

Title: 12/13 PSI - Explorations on Quantum Information Lecture 14

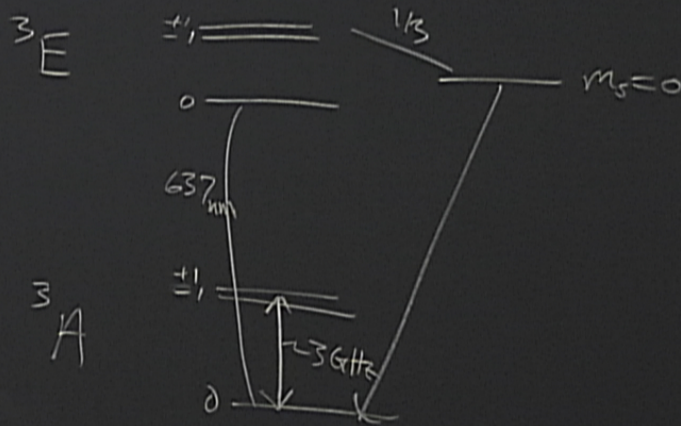
Date: Apr 05, 2013 09:00 AM

URL: <http://pirsa.org/13040037>

Abstract:

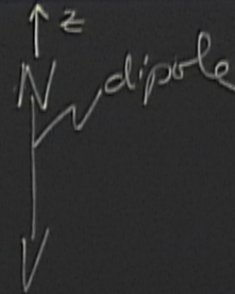
# Diamond NV

initialize (turn on laser)



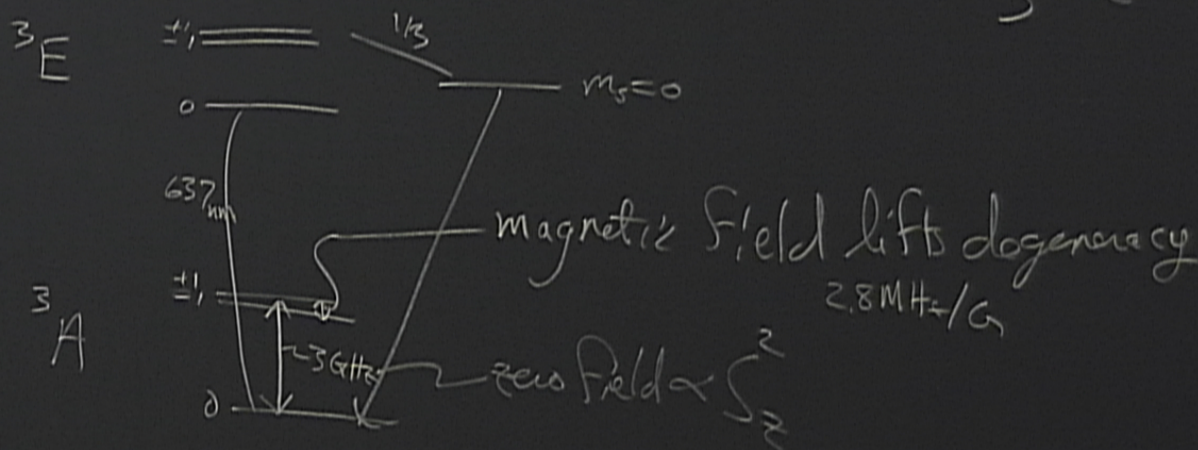
initialize (turn on laser)

$m_z = 0$



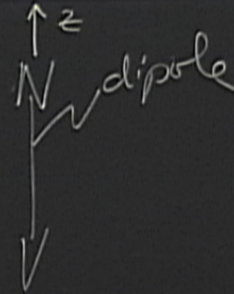
# Diamond NV

initialize (turn on laser)



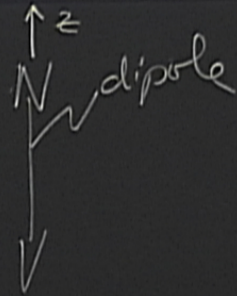
get rid  
of  
by selecting  
either  $+1$   
or  $-1$  qubit

initialize (turn on laser)



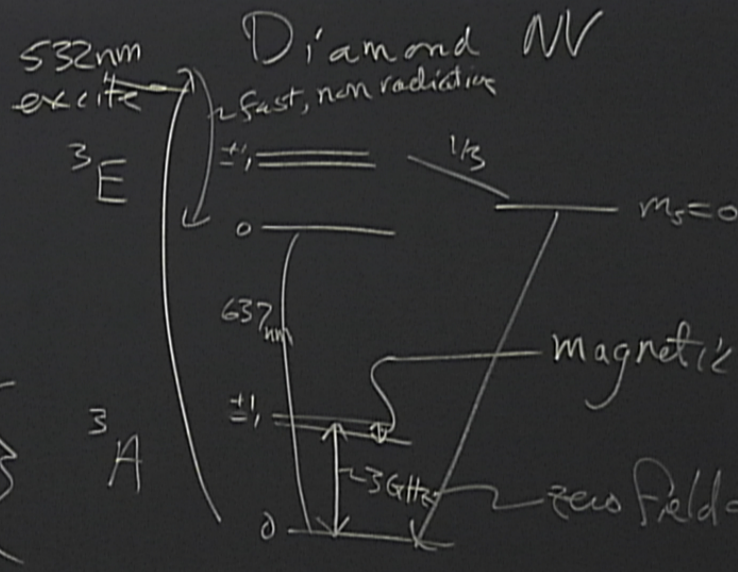
field lifts degeneracy  
 $2.8 \text{ MHz/G}$

lize (turn on laser)



For each deft  
there are 4 possible  
orientations of  $\vec{z}$

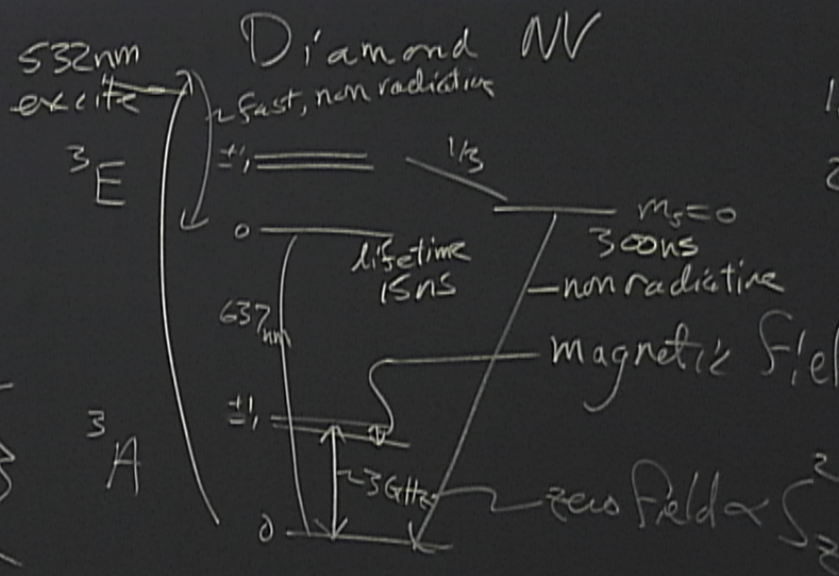
degeneracy  
 $1/G (B_z)$



initialize (turn on laser)

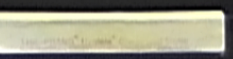
get it  
or  
by selection  
either  $+1$   
or  $-1$  qubit

magnetic field lifts degeneracy  
 $2.8\text{ MHz/G}$  ( $B_z$ )



1. initialize (turn on laser)
2. readout

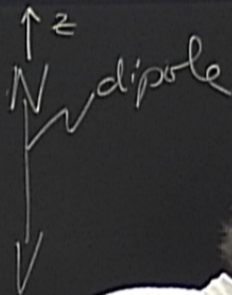
get it  
or  
by selection  
either +1  
or -1 qubit



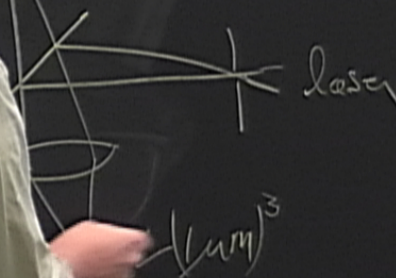


align (turn on laser)  
dout

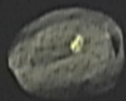
degeneracy  
 $1/g (B_z)$



For each deft  
there are 4 possible  
orientations of  $\vec{\mu}$

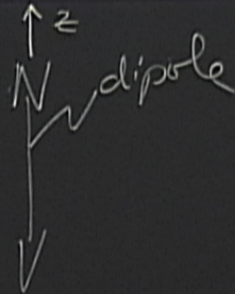


photon  
source

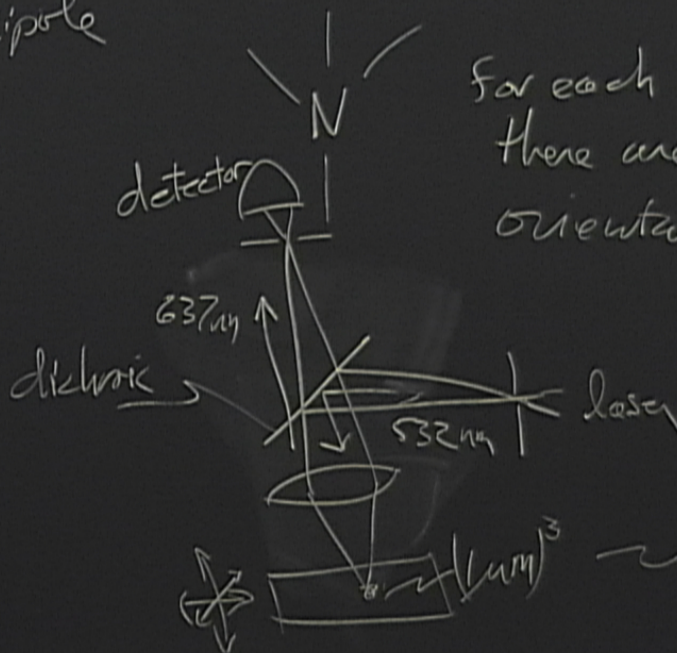


~ focal spot

n on laser)



For each deft  
there are 4 possible  
orientations of  $\vec{z}$

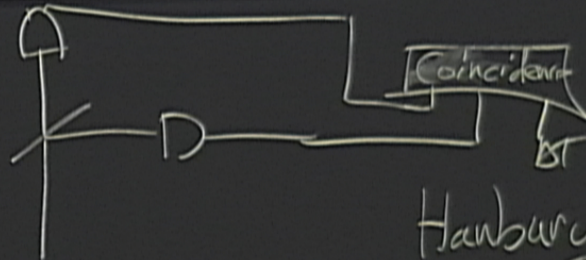


$(\mu\text{m})^3$  — only 1 defect

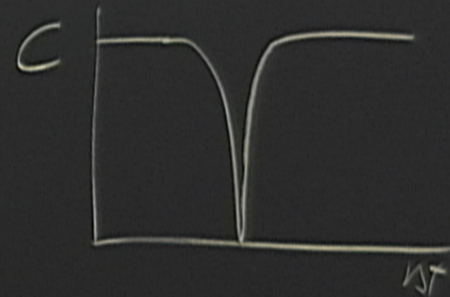
photon  
source



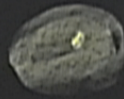
~ focal spot



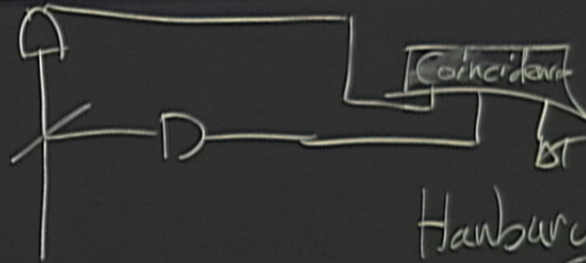
Hanbury Brown Twiss



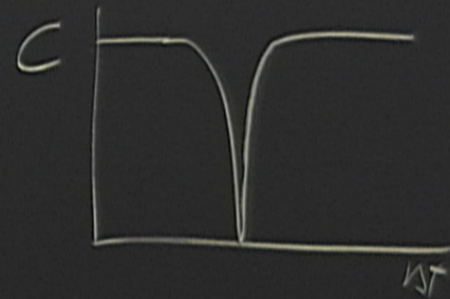
photon  
source

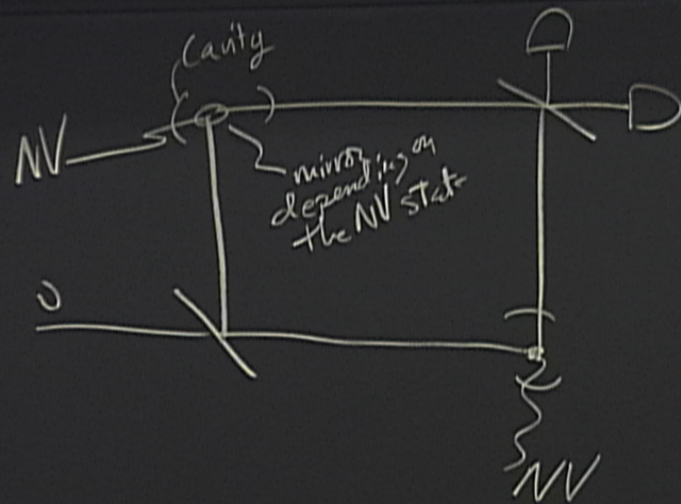


~ focal spot

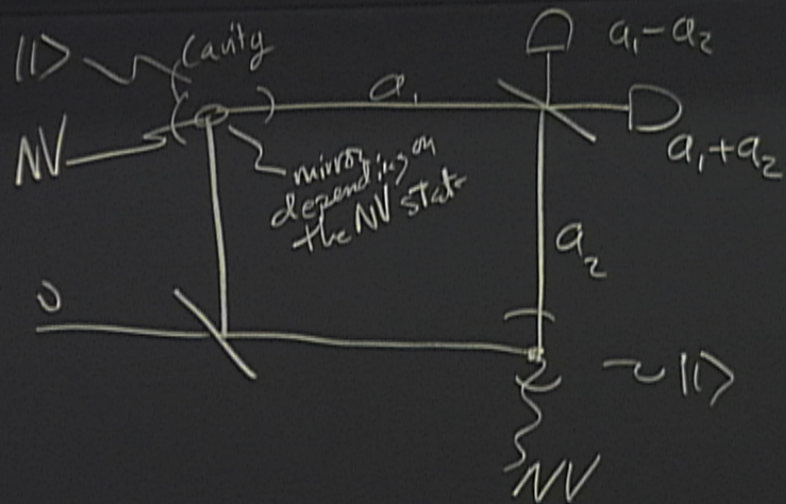


Hanbury Brown Twiss

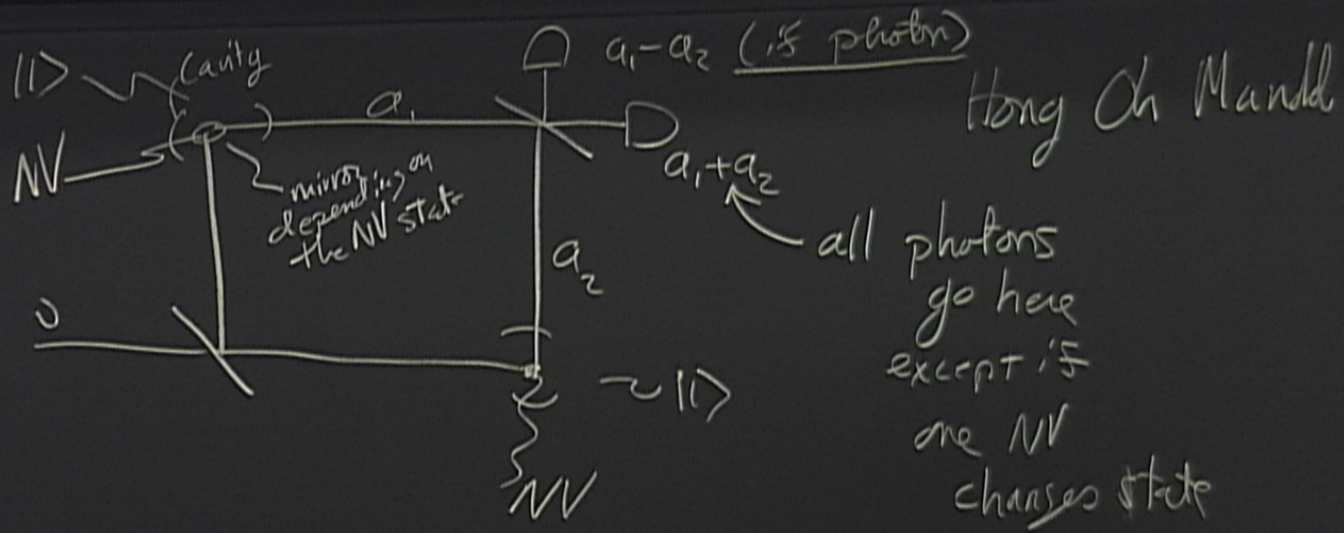




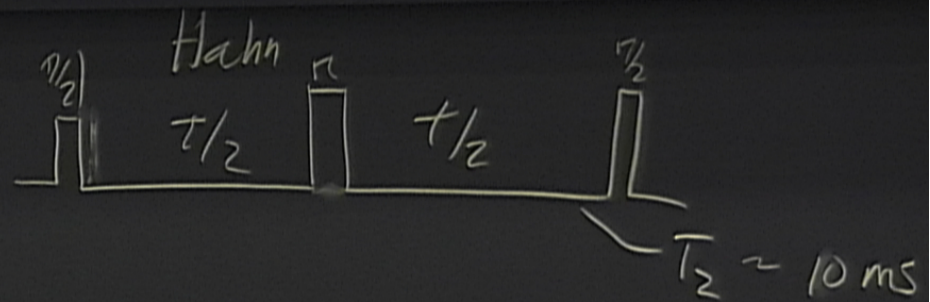
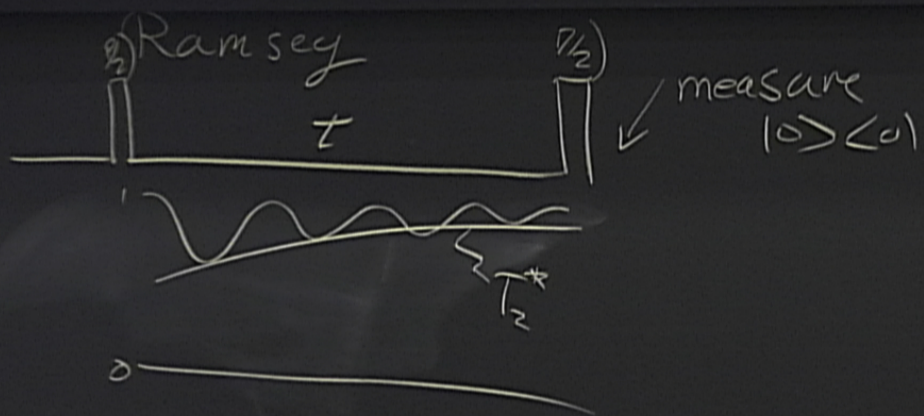
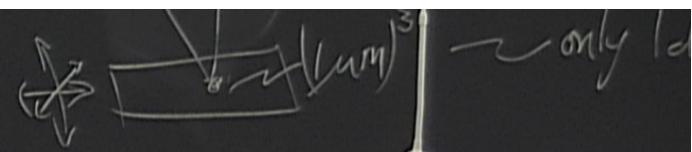
Hong Ch Mandd

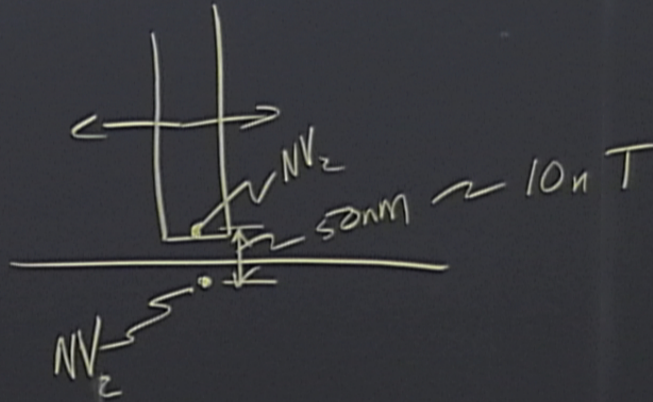


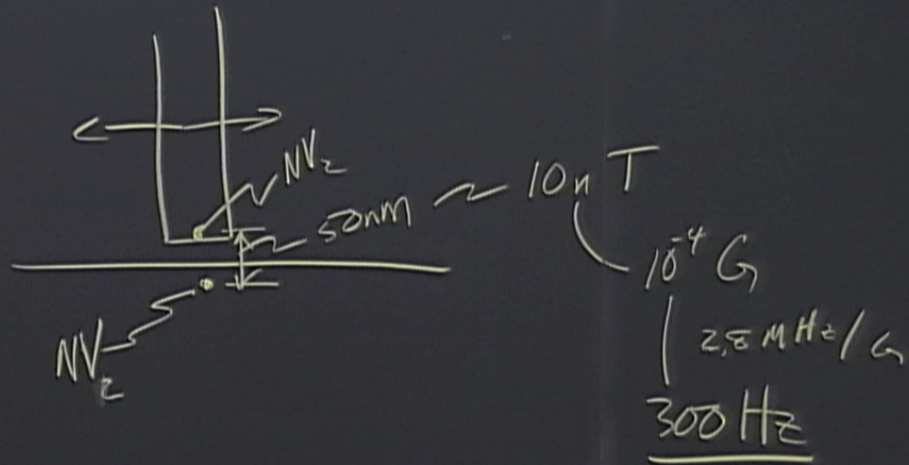
Hong Ch Mandd



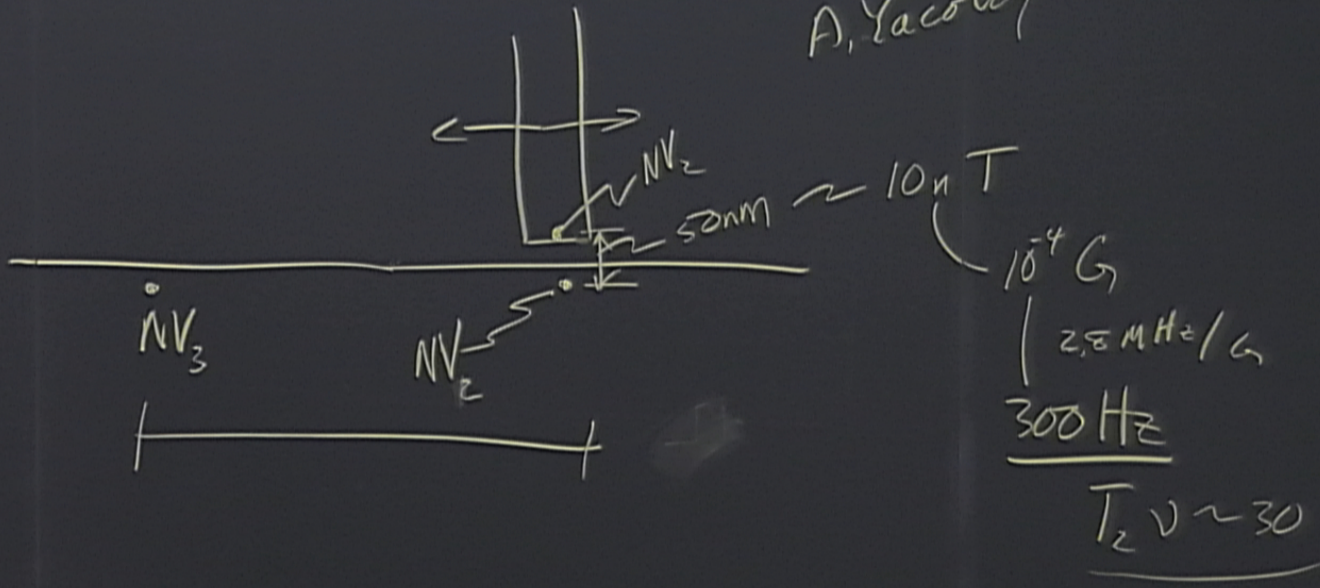


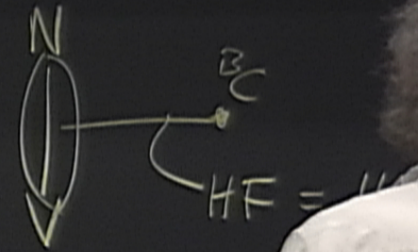
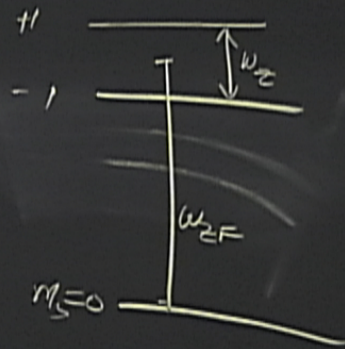


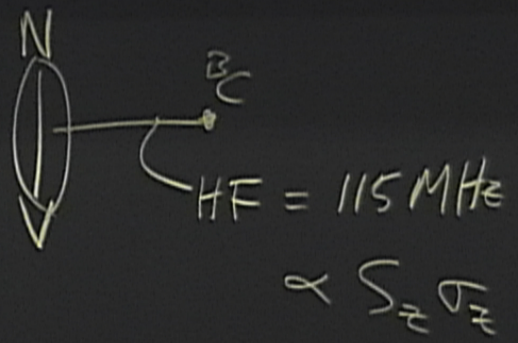
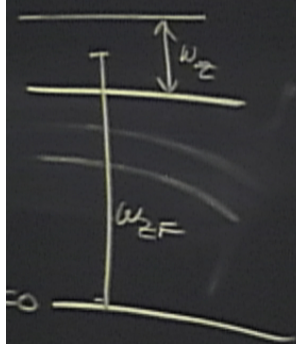




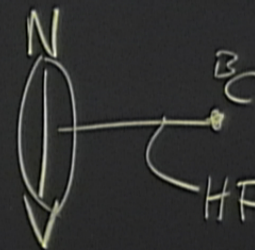
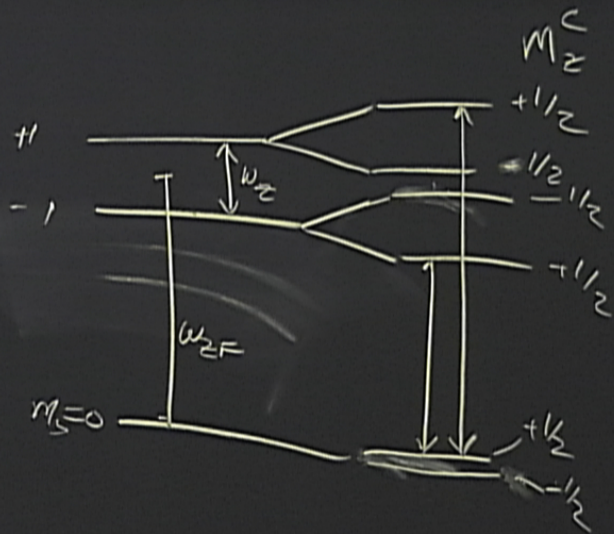
A. Yacoby





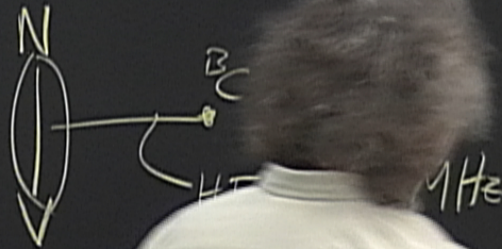
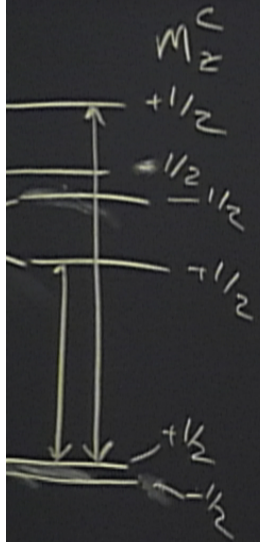


$$\sigma_+ \sigma_- \rightarrow \sigma_- \sigma_+$$



$$HF = 115 \text{ MHz}$$

$$\propto S_z$$



Experiment

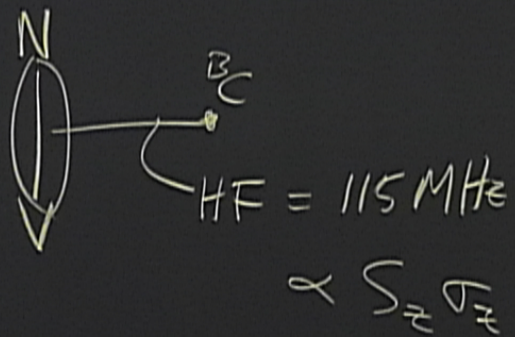
$$|0, -1/2\rangle$$

$\downarrow R_x^e$

$$(\alpha|0\rangle + \beta|1\rangle) \otimes |-1/2\rangle$$

$\downarrow CNOT$





### Experiment

$$|0, -1/2\rangle$$

$\downarrow R_x$

$$(\alpha |0\rangle + \beta |1\rangle) \otimes |-1/2\rangle$$

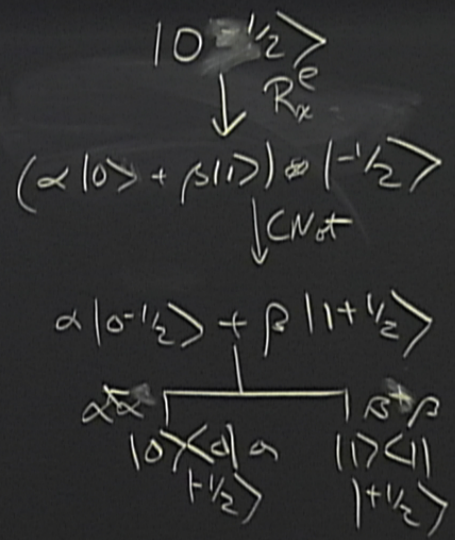
$\downarrow CNOT$

$$\alpha |0, -1/2\rangle + \beta |1, +1/2\rangle$$

$\alpha$	$\beta$
$ 0\rangle \otimes  -1/2\rangle$	$ 1\rangle \otimes  +1/2\rangle$

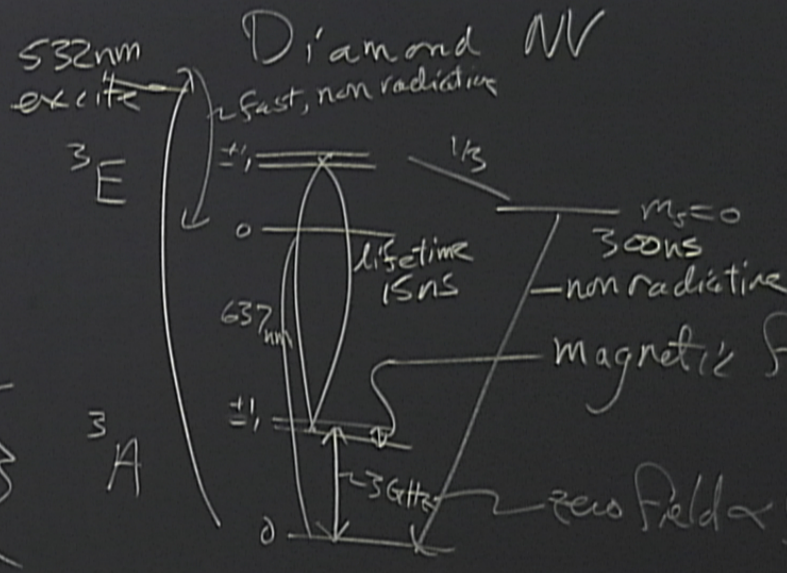
BC  
 $HF = 115 \text{ MHz}$   
 $\propto S_z \sigma_z$

Experiment



$|2^+\alpha$   
 $0, -1/2$

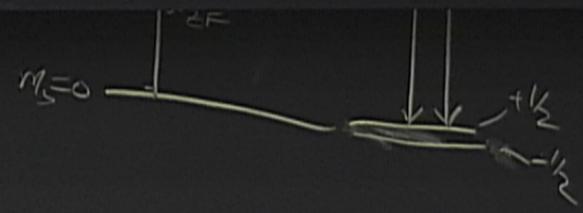
$|2^+\beta$   
 $0, +1/2$

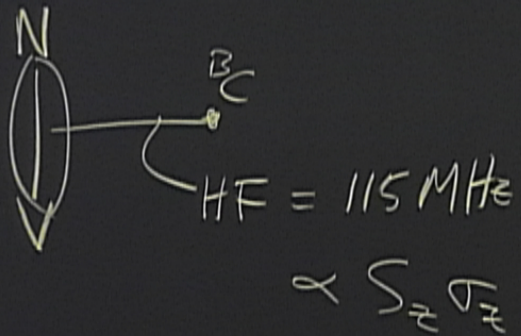


1. initialize (turn on laser)
2. readout

get rid of or by selecting either +1 or -1 qubit

2.8MHz/G ( $B_z$ )





Experiment

