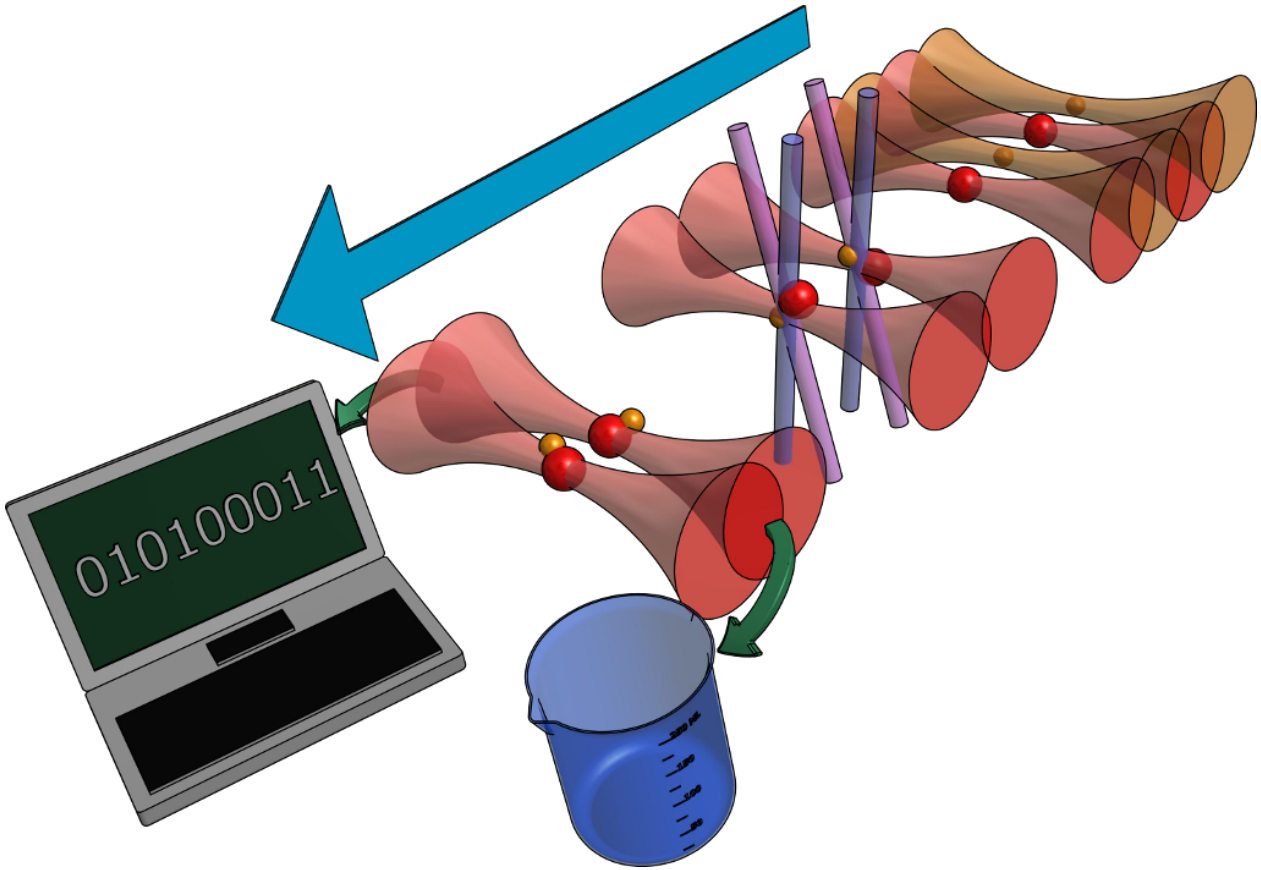
Trapping and imaging of single atom in the present of light shift



Yichao Yu
May 26, 2016
Ni Group/Harvard

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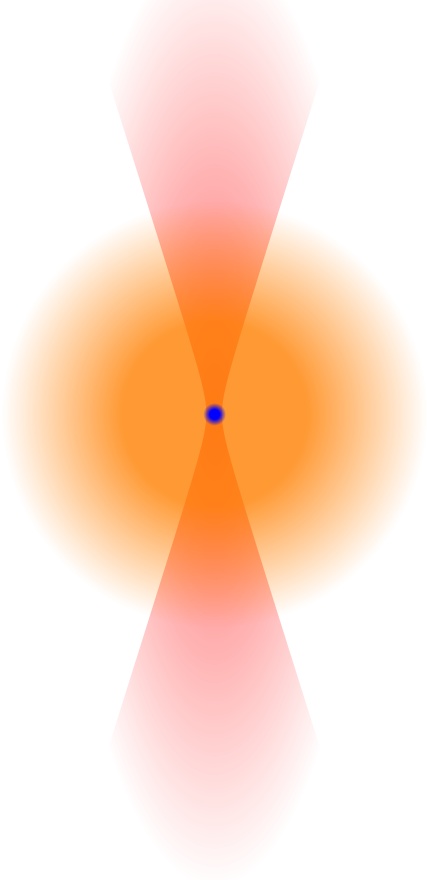

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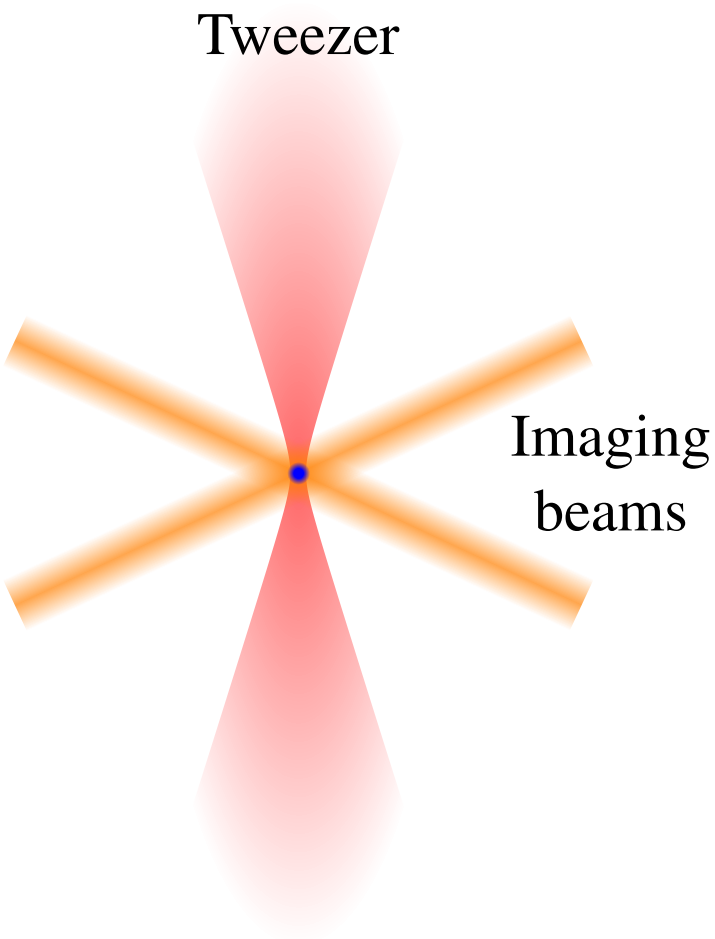

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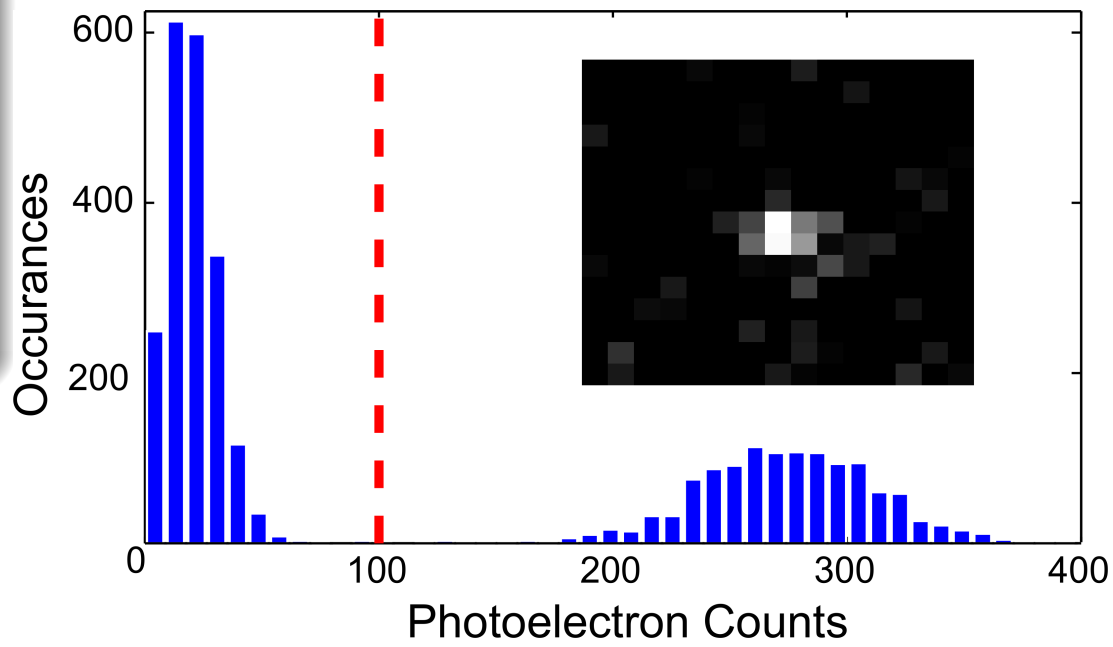

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Light shift

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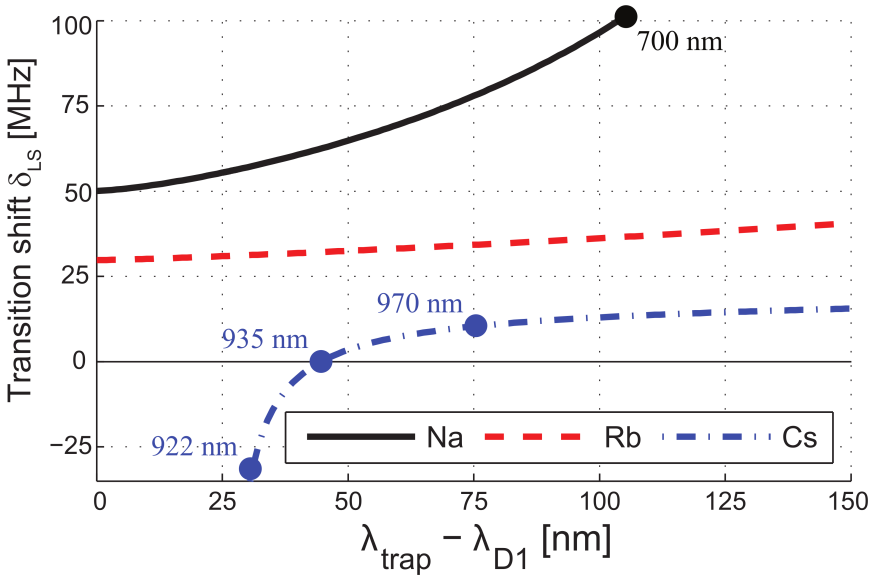
- Shift imaging light out of resonance



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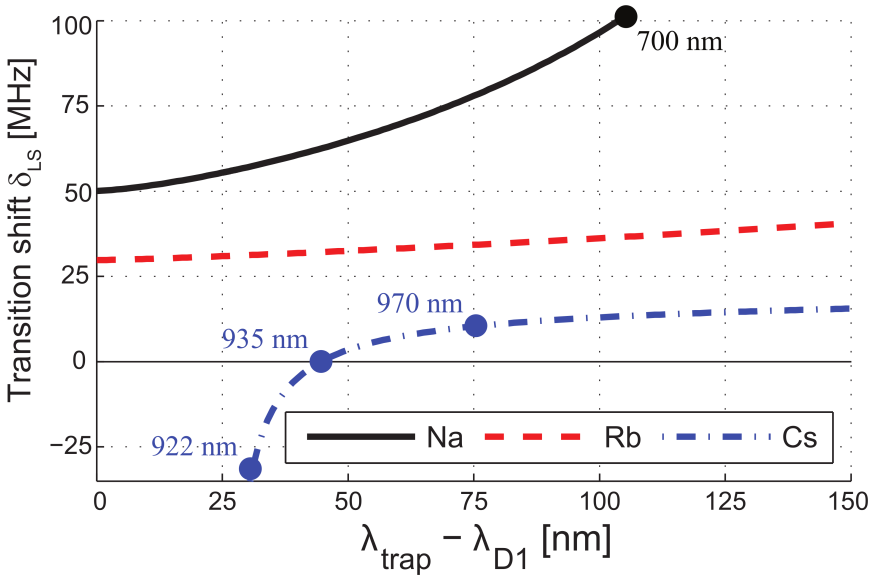

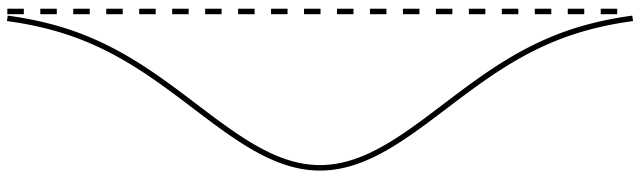

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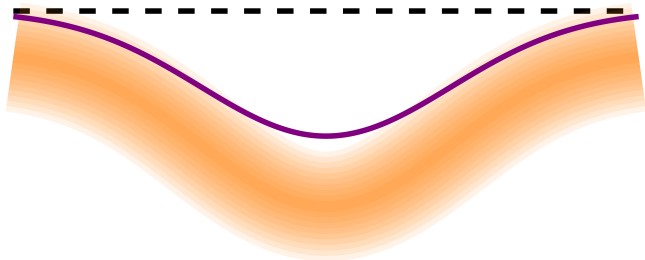

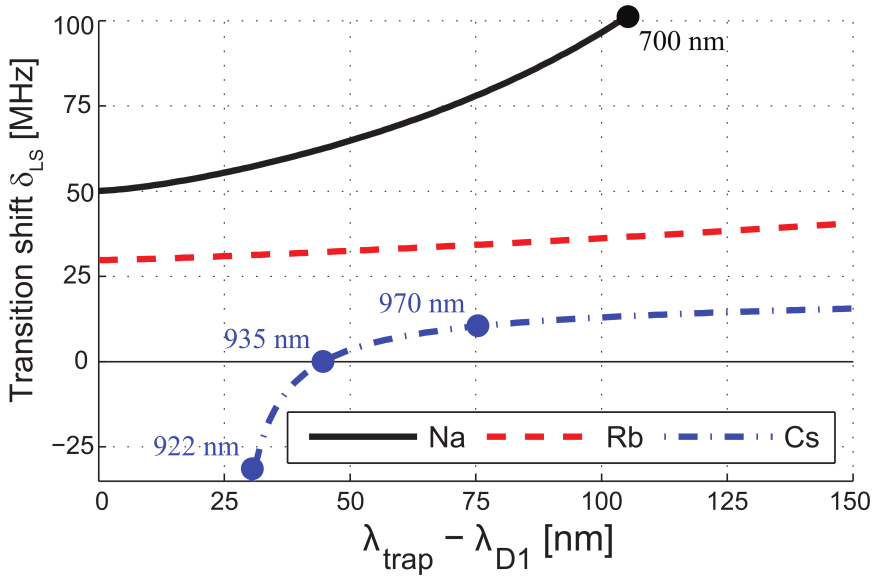

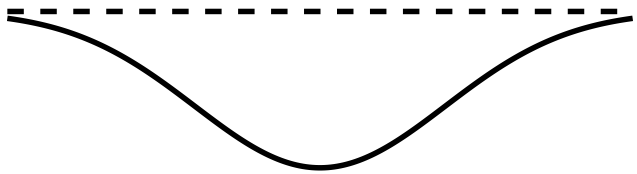

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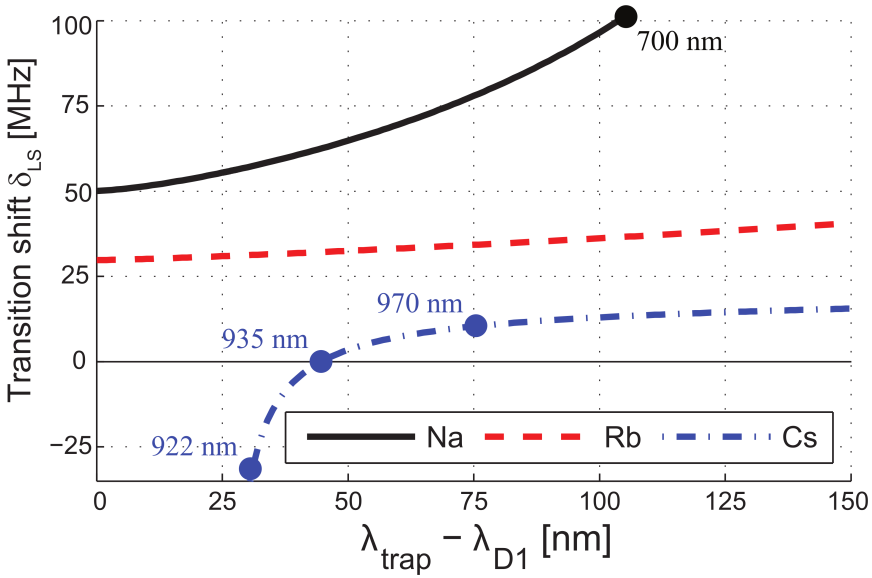

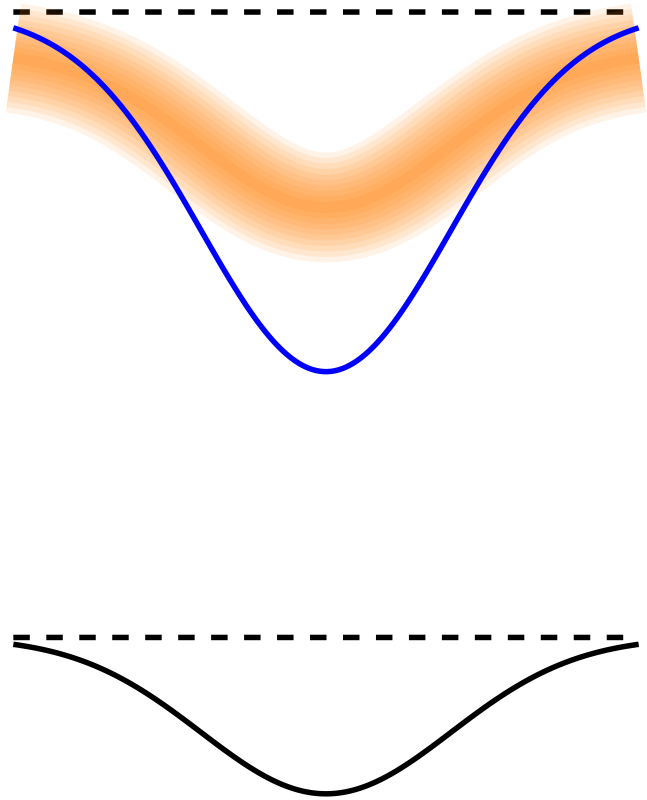

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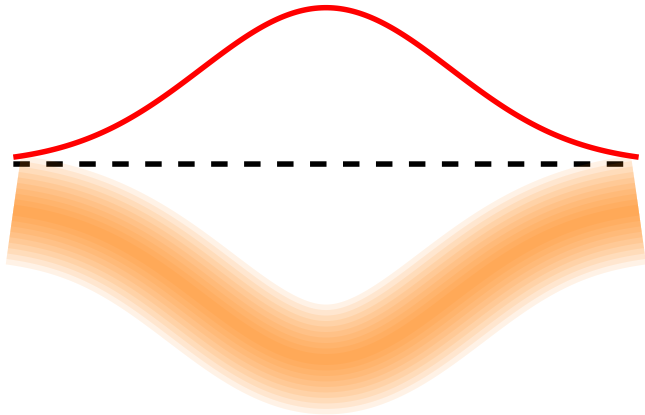

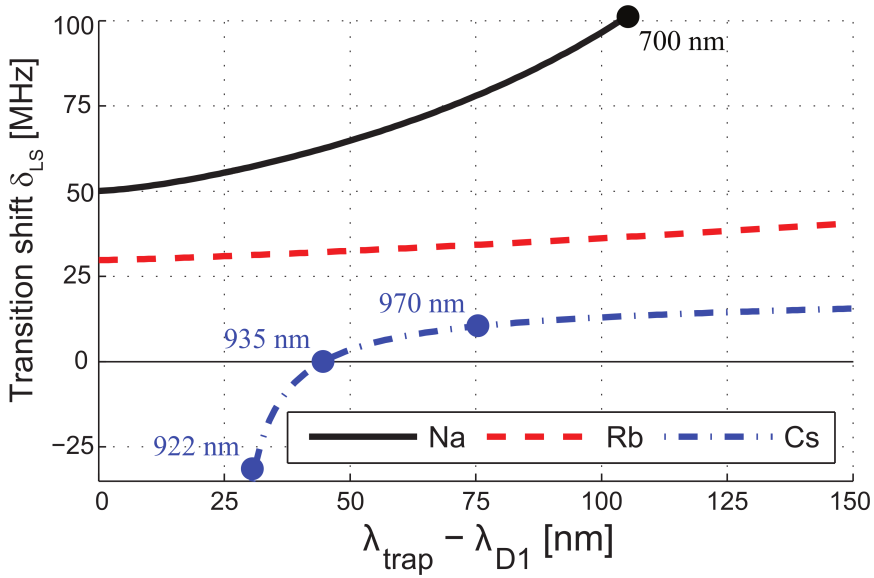

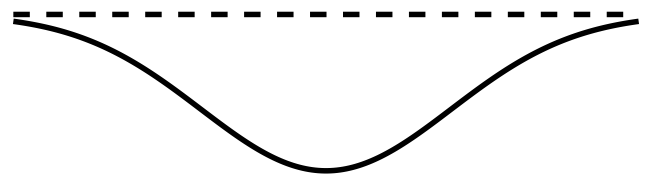

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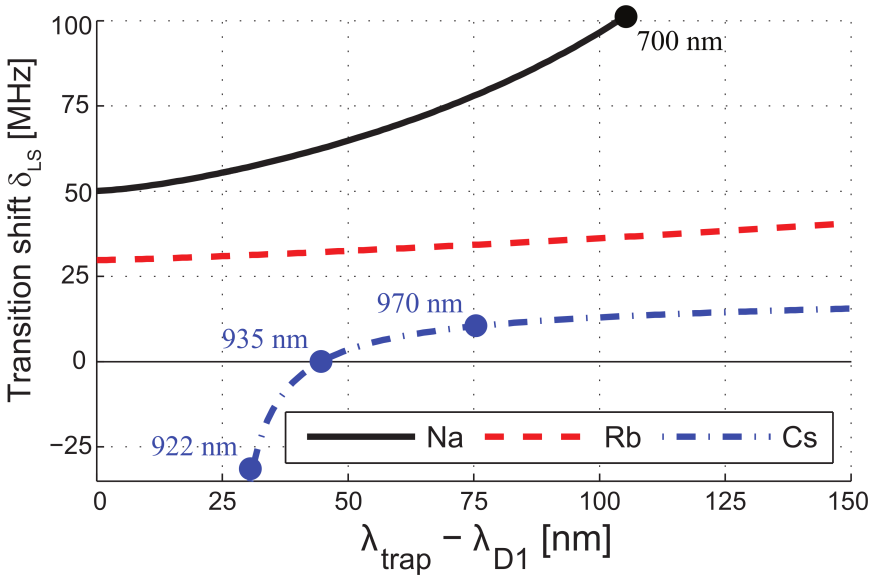
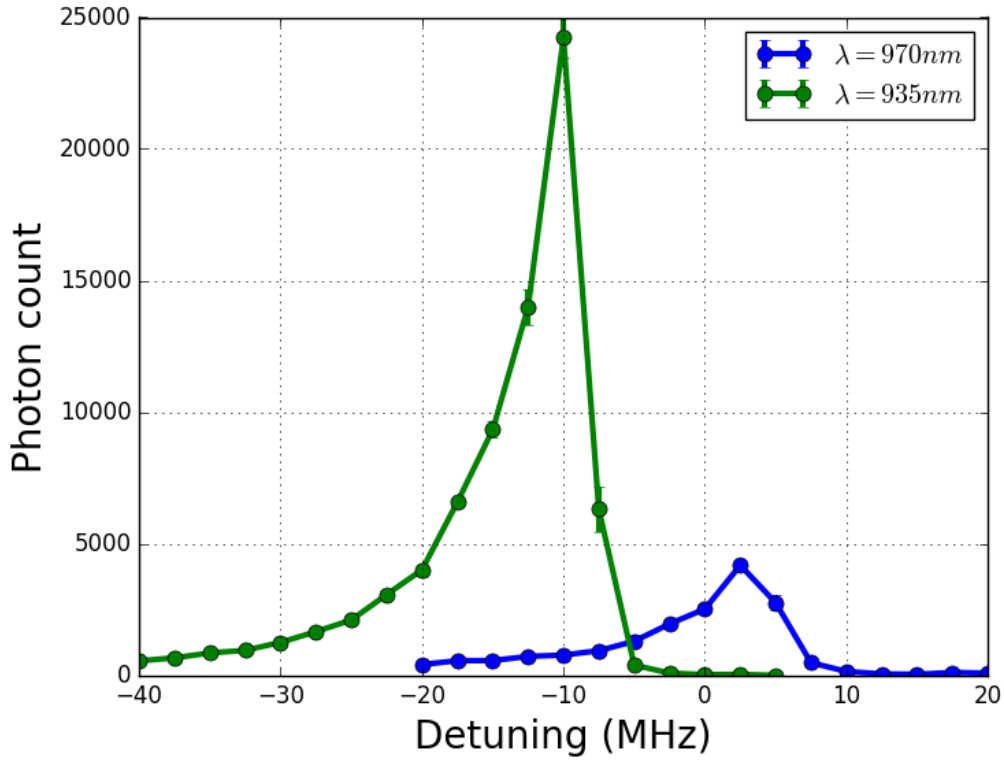


Cs single atom loading

λ_{trap}	922	935	970
Loading %	0	≈ 50	≈ 50

Cs single atom imaging



Trap switching

- Alternate between resonant and trap light
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  $f_{trap} = 10 \sim 400$kHz
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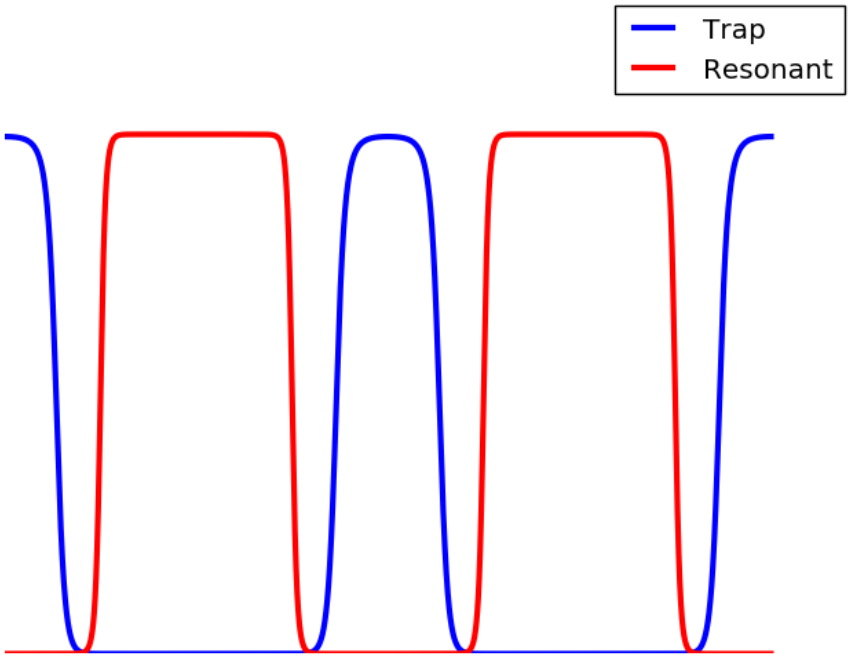

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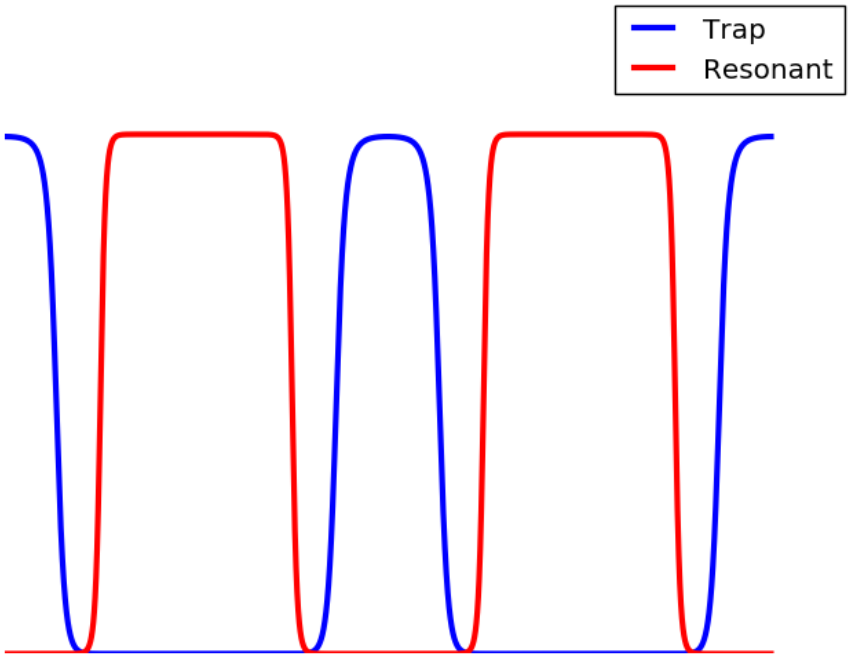

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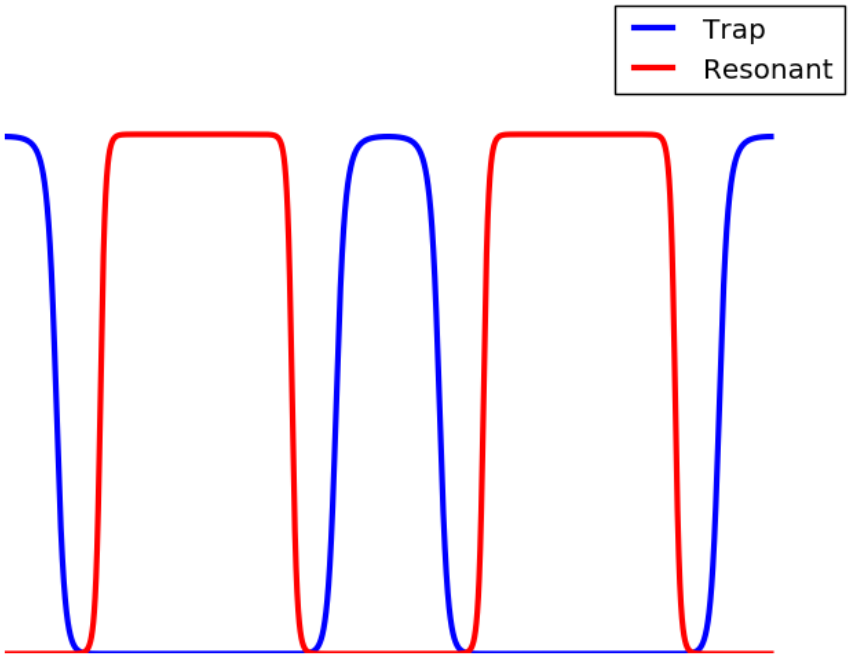

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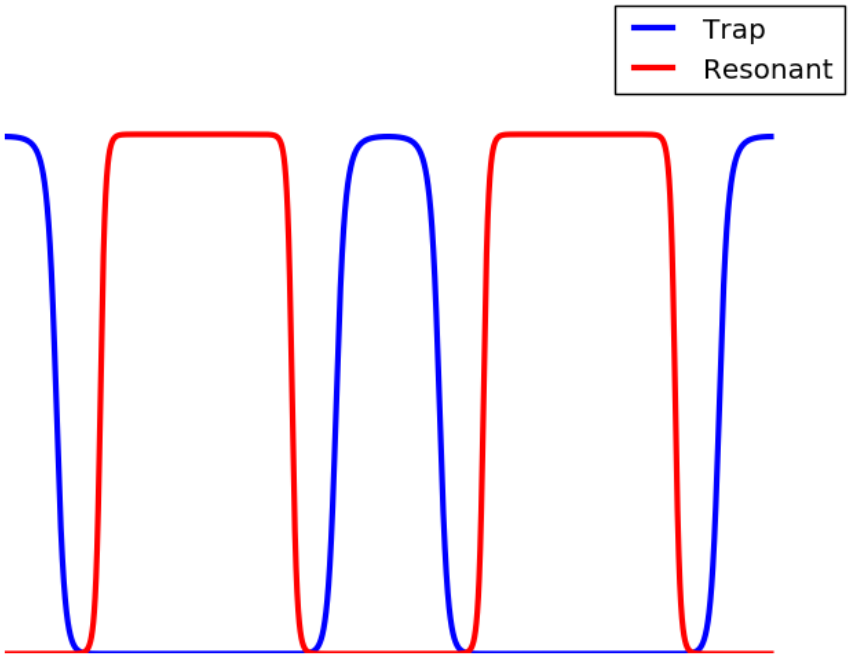

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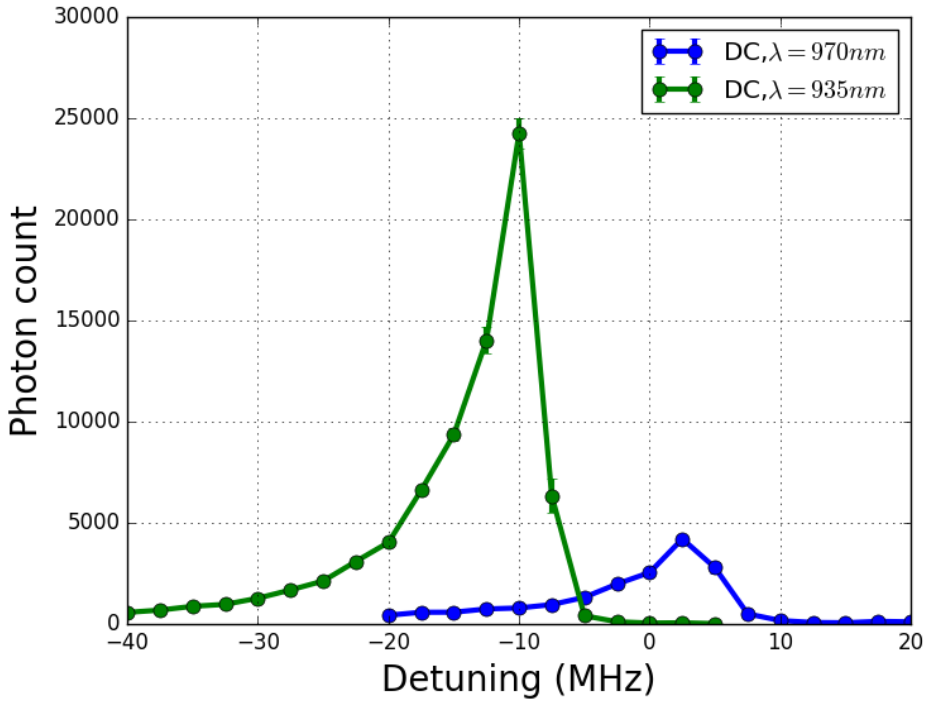

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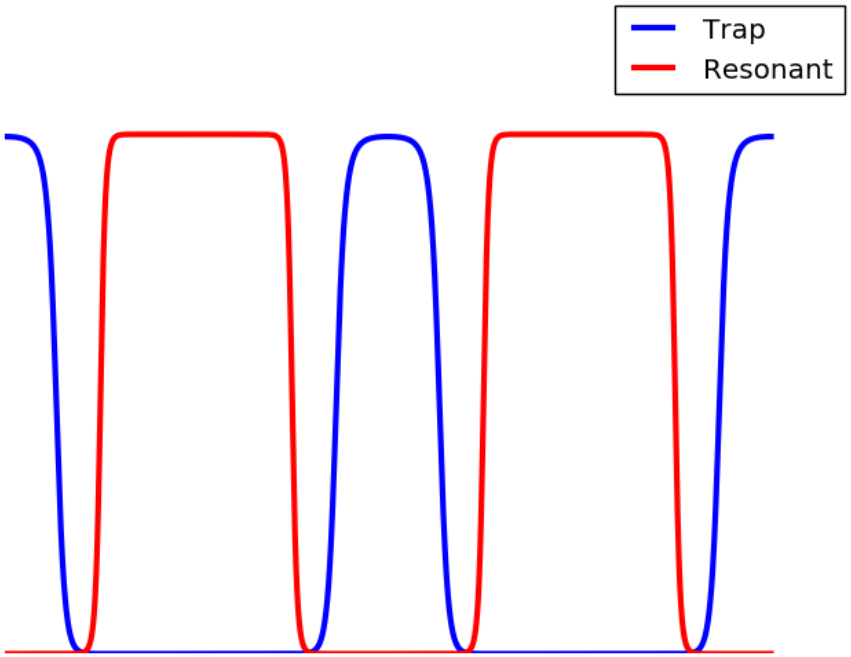

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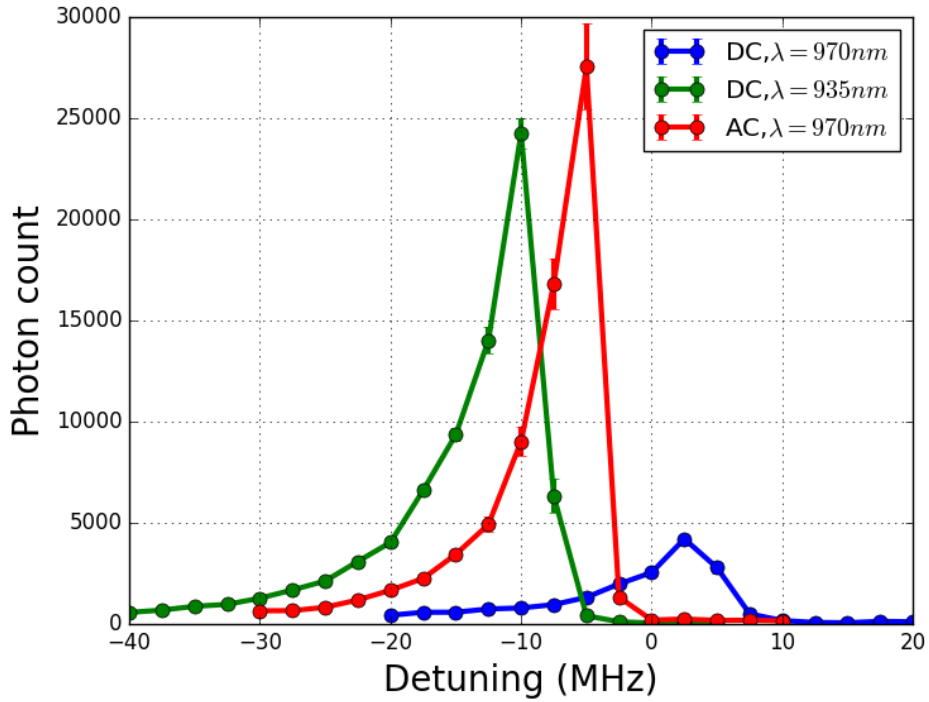

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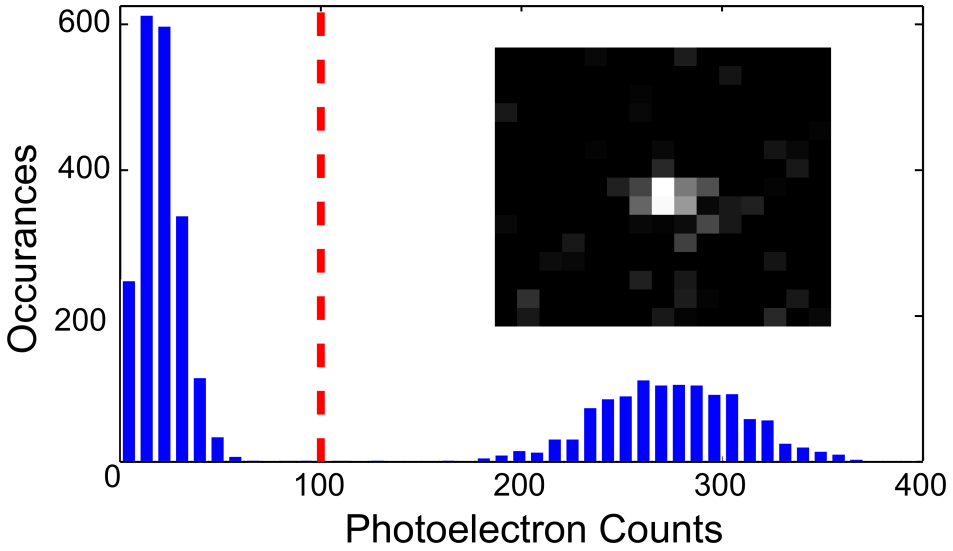

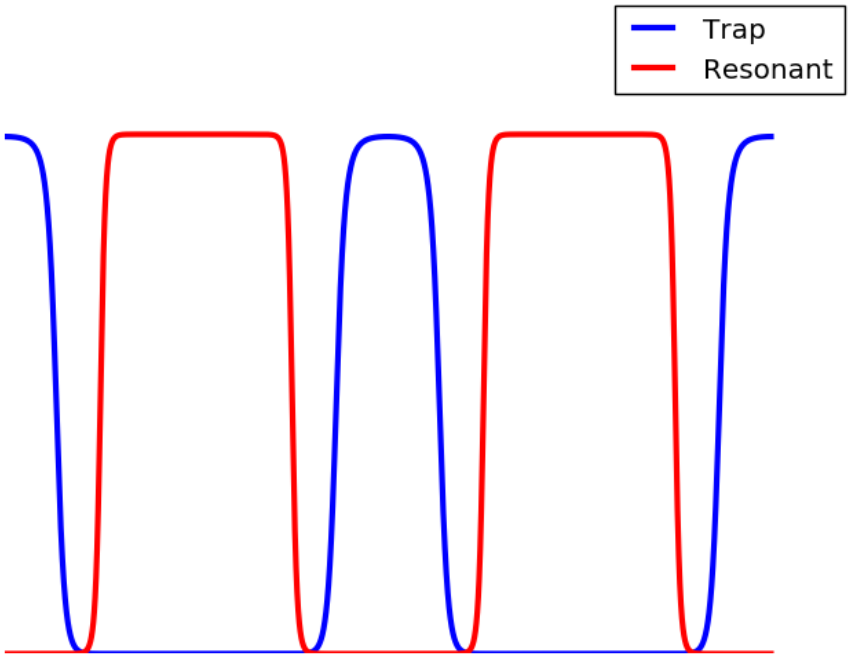

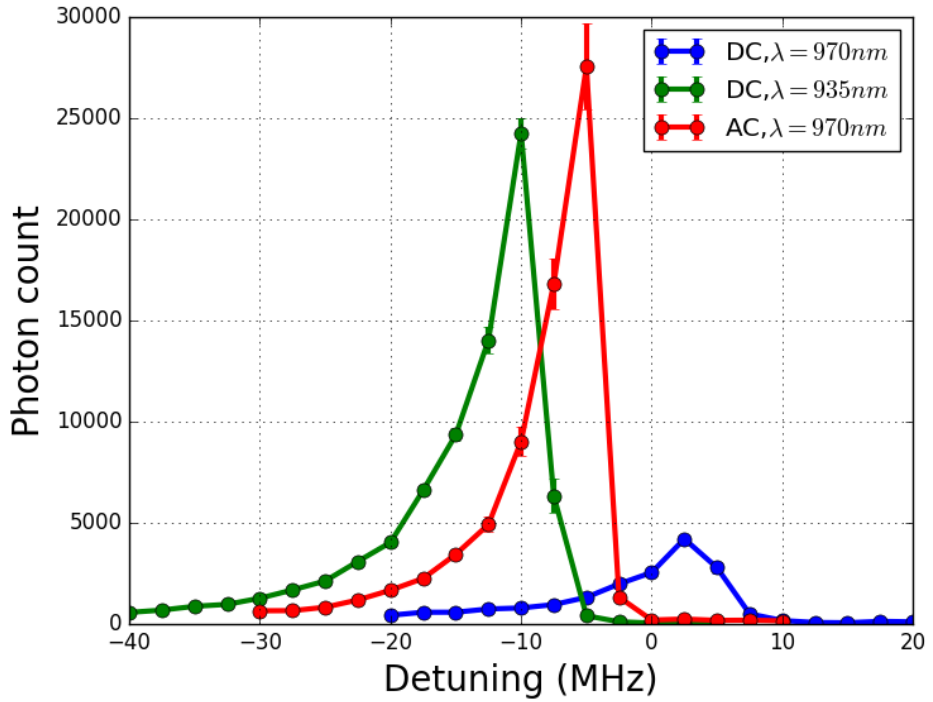

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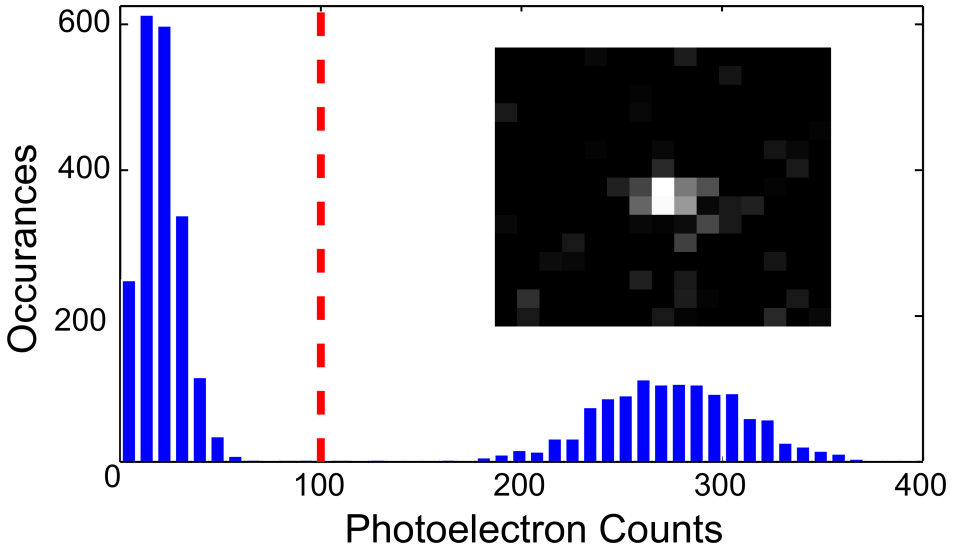

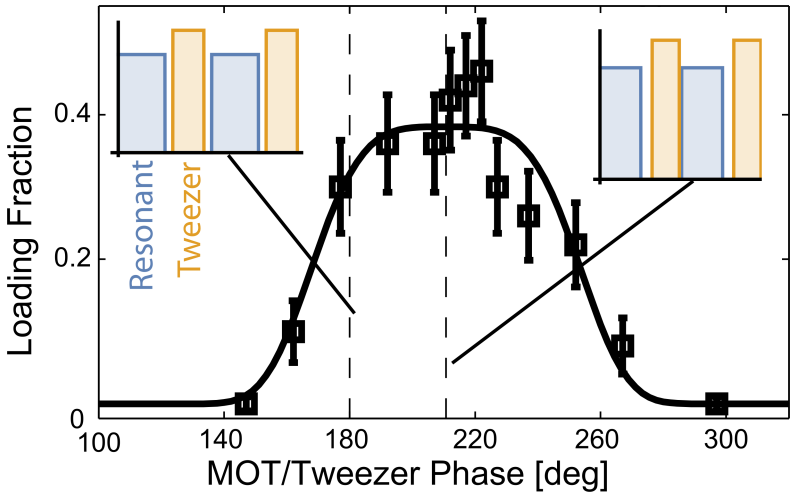

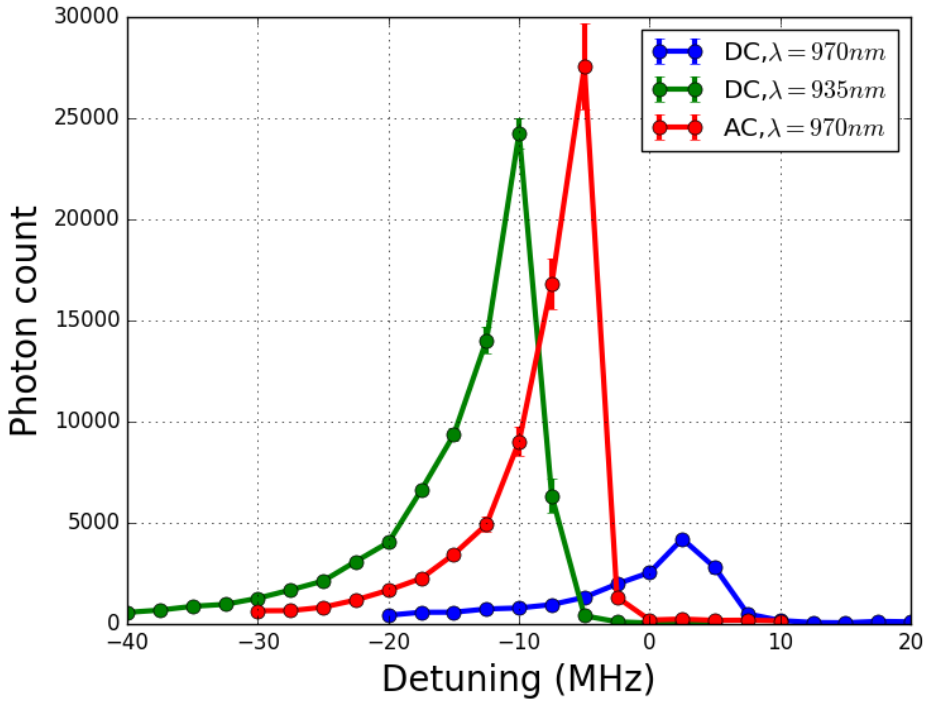

Conclusion

- 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