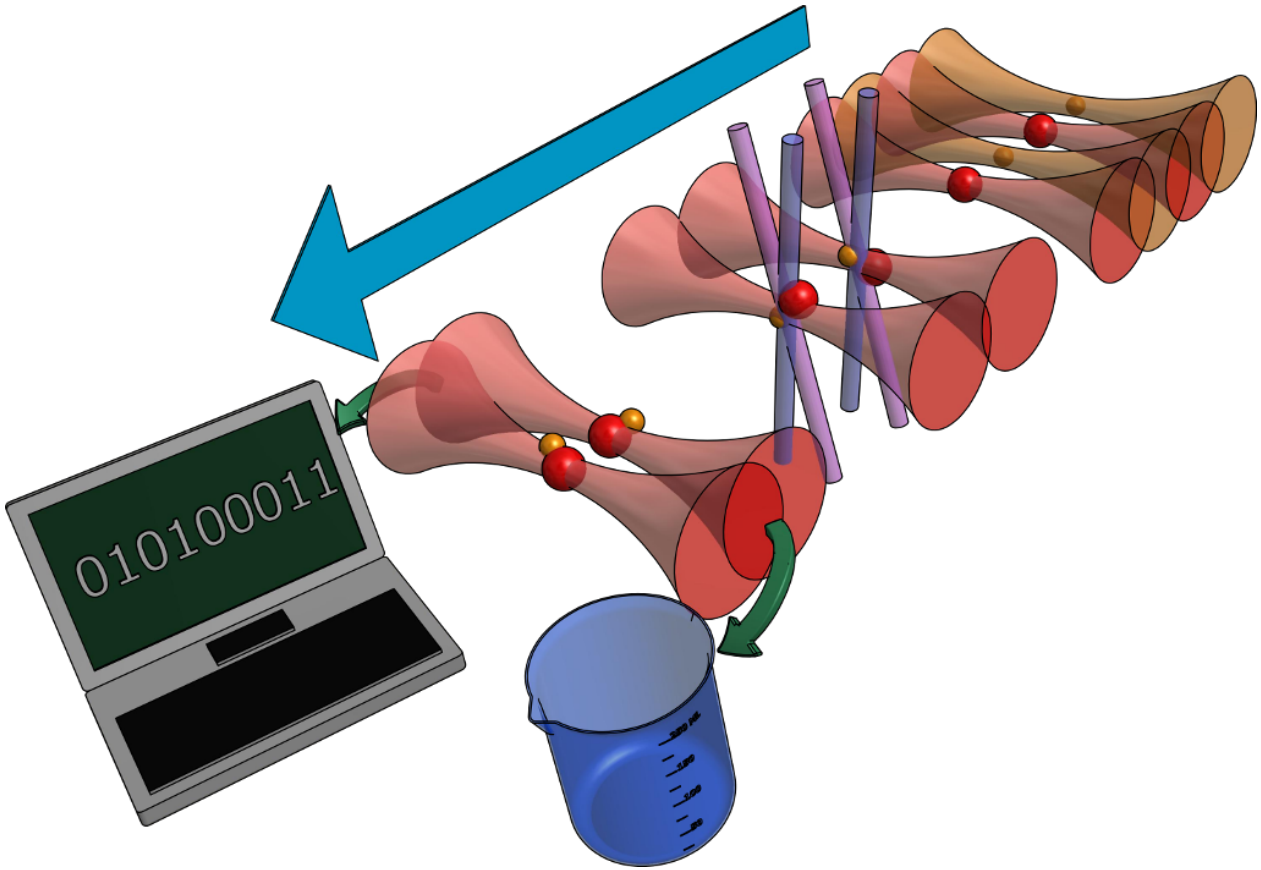
Trapping and imaging of single atom in the present of light shift



Yichao Yu
May 26, 2016
Ni Group/Harvard

Procedure

- MOT Loading
- Trapping
- Imaging
- Works for Cs

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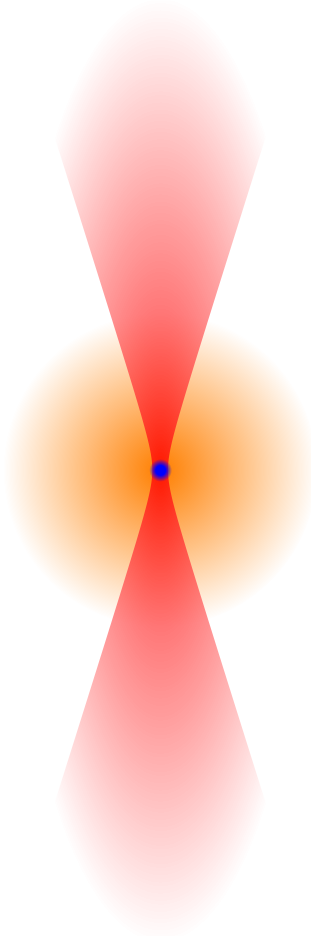

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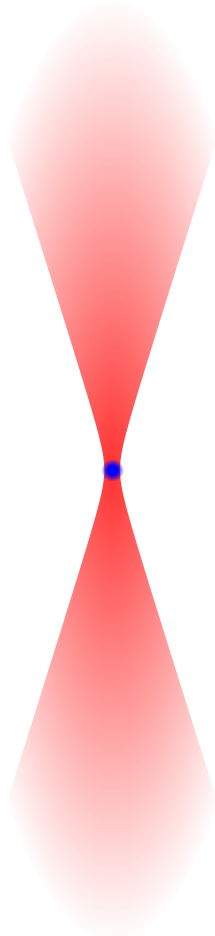

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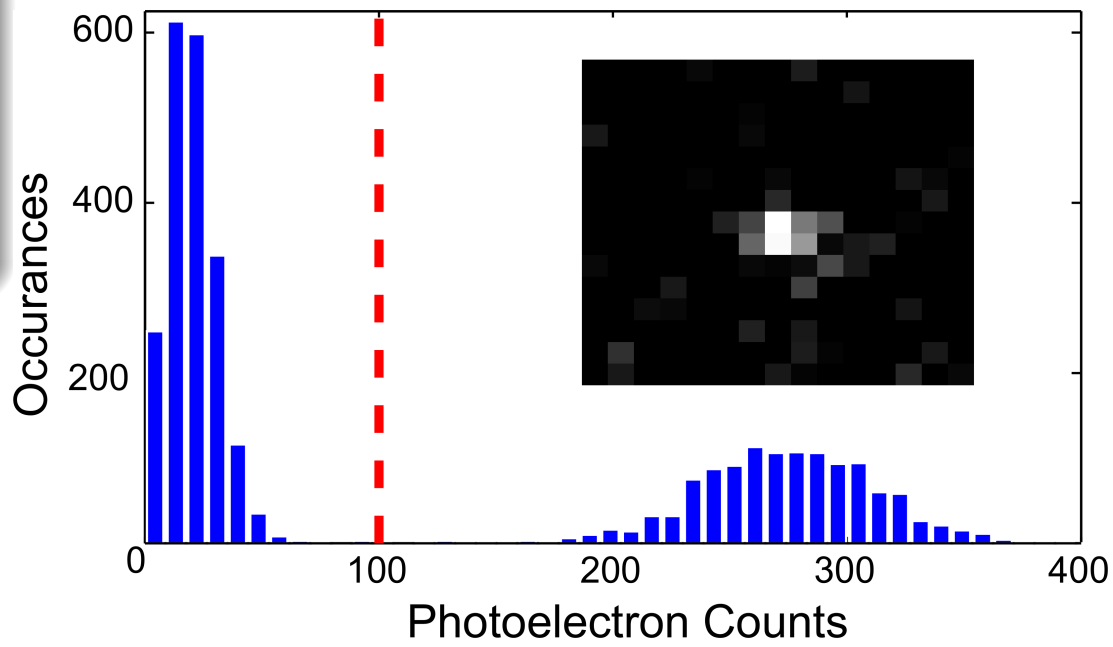
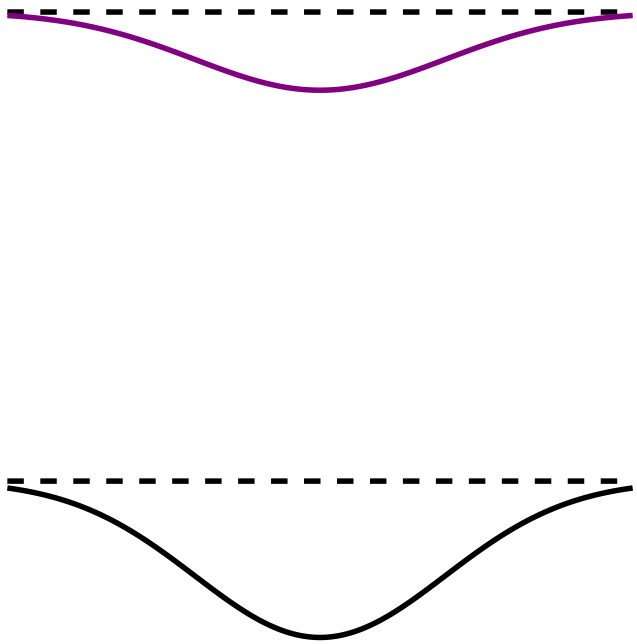


Light shift

- $\beta = \dfrac{\alpha_e}{\alpha_g}$
- Inefficient cooling; Heating
- Shift imaging light out of resonance



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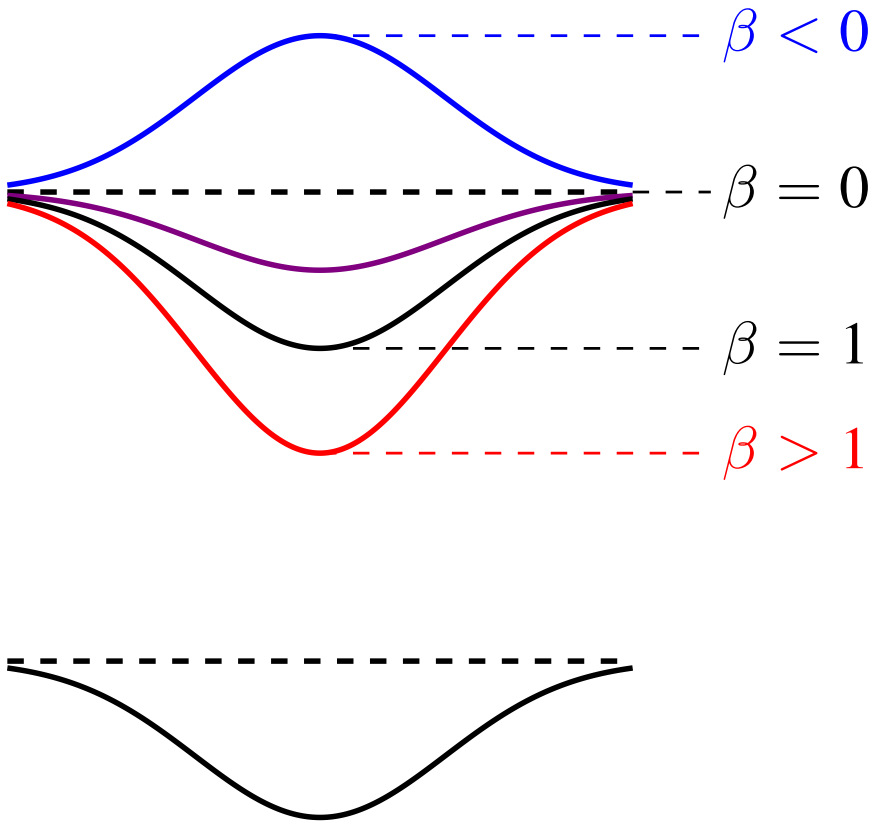

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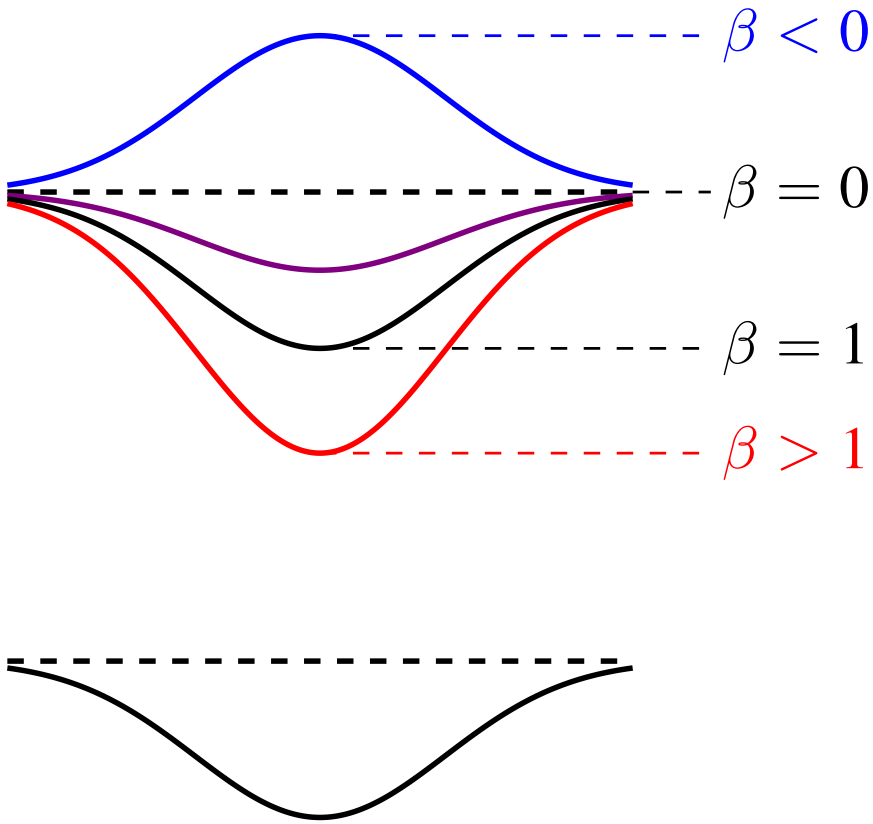

Atom	Cs			Na
λ_{trap}	922	935	970	700
β_{cycle}	2	1	0.6	-1

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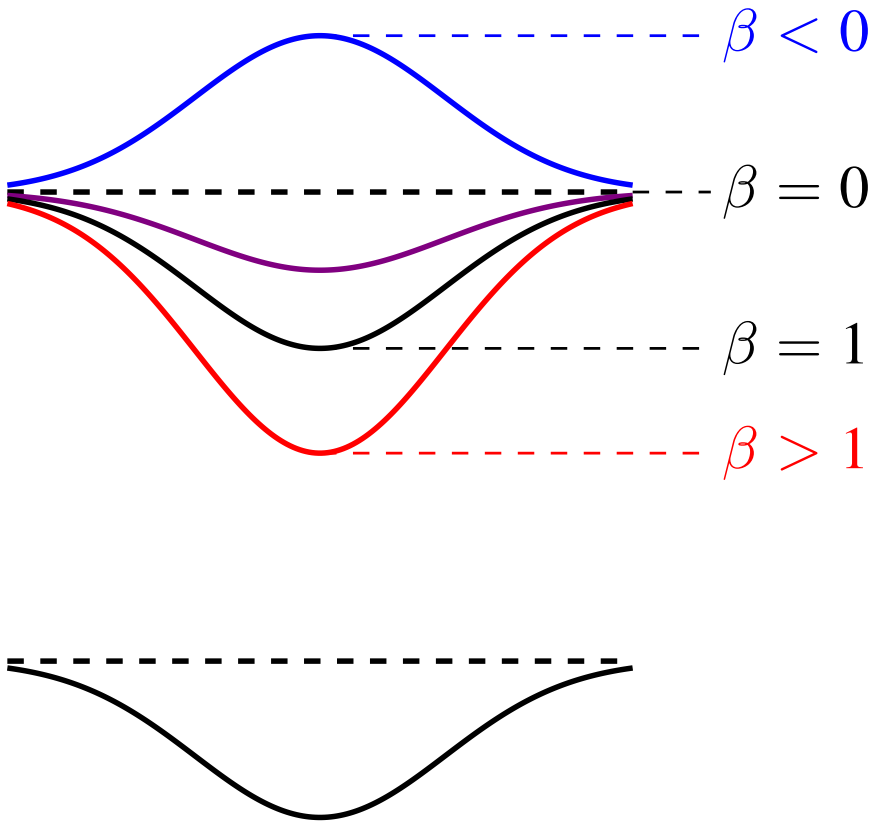

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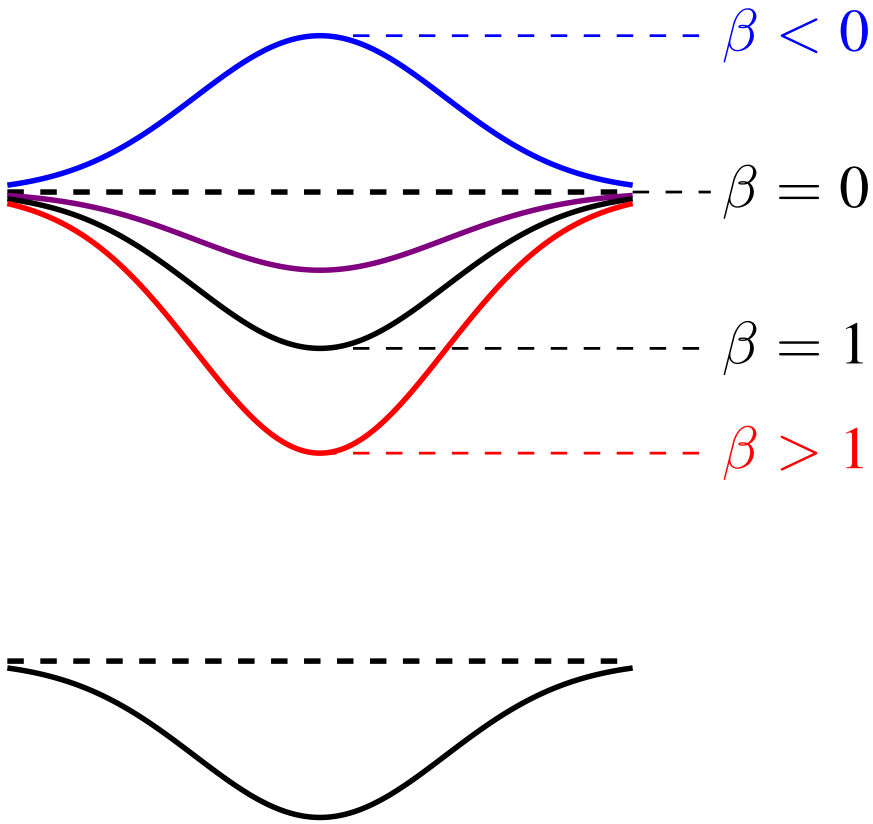

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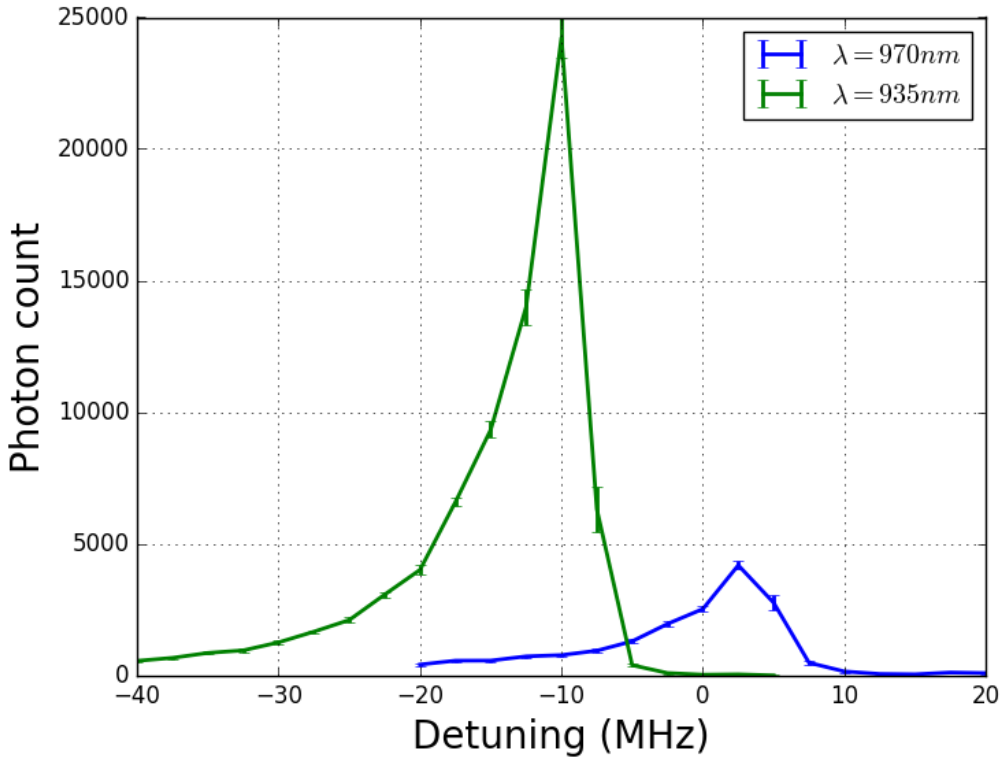
Cs single atom loading

λ_{trap}	922	935	970
Loading	No	Yes	Yes

Cs single atom imaging



Trap switching

- Alternate between resonant and trap light
- Switching at $1 - 3$MHz

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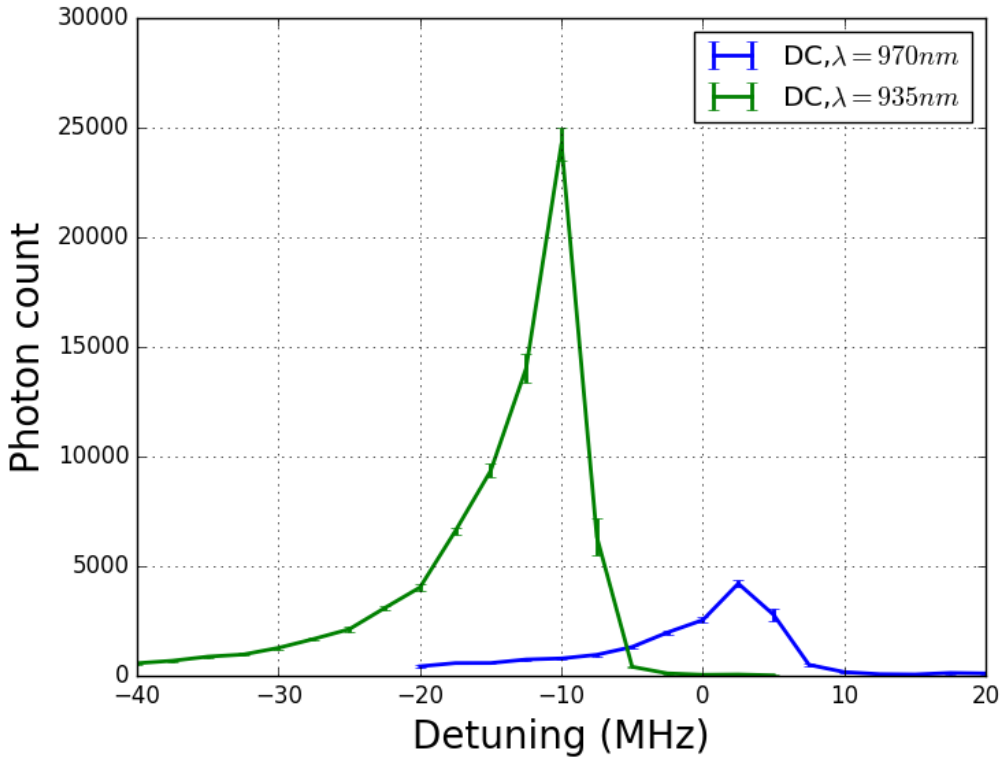

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