Report on Stokes, Anti-Stokes g2 experiment progress May 21, 2014

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1 Overview

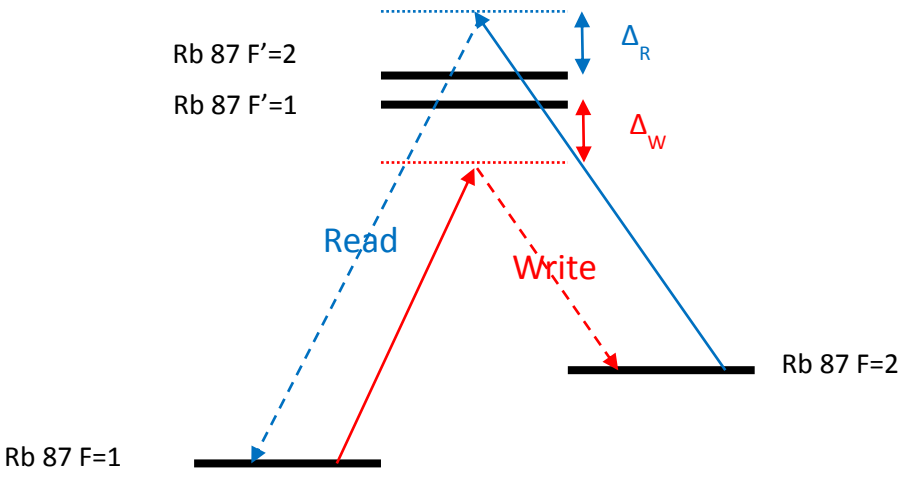
Stokes, No Anti stokes with ECLD, but with DFB , efficiencies of O(10%) on both channels

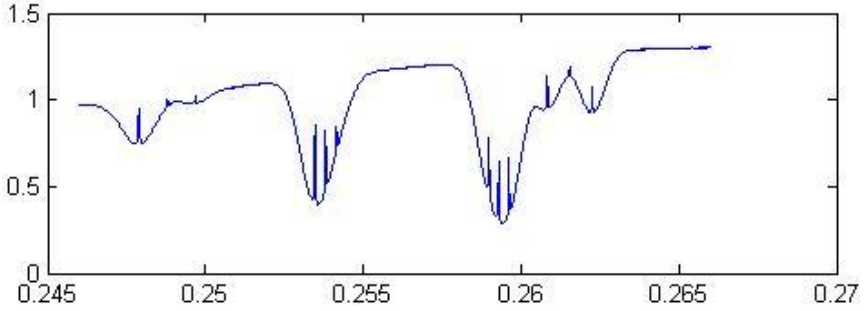
New : Coupling into SMF APC – reached 40% efficiency into SMF

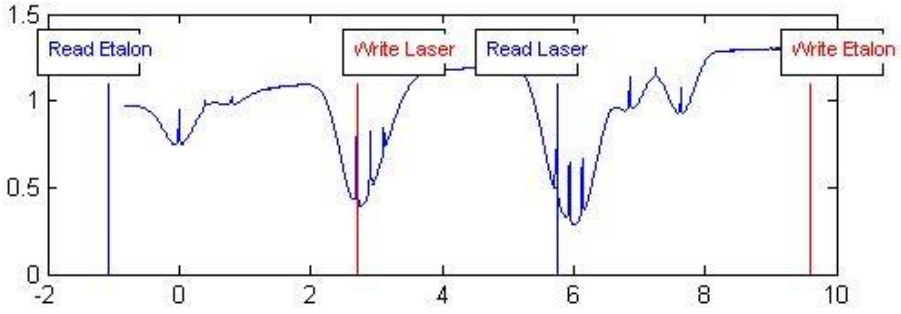
Change of location of etalon, 1:1 telescope, switch for temperature measurement of cells, removal of excess mirrors, switch to dielectric mirrors

2 Experimental Outline

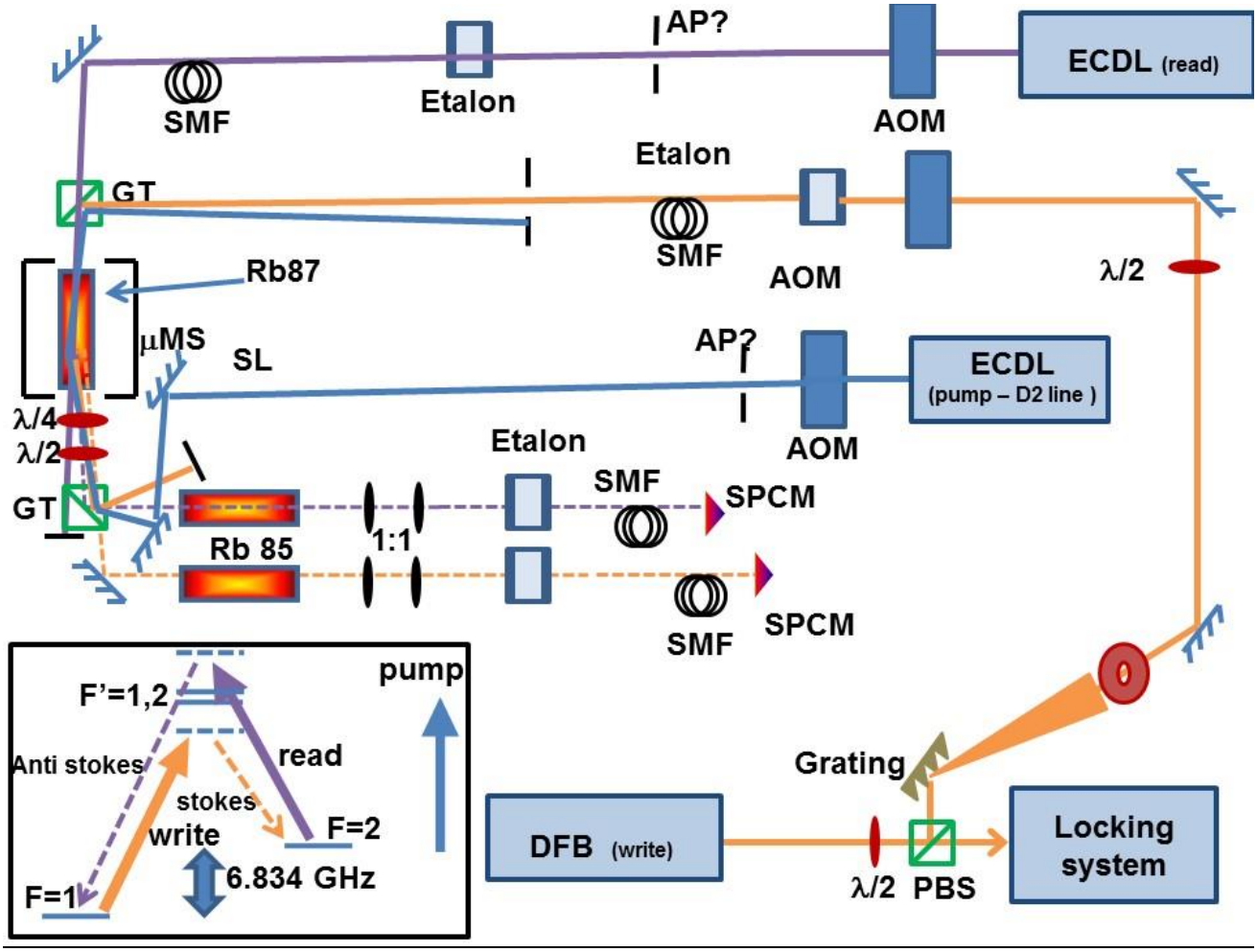
Write with stokes, Read with anti-stokes, measure g2




1.5
1
0.5
0
0.245
0.25
0.255
0.26
0.265
0.27


1.5
1
0.5
0
-2
0
2
4
6
8
10
Read Etalon
Write Laser
Read Laser
Write Etalon

3 Diagram


AP?
ECDL (read)
SMF
Etalon
AOM
Etalon
GT
SMF
AOM
λ/2
Rb87
μMS
SL
AP?
ECDL
(pump – D2 line)
λ/4
λ/2
AOM
Etalon
GT
SMF
SPCM
Rb 85
1:1
SMF
SPCM
pump
F'=1,2
Anti stokes
read
stokes
write
F=2
F=1
6.834 GHz
Grating
DFB (write)
Locking
system
λ/2
PBS

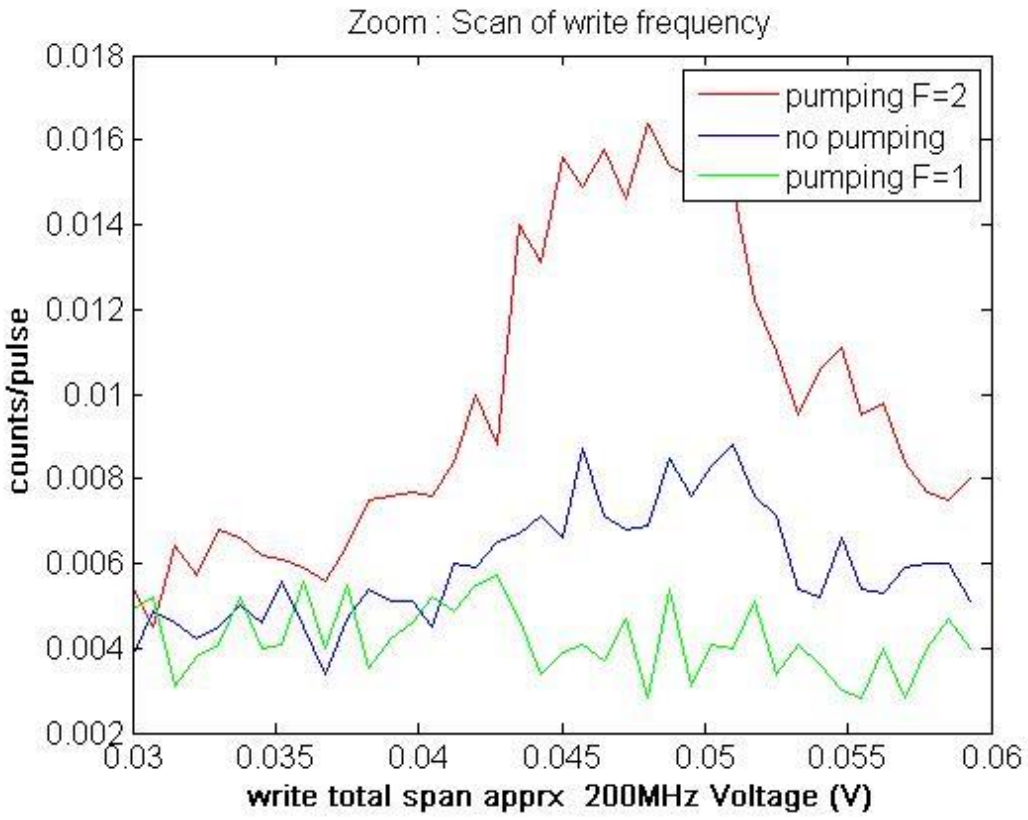
Current Status

4 Write Channel

Write Exit

Actual

6/5/14	before expt cell	after expt cell	before filter cell	before etalon	before SMF	after SMF
power abs [mW]		0.760		0.46	0.36	0.16
eff of stage [%]		100		60	78	44
overall eff		100		60	47	21

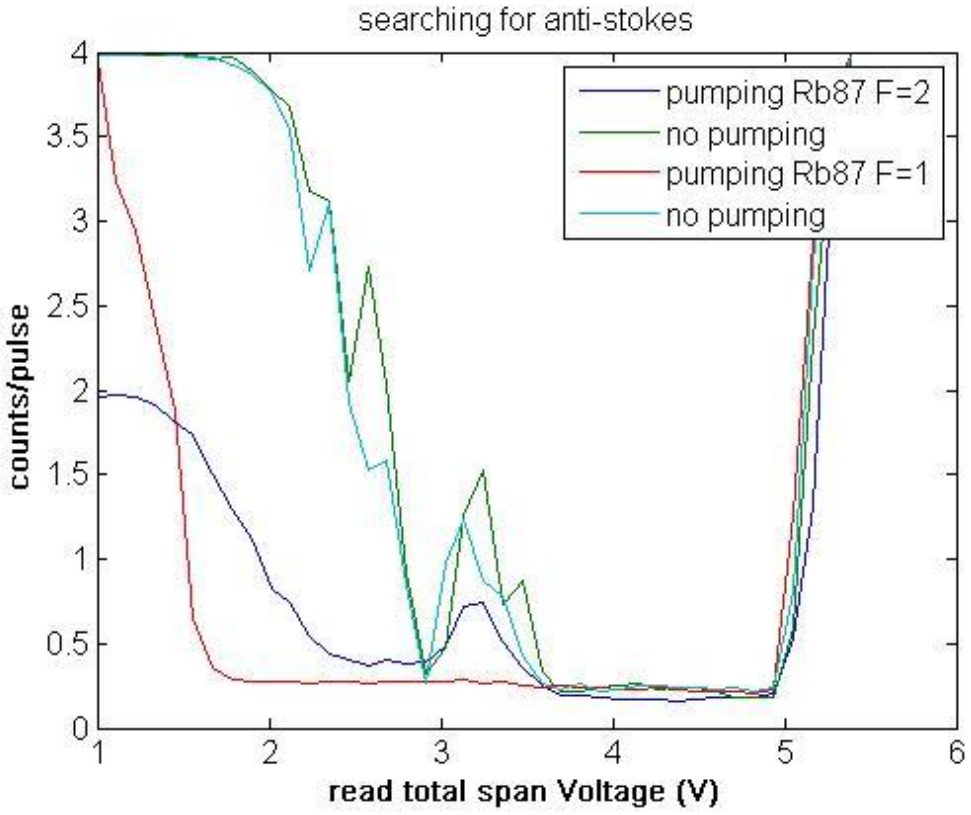


5 Read Channel

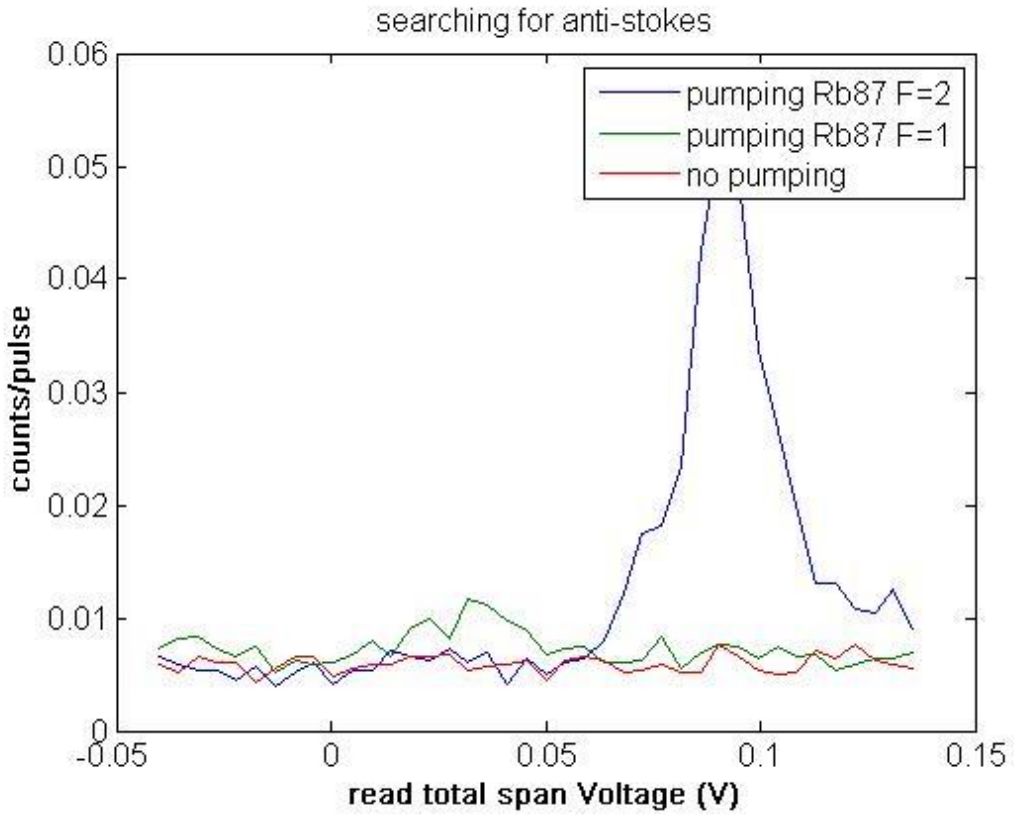
Read Exit

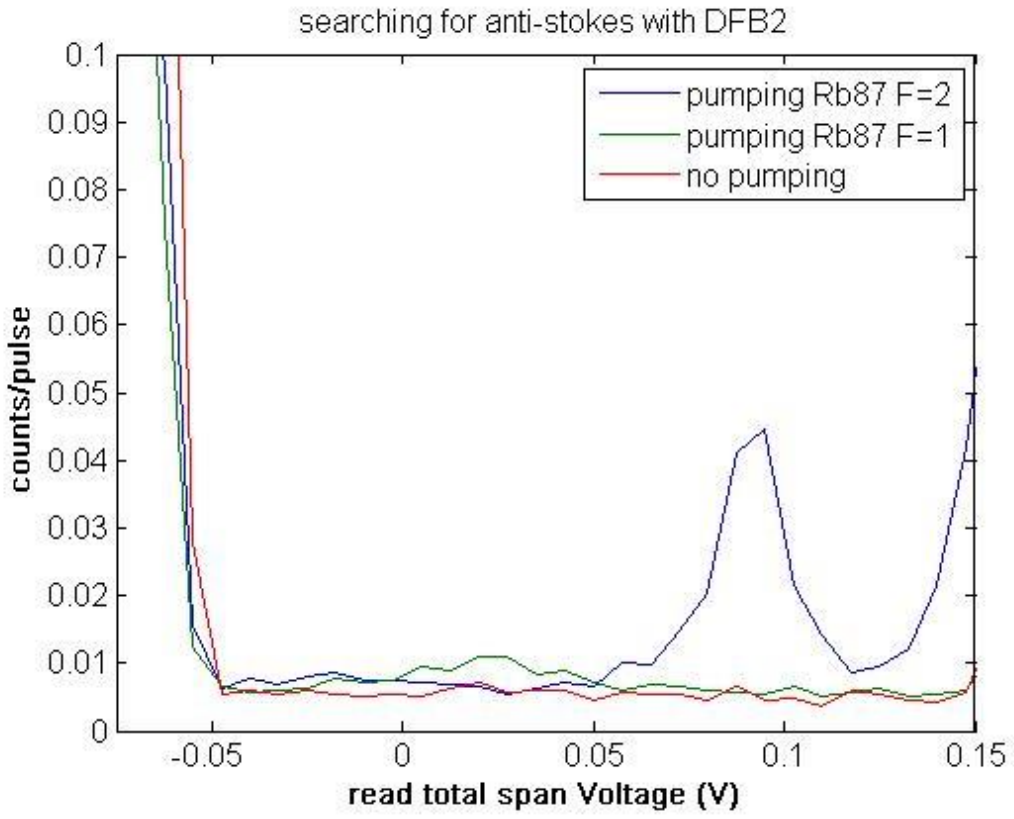
Actual

7/5/14	before expt cell	after expt cell	before filter cell	before etalon	before SMF	after SMF
power abs [mW]				0.46	0.20	0.05
eff of stage [%]						
overall eff						



Using DFB for read channel





6 Problems

Major

Read, anti-stokes signal

Secondary

- Instability of alignment of write and read entry ports

Minor

- Etaloning in fibers
- Maximizing power in pulsed mode
- Timing in pulsed mode
- Thermal drifts
- Abberations in lenses in telescopes
- Maximising etalon and SMF efficiencies simultaneously

7 Directions

Major

Find Stokes

- Power of read
- Try and find anti-stokes with DFB
- Understand signal

Secondary

- Switch to couplers
- Buy the proper holders

Minor

8 General Statistics

Write Entry

OPTIMUM	Initial	Before Grating	After Grating	Pin Hole	Before Double Pass [Amp 3V]	Before SMF	After SMF
CW							
abs [mW]					19.7	8.4	2.0
% eff of stage							24
% of total							
Pulsed							

Write Exit

Actual

4/24/14	**before expt cell**	**after expt cell**	**before filter cell**	**before etalon**	**before SMF**	**after SMF**
power abs [mW]		2.4		1.4	1	0.18
eff of stage [%]		100		60	70	18
overall eff		100		60	42	7.5

Pumping

OPTIMUM	Initial	Before Double Pass	After Double Pass
CW			
abs [mW]	29.4	23.6	6.35
% eff of stage			27
% of total			
Pulsed			

Read Entry

OPTIMUM	Initial after isolator (will change depending on frequency)	Before Double Pass	After Double Pass	BeforeSMF	After SMF		
CW							
abs [mW]		57.7	27.5	25.5	12.5		
% eff of stage			47.5		49		
% of total							
Pulsed							

Read Exit

Actual

1/5/14	**before expt cell**	**after expt cell**	**before filter cell**	**before etalon**	**after etalon**	**before SMF**	**after SMF**
power abs [mW]				1.9	1.2	1.1	0.4
eff of stage [%]					63	92	35
overall eff							