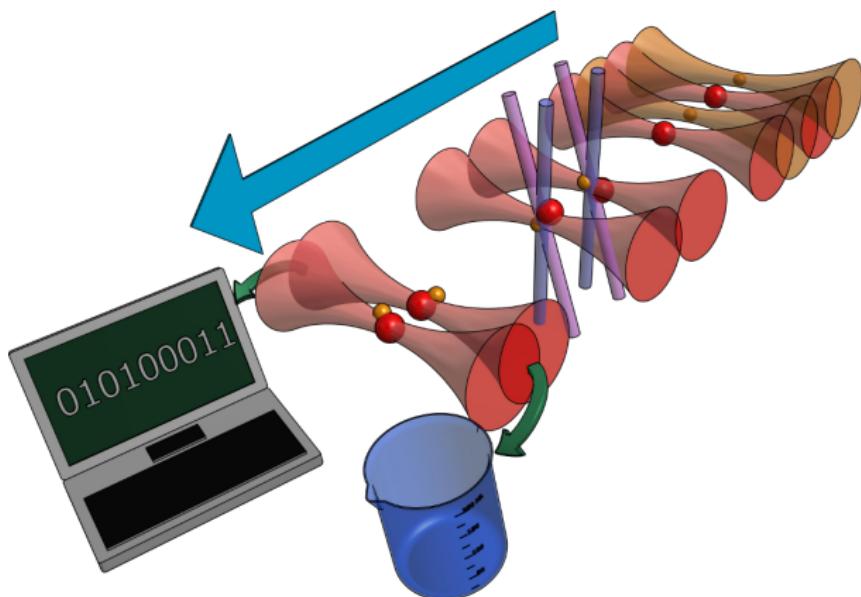


# Apparatus for making dipolar NaCs molecules

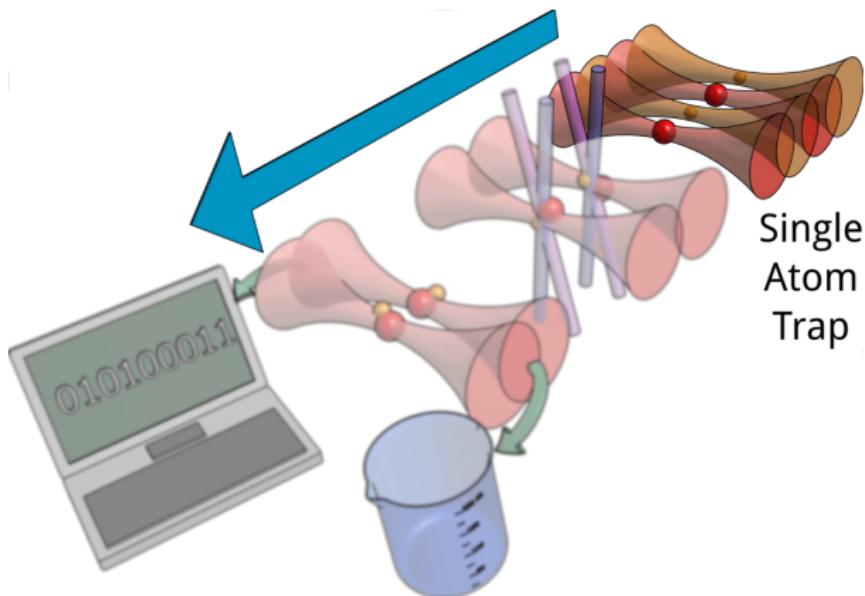


Yichao Yu

May 3, 2015

Harvard/Ni Group

# Apparatus for making dipolar NaCs molecules

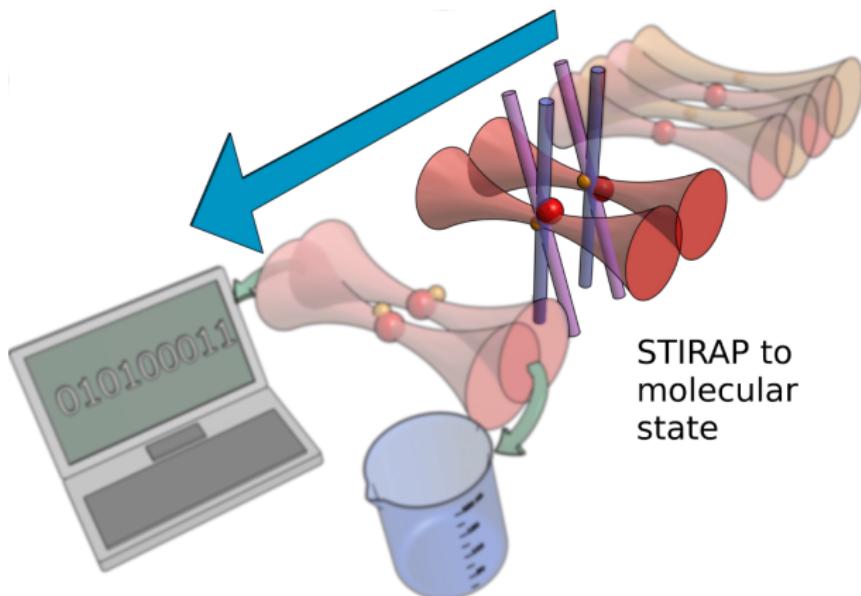


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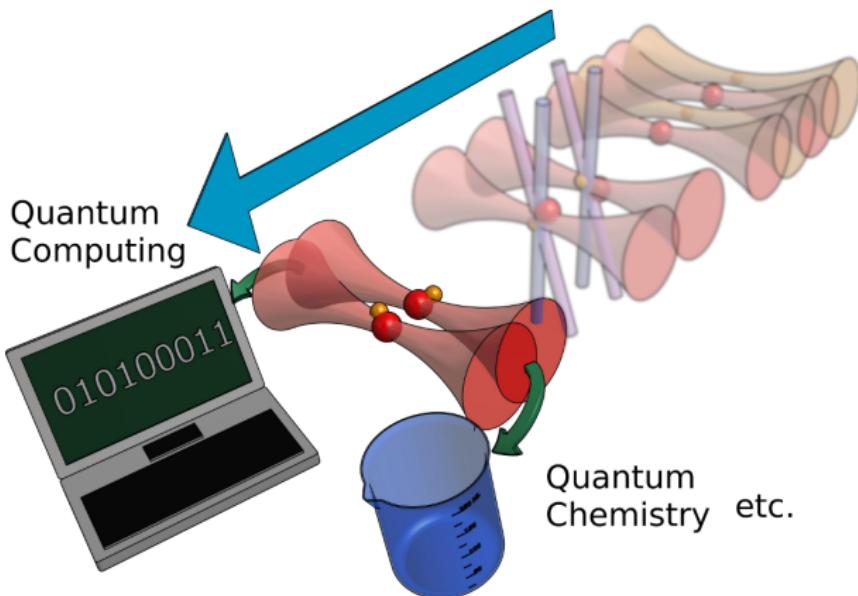


Yichao Yu

May 3, 2015

Harvard/Ni Group

# Apparatus for making dipolar NaCs molecules



Yichao Yu

May 3, 2015

Harvard/Ni Group

## Current state

# Cesium



## Current state

Cesium

MOT

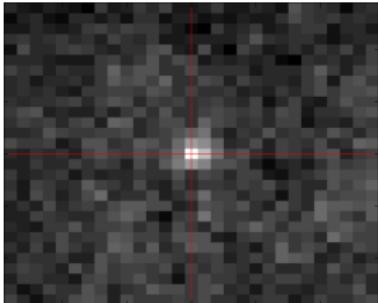


## Current state

### Cesium

MOT

Trapping  
single  
atom



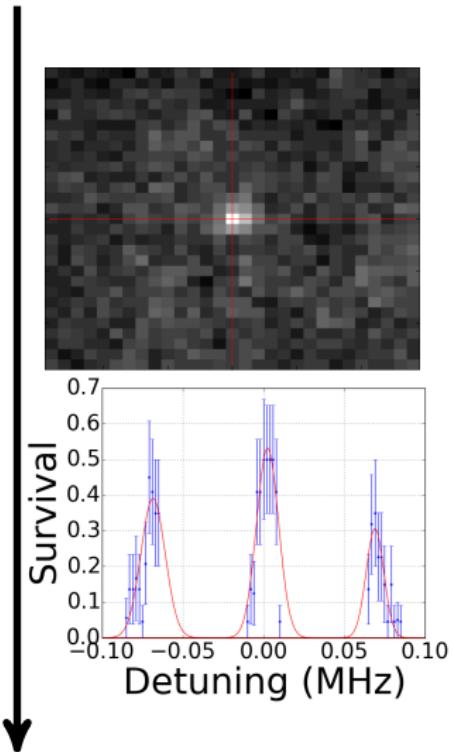
## Current state

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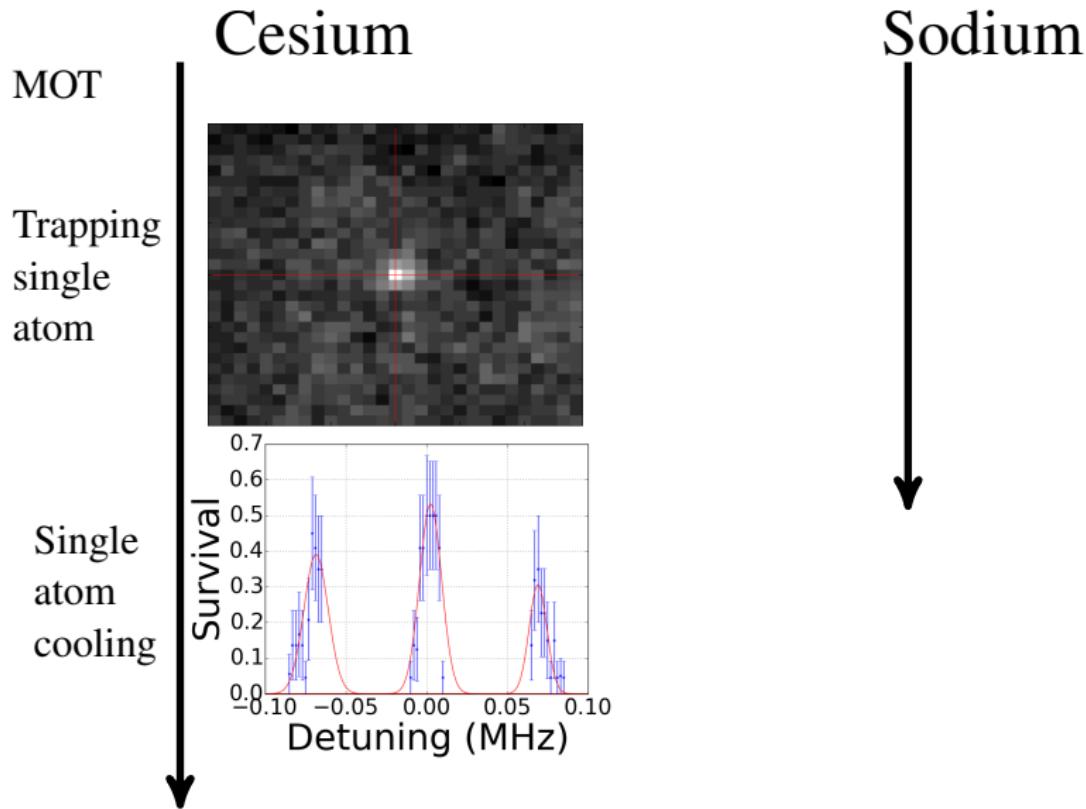
MOT

Trapping  
single  
atom

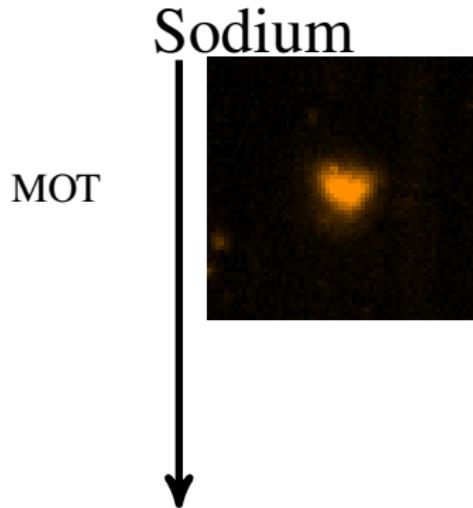
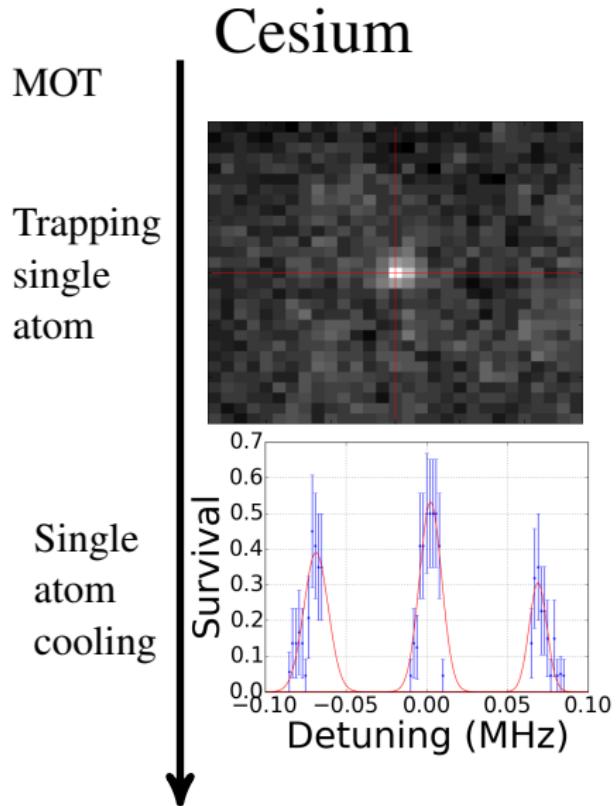
Single  
atom  
cooling



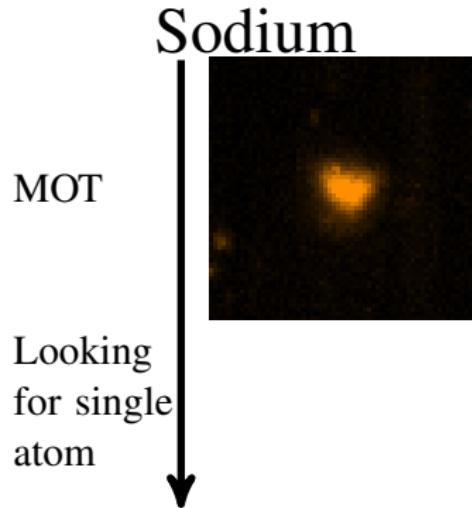
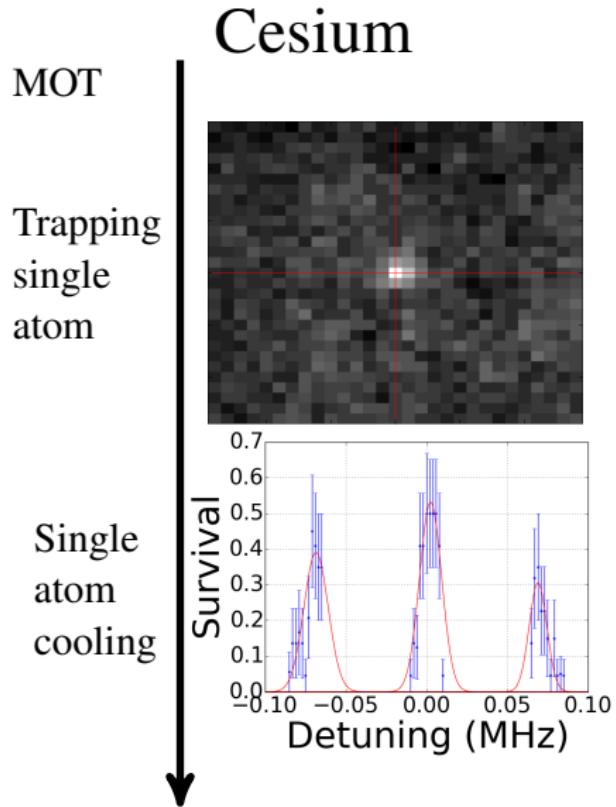
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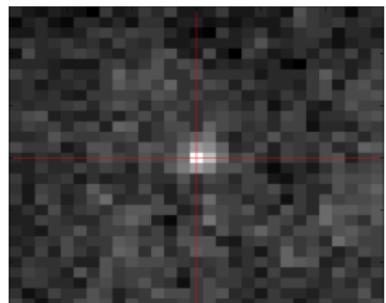


## Current state

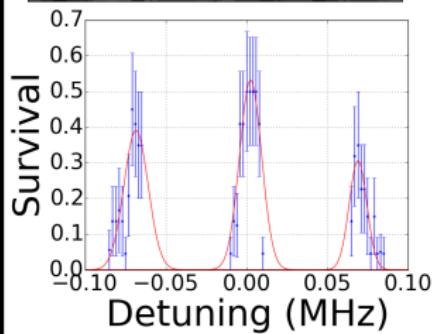
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MOT

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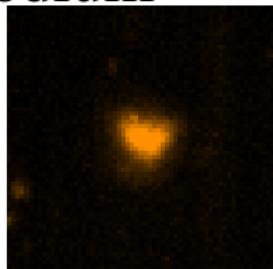
Single  
atom  
cooling



### Sodium

MOT

Looking  
for single  
atom



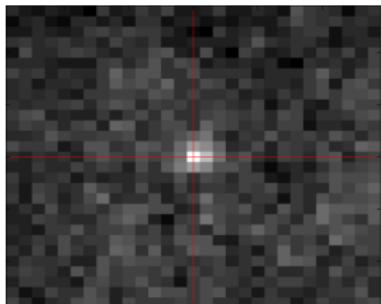
### Problems

- Sodium laser
- MOT stability

## Current state

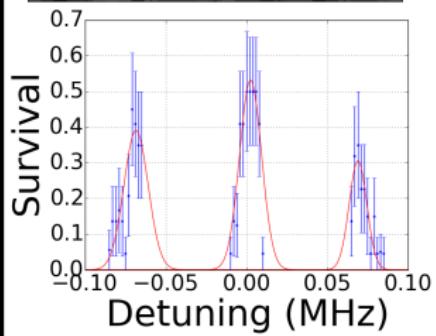
### Cesium

MOT



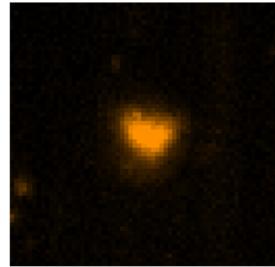
Trapping  
single  
atom

Single  
atom  
cooling



### Sodium

MOT



Looking  
for single  
atom

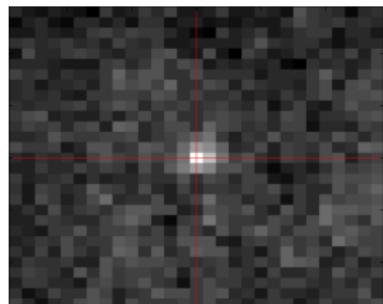
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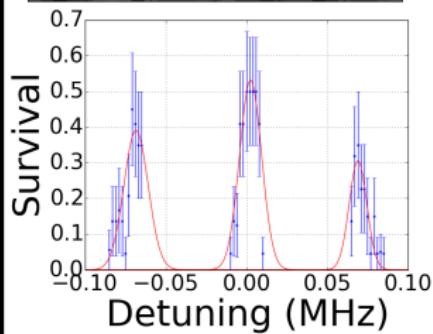
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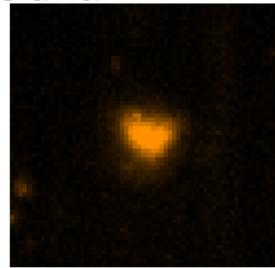
Trapping  
single  
atom

Single  
atom  
cooling



### Sodium

MOT



Looking  
for single  
atom

### Problems

- Sodium laser
- MOT stability

# Laser system for Sodium

## Sodium wavelengths

- D lines  $\approx$  589nm
- D2 line (Cooling, Imaging)
- D1 line (Pumping, Cooling)
- Off resonance (Raman transition)

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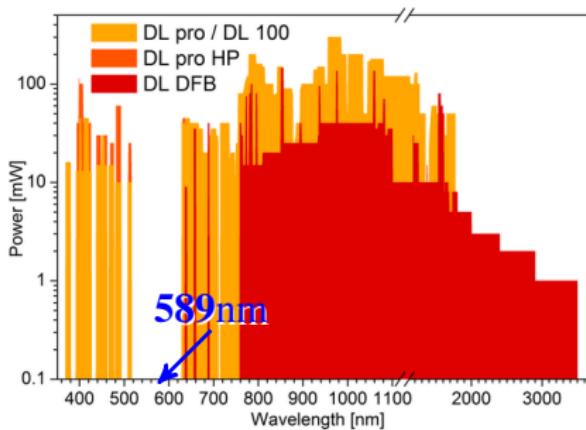
### Using diode laser

- Diode laser spectrum
- Power requirement for frequency doubling
- Diode laser from Innolume Tunable 1175-1280nm
- Waveguide doubler

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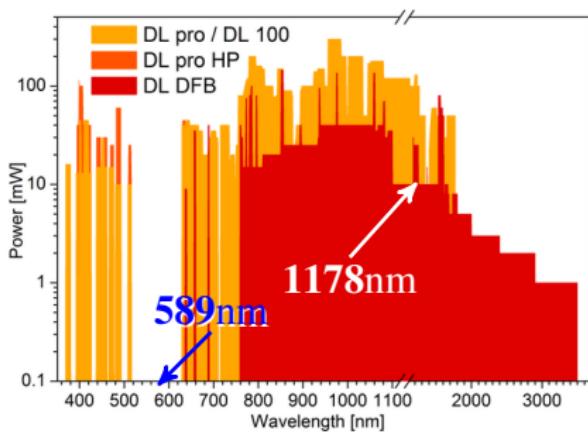
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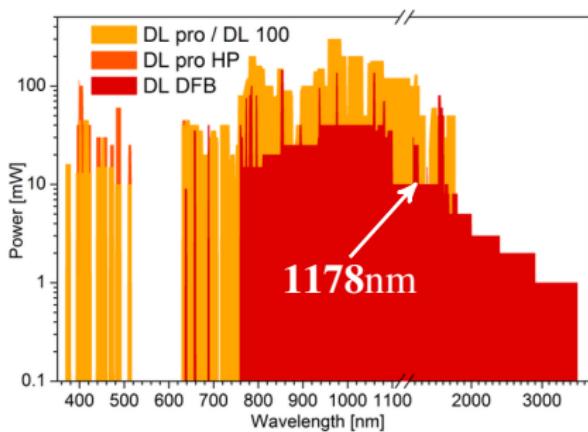
$$589 \times 2 = 1178\text{nm}$$

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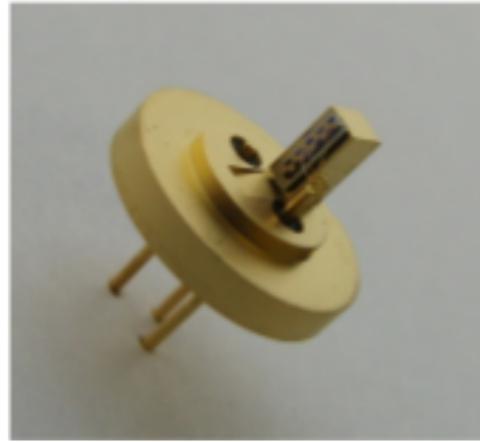
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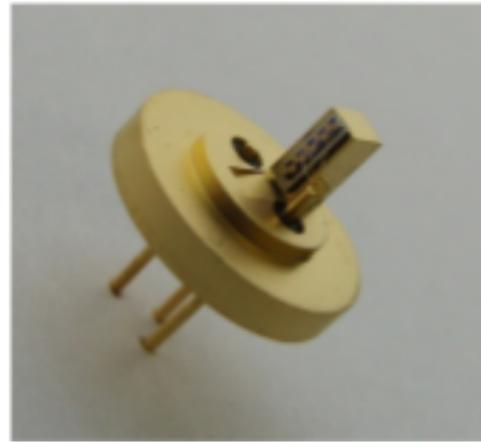
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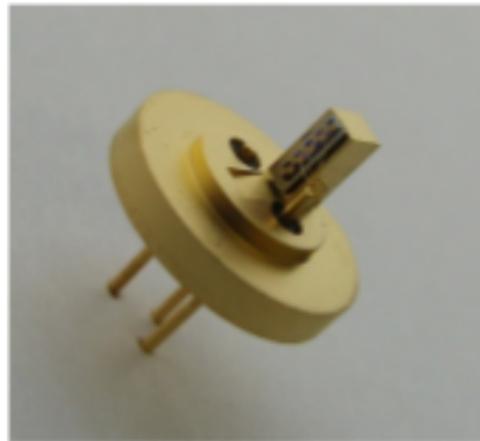
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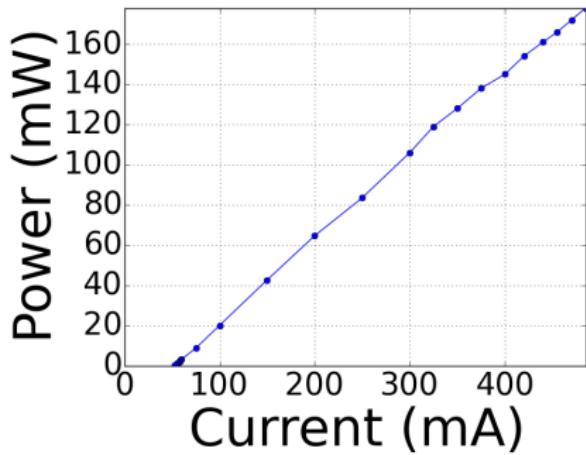
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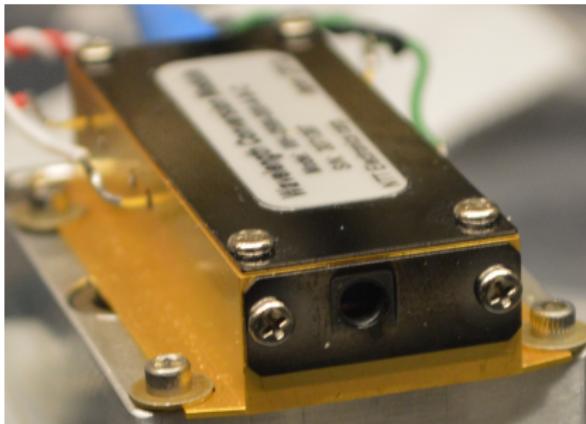
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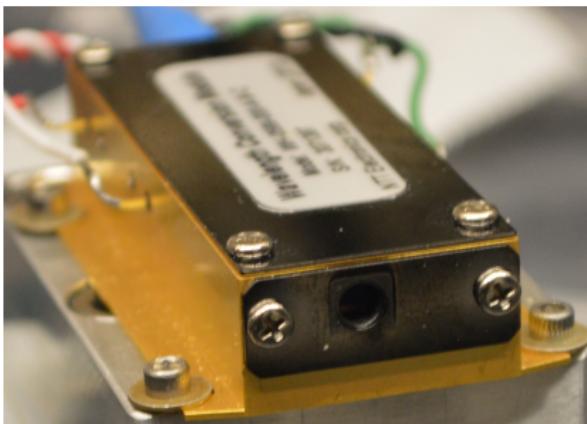
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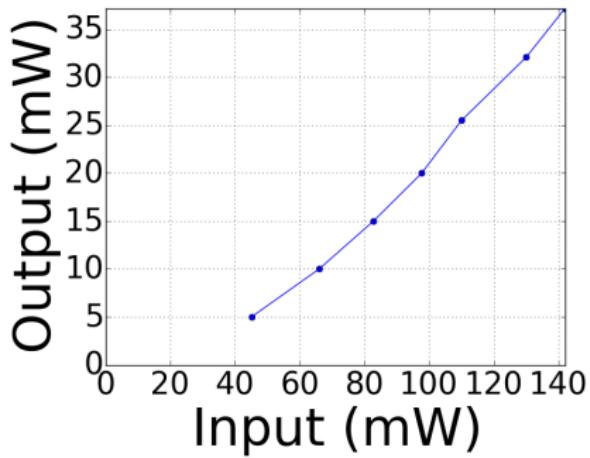
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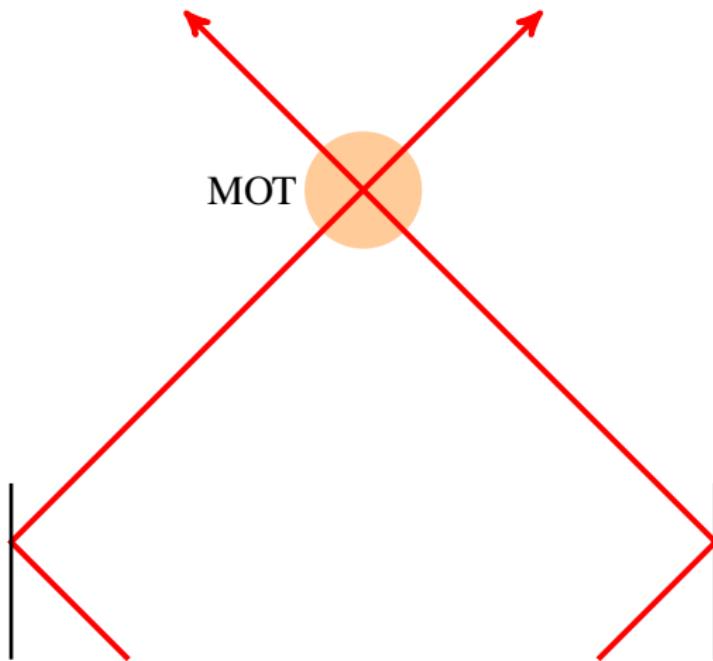
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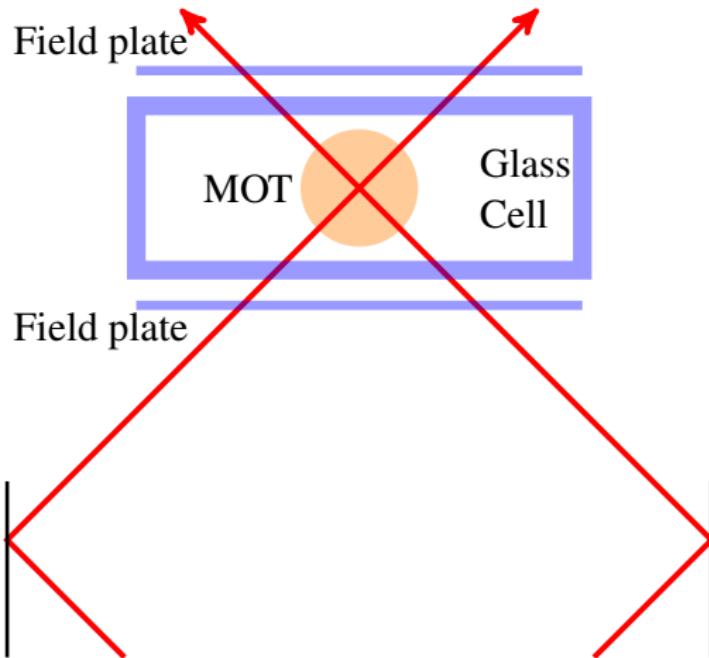


## MOT stability



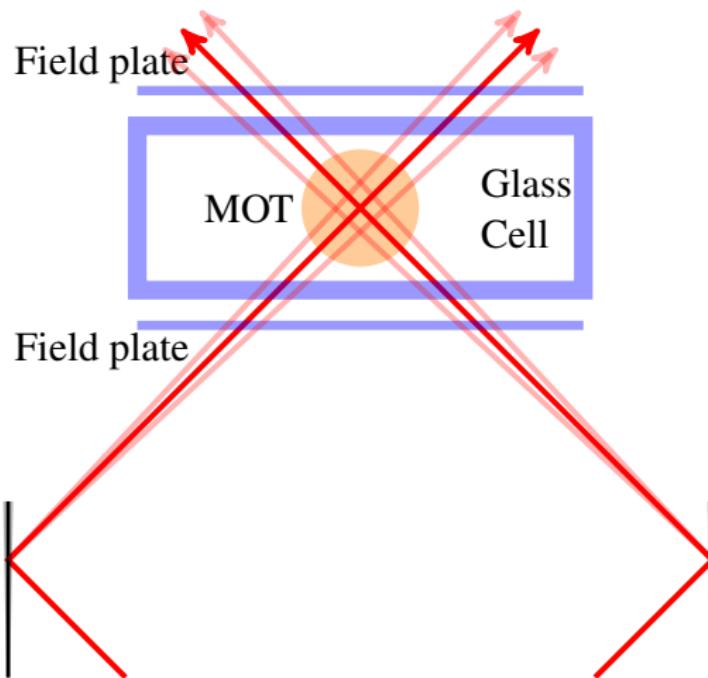
- MOT beam path
- Interference and stability
- Modulating the MOT beams
- Performance

## MOT stability



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# Members