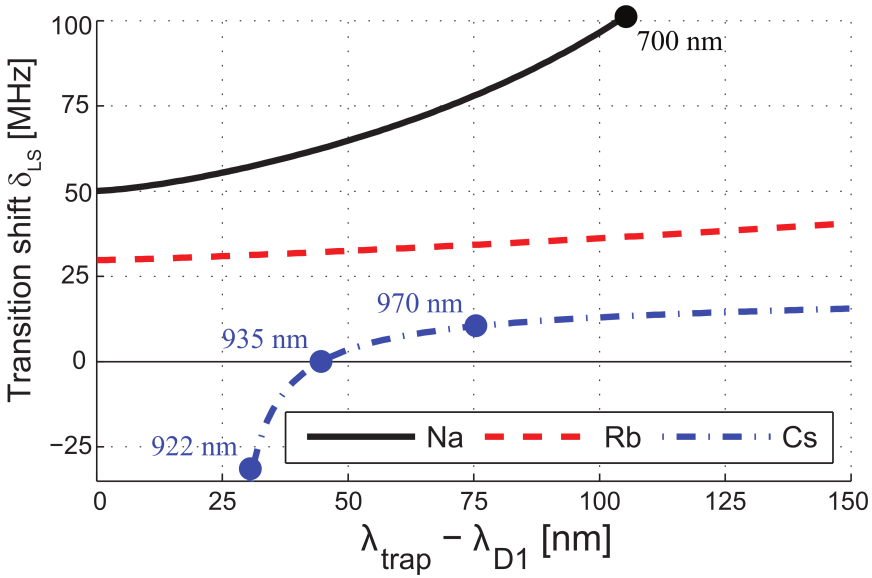


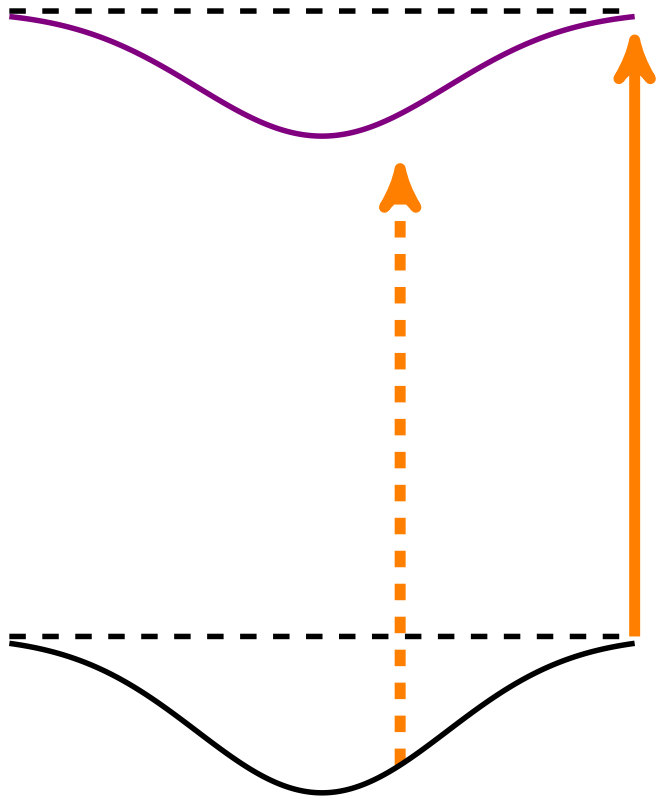

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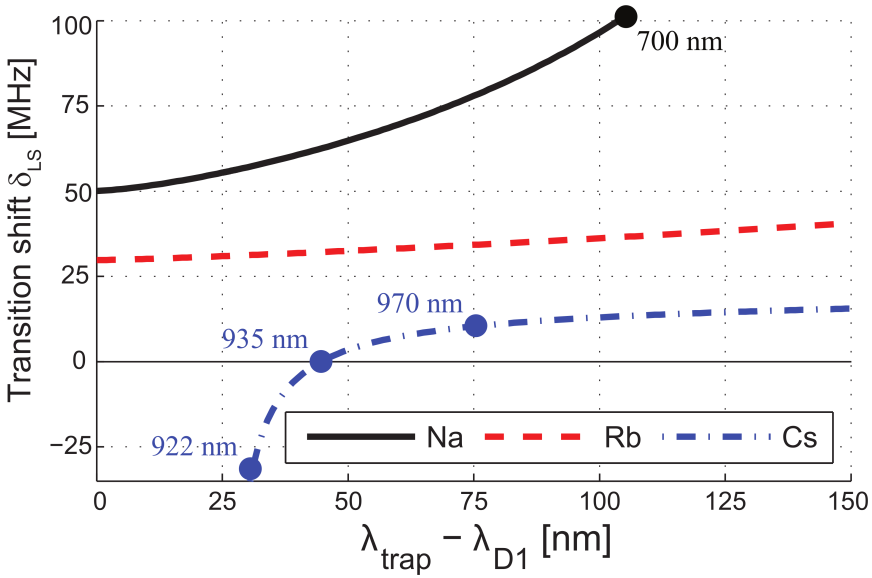


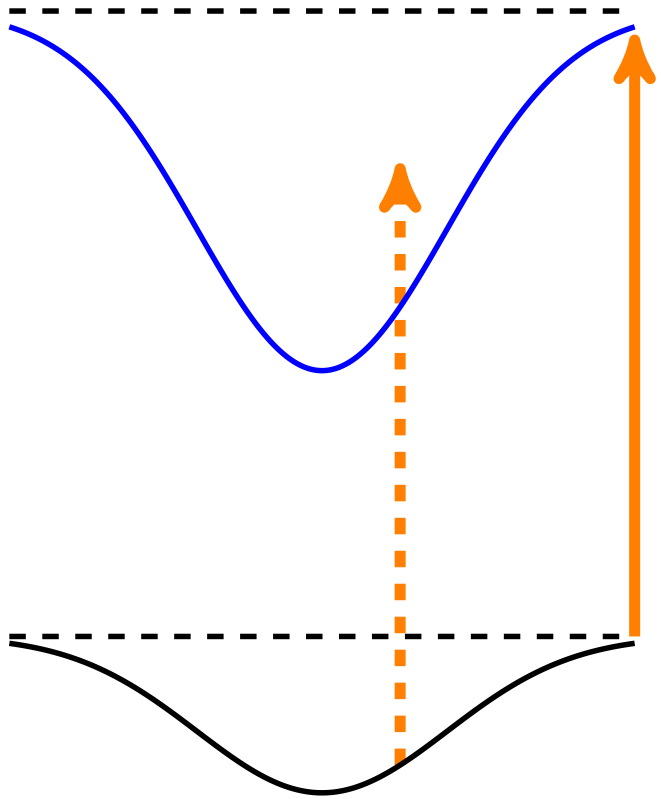

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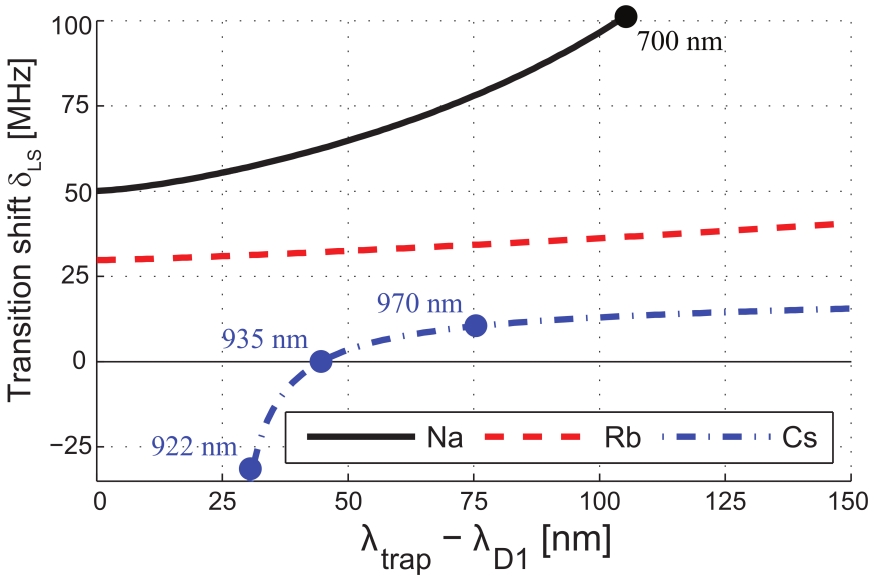


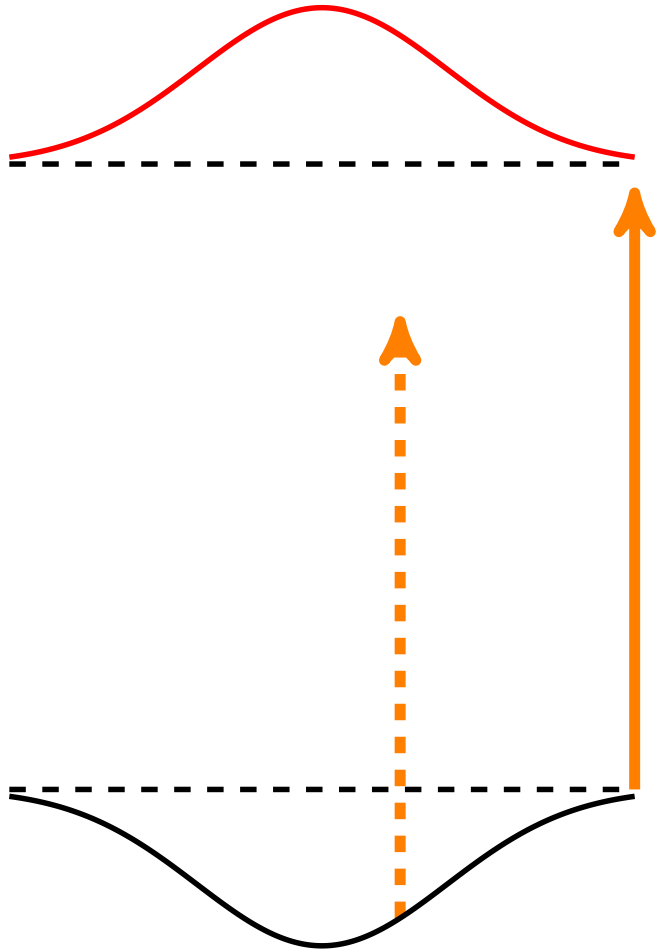

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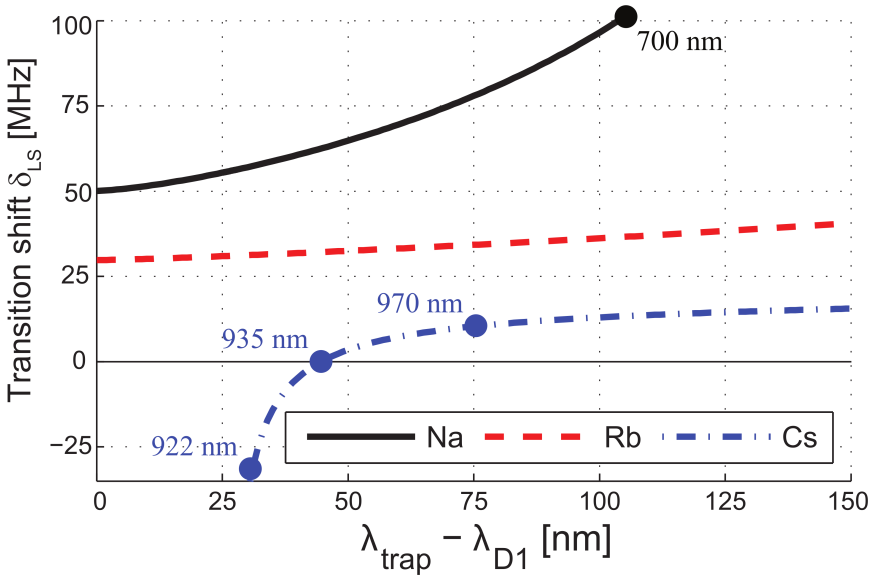
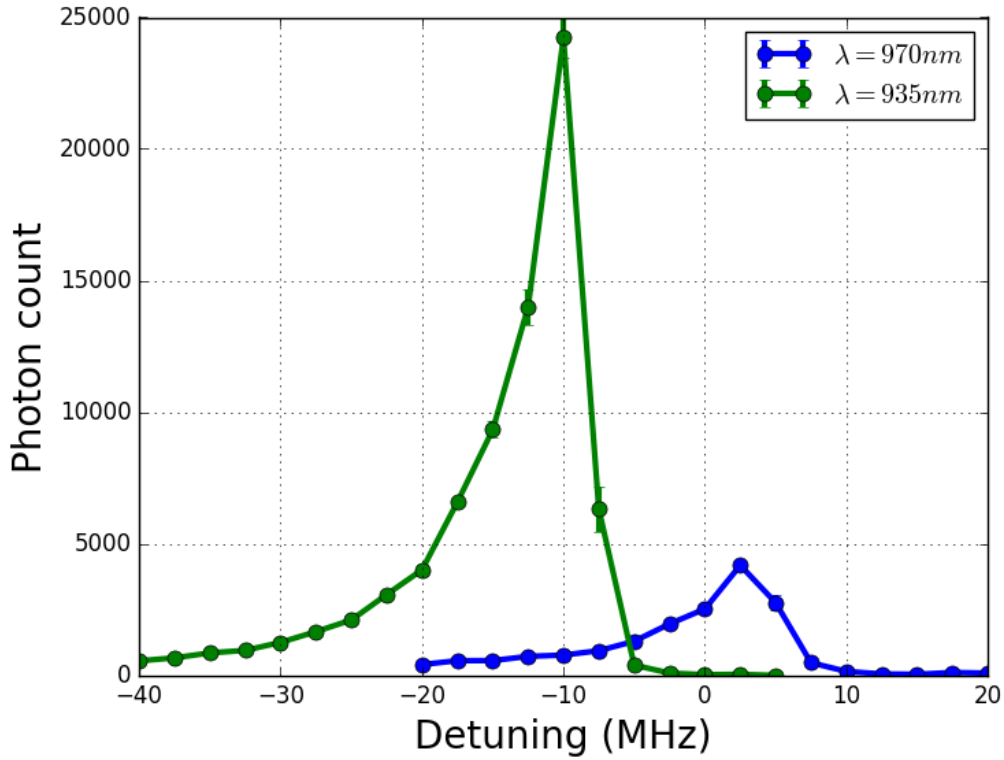
Cs single atom loading

| $\lambda_{trap}(nm)$ | 922 | 935 | 970 |
|---|---|---|---|
| Loading (%) | 0 | $\approx 50$ | $\approx 50$ |




Cs single atom imaging

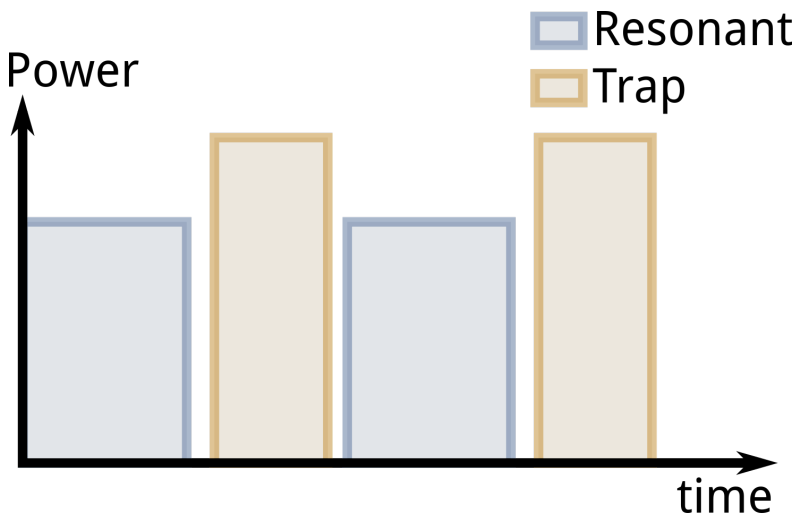


## Trap modulation

Alternate between trap and resonant (cooling and imaging) light at $1 \sim 3$ MHz

$f_{trap} = 10 \sim 400$ kHz

$\Gamma = 2\pi \times (5 \sim 10)$ MHz



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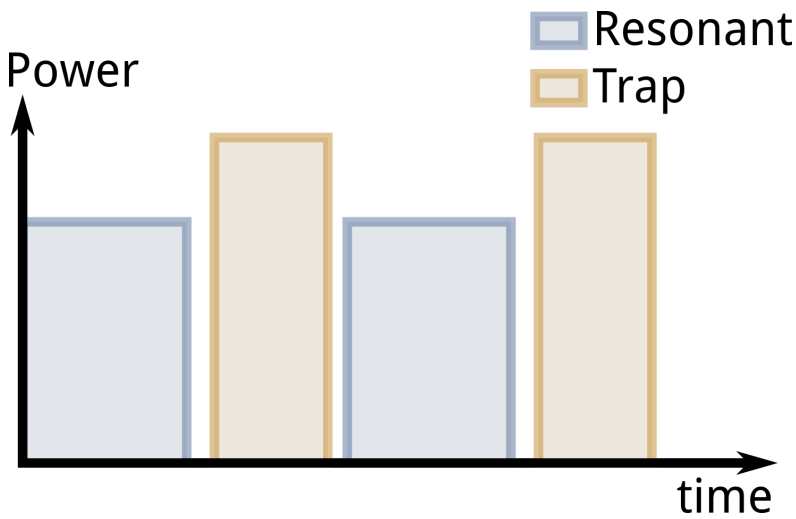


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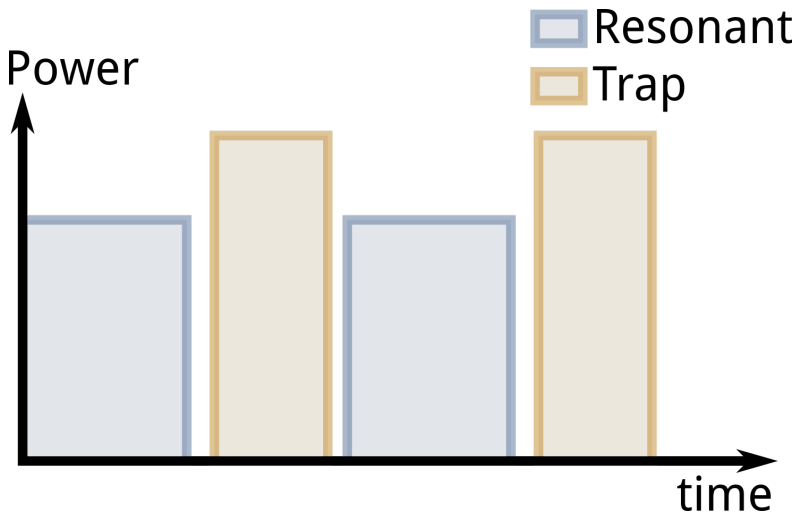


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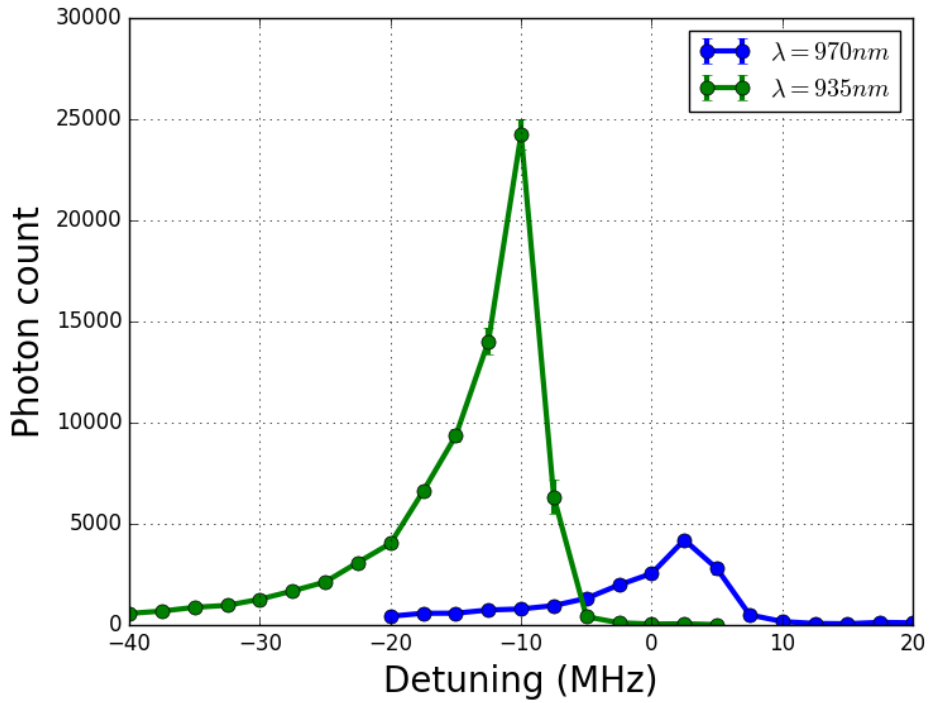

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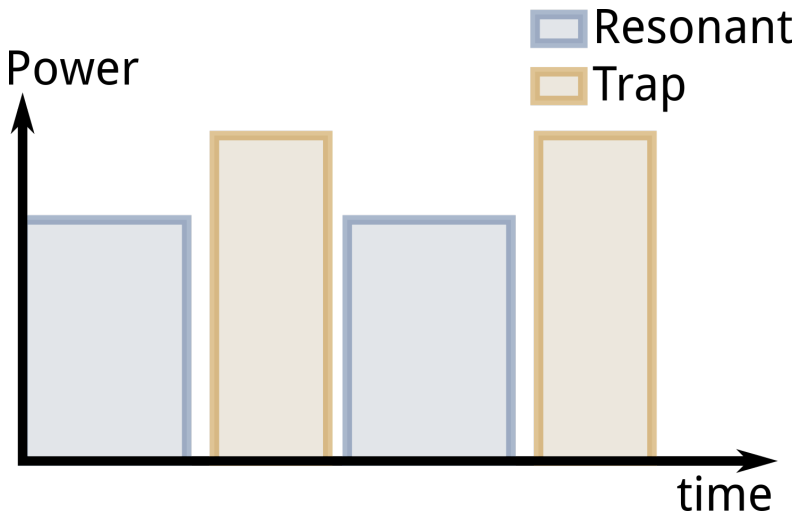


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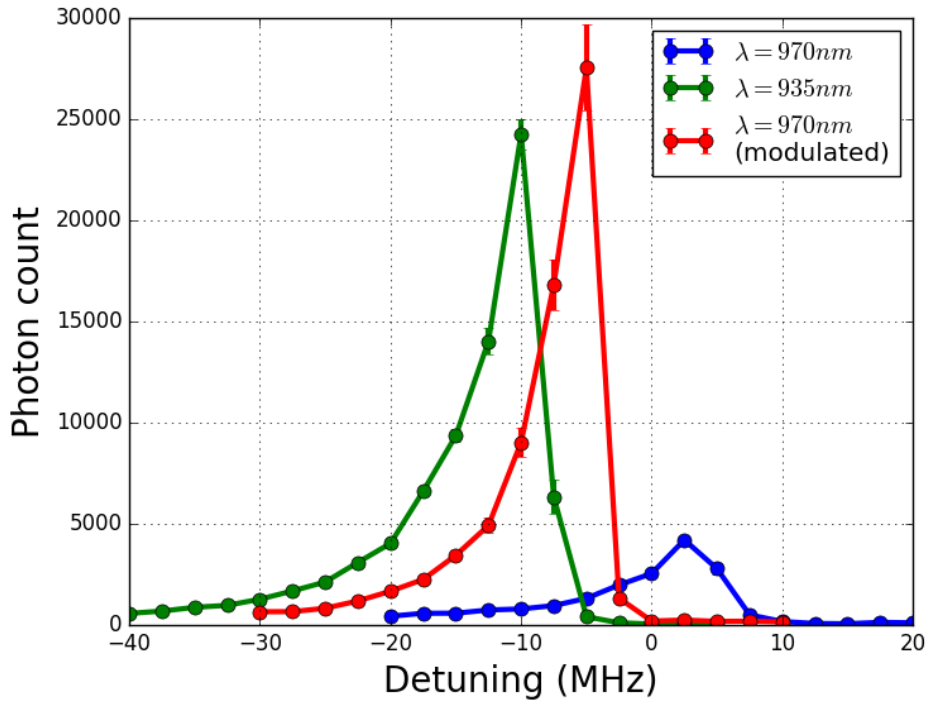

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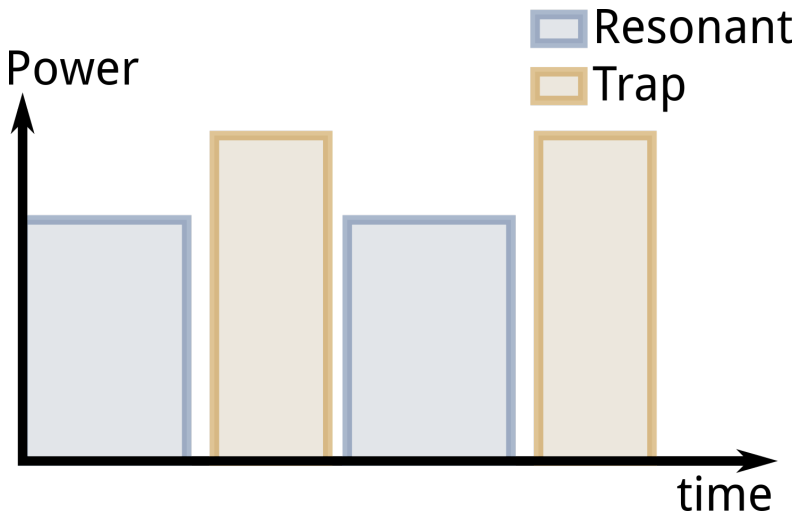


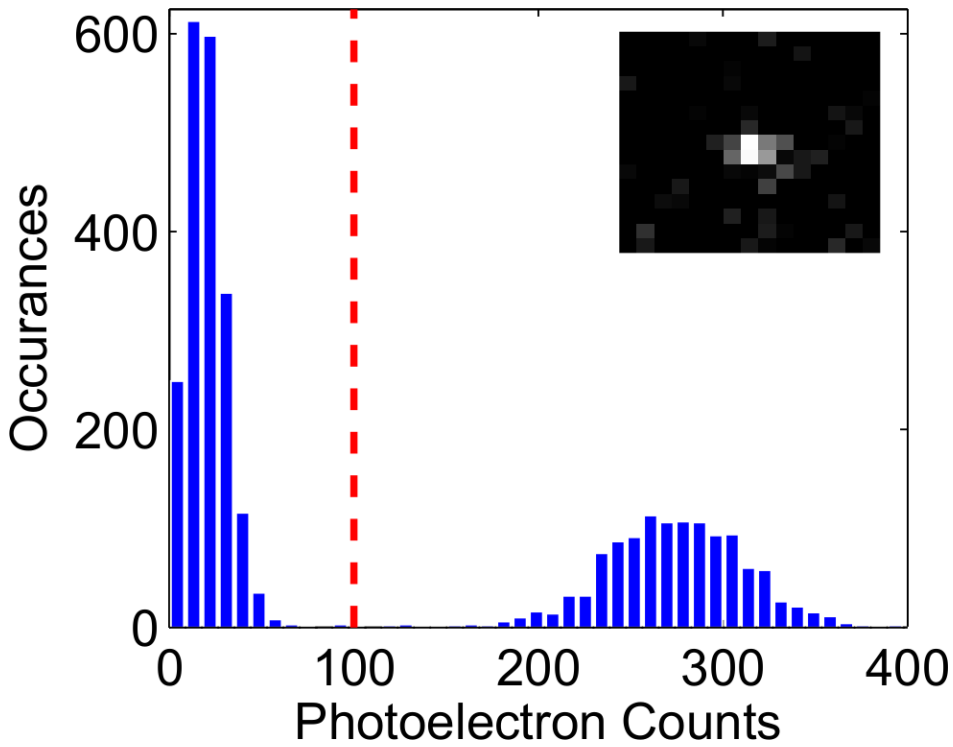


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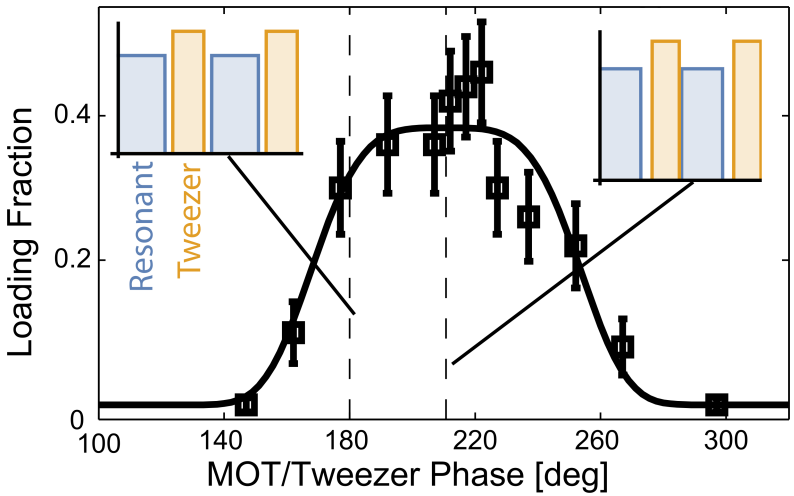


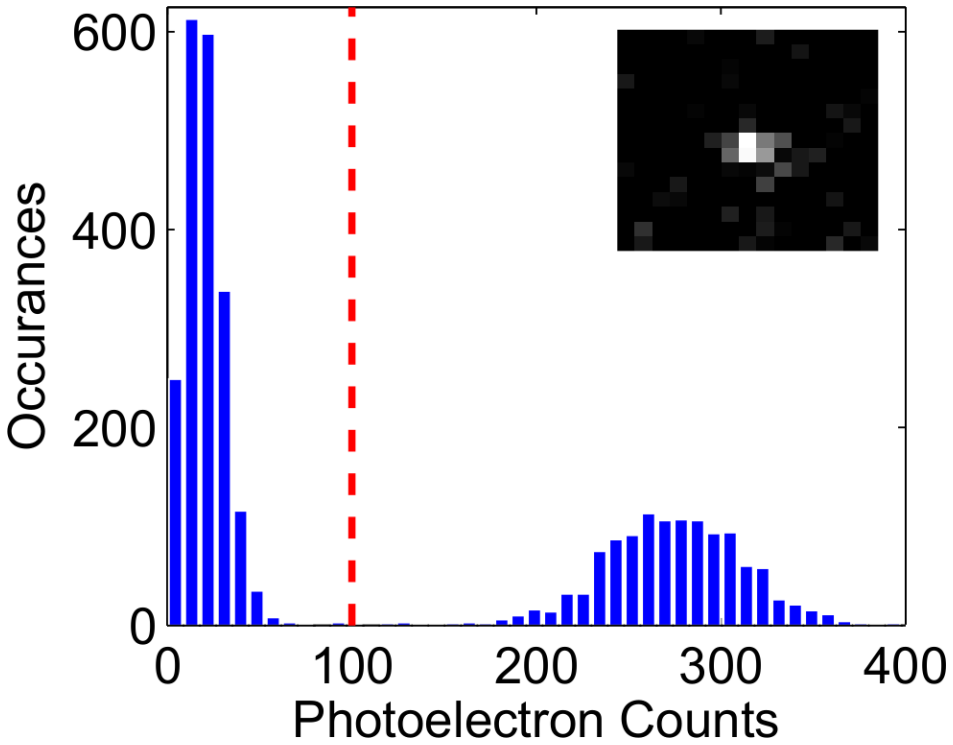


Na Single Atom Loaded!!

# Conclusion

- Measured the effect of light shift on loading and imaging of single atom
- Overcome the light shift by alternating trapping and resonant light to achieve loading of single Na atom.
- Generalizable to other species