NOTEBOOK NO. G2P / GEP

ISSUED TO: ~~Josh Pierce~~ Pt Group

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Catalog number #2001HC

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May 20 2011

14:10 Start LN_2 cool down of Helium/magnet space for G2V magnet (no fridge or 7" pump tube inserted).

OVC pressure @ 3.8×10^{-6} Torr @turbo
3.1×10^{-3} Torr @ chamber

14:37 $R_{coil} = 95.7$

Fill Pressure ~3 psig

14:55 OVC: 1.3×10^{-4} @ chamber
$R_{coil} = 94.3$

15:07 OVC 7.6×10^{-5} @ chamber
$R_{coil} = 93\,\Omega$

15:17 OVC 6.4×10^{-5} @ chamber
$R_{coil} = 92.2\,\Omega$

15:43 OVC = 5.0×10^{-5} @ chamber

17:15 OVC = 6.3×10^{-5} @ chamber
leak rate 8.8×10^{-6} Atmic/sec and trending upward!
WTF Factor High

17:30 *Pressurized Magnet w/ 3 psig of He gas NO Rise in leak rate

17:39 OVC = 2.8×10^{-4} @ chamber
Leak rate 6.5×10^{-5} Atmic/sec

17:48 OVC = 8.1×10^{-4}
Leak 6.3×10^{-5}
$R_{10} = 94.0$

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May 23 2011

Turbo pressure = 1.3×10^{-6}

OVC = 1.7×10^{-10} → bad gauge → now 5×10^{-4}

Put L.D. on OVC → 2.5×10^{-3}

L.D = 4.3×10^{-7} creeping up

pumpout magnet to 29 in Hg.

L.D = 6.3×10^{-7} rising steadily

Back fill to ~½ psi → 6.6×10^{-7} hard to call this leak!

background $2.7_2 \times 10^{-7}$ $\frac{\text{Atm cc}}{\text{sec}}$

Filling He	Δ time (min : sec)	background ($\frac{\text{Atm cc}}{\text{sec}}$)
He gas @ Atm	2:24	$2.7_2 \times 10^{-7}$
He @ ½ psig	3:00	$2.7_1 \times 10^{-7}$
He @ 1 psig	3:30	$2.7_0 \times 10^{-7}$
He @ 1 psig	4:18	$2.6_9 \times 10^{-7}$
He @ 1 psig	5:11	$2.7_0 \times 10^{-7}$
He @ 1 psig	6:24	$2.6_7 \times 10^{-7}$
pump out Magnet	6:36	$2.6_8 \times 10^{-7}$
	1:25	$2.7_2 \times 10^{-7}$
	1:55	$2.7_2 \times 10^{-7}$
OVC Turbo off		$2.7_7 \times 10^{-7}$
	0:44	3.2×10^{-7}
	1:30	3.7×10^{-7}
	2:00	4.1×10^{-7}
	3:05	4.6×10^{-7}
	at long	6.6×10^{-7}
		$6.7_3 \times 10^{-7}$
		$6.6_3 \times 10^{-7}$
		$6.6_7 \times 10^{-7}$
		$6.7_0 \times 10^{-7}$

sounds of pinging

10:51

10:55 backfilling He

11:00 pump out Magnet system

11:01

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time	background
11:02 am	6.73×10^{-7}
11:03	6.76×10^{-7}
11:04	6.80×10^{-7}
11:23	6.77×10^{-7}
11:26	6.77×10^{-7}
11:31	6.75×10^{-7}
12:00	6.72×10^{-7}
14:00	6.24×10^{-7}

@ Atm of He gas in Magnet
1 psig of He gas in Magnet

We see no clear evidence of a leak.
Let's try cooling again!
← start cooling $T_7 = 186$ K

G2P LN2 Cool down #2 05/23/2011

time	leak rate (Atm cc/sec)	OVC (torr)	ITC 501 (K)	
14:03	6.21×10^{-7}	7.8×10^{-5}	Ch7	180
14:07	6.16×10^{-7}	5.5×10^{-5}	Ch7	165
14:09	6.15×10^{-7}	4.9×10^{-5}	Ch7	160.3
14:12	6.13×10^{-7}	3.6×10^{-5}	Ch7	130
14:15	6.09	3.2×10^{-5}		

N_2 pressure ~ 2.0 psi G

Note LN2 goes in at Siphon port and exhaust through ball valve on Fill port & ball valve connected to tubes from bottom of magnet

14:25	6.09	2.9×10^{-5}	Ch7	123
14:26	6.09	3.2×10^{-5}		125
14:28	6.10	3.6×10^{-5}		129
14:30	6.10	3.8×10^{-5}		126.
14:35	6.14	4.2×10^{-5}		127
14:39	6.21×10^{-7}	4.6×10^{-5}		129
14:43	6.40	5.0×10^{-5}		
14:49	7.31	6.3×10^{-5}		
14:52	7.6	← Backfill w/ 2 psi helium (LN2 is kicked empty)		
	7.75			
	8.1	leak rate rises,		
	9.2			
14:56	1.0×10^{-6}	start pumping out He		

pressurized w/ He and found leak & repeated.

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05/23/2011 Magnet leak ... Approaching 1×10^{-4} $\frac{\text{Atm cc}}{\text{sec}}$ @ 1 atm He

---

05/29/2011 pumped & purged Magnet Space w/ Argon 3 x

warm leak check

	leak rate	OVC pressure	He Magnet Pressure	
	5.3×10^{-7}	113 mtorr	30 inch Hg	
10:57				start Pumping Magnet space w/ He
10:53	$6.3_5 \times 10^{-7}$	124 mtorr	~0 psig	
10:58	$6.7_8 \times 10^{-7}$	133 mtorr		pumping out Magnet Space
10:57	$1.2_9 \times 10^{-7}$	81.0 mtorr	28 inch Hg	open turbo & Blower to OVC
11:03	8.5×10^{-8}	62.7		back filling
11:05	7.9×10^{-8}	60.2	1 psig	of He

05/26/2011 Indium seals remade and LN2 shield & OVC attach. Background in magnet too high to perform warm leak check.

	leak rate	OVC Pressure		Magnet Space Pressure	
11:08	$1.4_0 \times 10^{-6}$ & dropping	215 mtorr		-30 in Hg	
11:09	$1.2_9 \times 10^{-6}$	212		30 in Hg	
11:10	$1.1_7 \times 10^{-6}$	207		30 in Hg	
11:11	$1.1_4 \times 10^{-6}$	205		30 in Hg	start fill
11:15	$9.5_8 \times 10^{-7}$	198	pinging sounds @ positive pressure	1 psig	of He
11:16	$8.8_6 \times 10^{-7}$	194		1 psig	
11:18	$8.3_4 \times 10^{-7}$	191		1 psig	
11:21	$7.2_2 \times 10^{-7}$	185		1 psig	
11:39	$1.9_3 \times 10^{-7}$	126		1 psig	

close off all pumps except L.D. Pumps out magnet / back-fill w/ helium

16:50 1.17×10^{-8} 8 mtorr -30 in Hg → 1 psig

→ 1.21×10^{-8}

Repeat: 1.26×10^{-8} → no leak.

pump out magnet

Turbo & Roots open to OVC again pressure 4.5 mtorr

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May 27 2011

OVC ~ 2 mtorr still quite high

LD = 5.6×10^{-9} w/ Blowers & turbo.

Valve off the latter two pumps → LD → 6.2×10^{-9}

Back fill w/ helium into magnet 1.5 psig ⇒ 6.2×10^{-9} no leak

9:40 open LN_2 valve slowly to fill magnet

P_{ovc} = 1.2 mtorr turbo = 9.9×10^{-6} LD = 2.6×10^{-9}

9:50 magnet = 1 psig OVC = 0.7 mtorr turbo = 5.7×10^{-6}

TC 501_	1	2	3	4	5	6	7	8
	254	×	254	254	254	254	203	252

9:55 LD has risen 6×10^{-9} → H_2O freezing?

10:00 LD now falling 3.7×10^{-9} but turbo pressure rising: 7.1×10^{-6}

T_7 = 197

10:35 LD = 1.7×10^{-9} OVC = 0.0 mtorr Turbo = 1.1×10^{-6}

T_{1-6} = 254 T_7 = 152 T_8 = 177

10:45 LD rising steadily 1.4×10^{-8} Turbo 1.1×10^{-6} up from 1.0

T_5 = 135 T_6 = 230 T_7 = 155 T_8 = 177

11:30 LD = 1.4×10^{-8} has decreased from ~ 5×10^{-8} turbo = 9.3×10^{-7}

T_6 = 107 T_7 = 144 T_8 = 145

11:50 OVC = 1.3×10^{-4} turbo 9.7×10^{-7} LD = 1.1×10^{-7} ! rising steadily

T_1	218	T_6	107
T_3	255	T_7	145
T_4	129	T_8	144
T_5	180		

Nupro valve from bottom of magnet was blowing liquid. I closed it

12:10 LN_2 dewar empty

LD falling 1.7×10^{-7} OVC = 7.9×10^{-4} Turbo 2.5×10^{-6}

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Blow Helium gas thru Newpro valve to magnet bottom
LD steady @ 1.7×10^{-7} no leak?

12:20 start LN_2 transfer from fresh dewar OVC: 2.7×10^{-4}
Turbo: 1.2×10^{-6}

I think pressure/leak rose in OVC because things warmed up

12:45 cooling again but OVC is getting worse 3.4×10^{-4}, turbo 1.2×10^{-6}
LD = 2.2×10^{-7} rising...

12:55 LD really rose fast to 1.6×10^{-6}! OVC fell: 3×10^{-4}
turbo 1.1×10^{-6}

T_1	T_3	T_4	T_5	T_6	T_7	T_8
111.5	255?	106.4	130	107.8	125.4	136.8

LD now 7.2×10^{-6} ↑ OVC = 4.9×10^{-4} Turbo 1.7×10^{-6}

111.5	255	106.4	118	107.8	126.3	130.9

Some of these aren't like submerged in LN_2 ⇒ no
stop transfer - blow helium thru again. No leak
Temps warm quickly → no LN_2
start LN_2 again

13:23	111.7	107.6!	106.9	110.6	108.1	120.2	127.1	OVC = 9.4×10^{-4}

LD = 1.6×10^{-5} ↑
turbo = 3.7×10^{-6}

13:25 OVC → 2.6×10^{-3} Turbo 4×10^{-4}
13:30 OVC → 4.4 mtorr turbo 3.4×10^{-5} → has to be a leak!
13:35 OVC → 100 mtorr Stop transfer → pressure improves!
blow helium → no leak! What the fuck?

14:00 now pressures are falling again!

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14:50 LD = 6.6×10^{-5} OVC = 1.6×10^{-4} Turbo = 9.7×10^{-7}

T1	T3	T4	T5	T6	T7	T8
110.7*	106.6*	105.9*	109.7*	107.1*	99.0	110.4

* I think these are LN_2 values..

Blow off has decreased. I think we're filling now

15:10 LN_2 down empty - stop transfer..

15:10 110.2 106.0 105.3 109.0 106.5 98.4 111.3

LD = 6.7×10^{-5} OVC = 2.2×10^{-4} Turbo = 1.1×10^{-6}

Resistance across coils: Start/5 (14/15) 157 Ω

D sub	
(14/15)	157 Ω
(15/16)	42 Ω
16/17	57 Ω
17/18	29 Ω
18/19	29 Ω
19/20	56 Ω
20/21	41 Ω
21/22	155 Ω

15:40 OVC = 1.9×10^{-4} T1 = 110.3

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May 28 2011 OVC = 9.2×10^{-6} turbo = 1.4×10^{-7}

T1	T3	T4	T5	T6	T7	T8
109.9	105.8	105.0	109.0	106.3	98.2	113.0

May 29 2011 OVC = 6.7×10^{-6} turbo = 1.4×10^{-7} LD = 2.7×10^{-8} dropping slowly

109.8	105.7	105.0	108.7	106.2	98.2	116.2	still cold

May 30 2011 OVC = 6.0×10^{-6} turbo = 1.2×10^{-7}

109.8	105.7	104.9	108.7	106.2	98.2	119.4	still LN_2

May 31 2011

leakrate w/ turbo in //. $1.4_8 \times 10^{-9}$ atm-cc/sec Magnet space filled w/ LN_2
Going to push LN_2 out w/ He gas.
OVC = 6.2×10^{-6} turbo = 1.4×10^{-7}

109.9	105.7	104.9	108.7	106.2	98.2	121.4	still LN_2

9:07 Blow LN_2 out of magnet & into LN_2 shield – we're out of LN_2!
LD = 1.31×10^{-9}

9:37 OVC = 4.4×10^{-6} torr leakrate = $1.2_5 \times 10^{-9}$ Atm-cc/sec

ITC 501

ch1	ch3	ch4	ch5	ch6	ch7	ch8
109.8	105.1	105.0	109.0	106.4	98.1	165.0

10:34 OVC = 3.4×10^{-6} torr leakrate = $1.2_1 \times 10^{-9}$ Atm-cc/sec

ITC 501

ch1	ch3	ch4	ch5	ch6	ch7	ch8
110.3	106.2	105.3	109.2	106.7	99.1	128.0

11:07 OVC = 3.4×10^{-6} torr leakrate = $1.3_8 \times 10^{-9}$ Atm-cc/sec

ITC 501

ch1	ch3	ch4	ch5	ch6	ch7	ch8
108.4	104.3	105.4	106.1	106.0	103.9	226.8

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11:25 Magnet empty No more LN2. Pressurized Magnet space w/ 3 psig He No observable leak. Leak rate is rising slow.

11:32 OVC = 3.7×10^{-6} leakrate = 3.2×10^{-9} $\frac{Atm \cdot cc}{sec}$

ITC 501 ch1	ch3	ch4	ch5	ch6	ch7	ch8
110.1	105.0	105.6	108.3	106.0	105.7	183.9

12:00 Pumped on magnet a few times 0 → 10", 0 → 15" 0, 20 0 → 25" Back-fill w/ helium each time. RD is rising, but slowly, so I don't see clear evidence of a leak

Let it warm for ½ hour or so before final pump out.

12:15 RD = 8.3×10^{-9}

13:15 RD = 5.8×10^{-9} OVC 5×10^{-6}

16:25 LN2 Shield full. LN2 Probe reads 12.9" or 53%.

OVC = 3.7×10^{-6} Torr leakrate = 3.6×10^{-9} $\frac{Atm \cdot cc}{sec}$

112.7 108.6 108.0 112.1 109.6 117.6 160.2

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06/01/2011 G2P Magnet cool down w/ LHe

8:35 OVC = 4.0×10^{-6} torr Leakrate = 7.5×10^{-10} $\frac{\text{Atm cc}}{\text{sec}}$

ITC 501

114.7 110.5 109.7 115.3 112.3 125.6 154.1

LN2 level 7.1 inches 29.5%

8:55 Start LHe transfer. We have ~190 Liters in this dewar

LN2 level 10.8 in OVC = 3.9 Leakrate 2.1×10^{-9} $\frac{\text{Atm cc}}{\text{sec}}$

10:23 OVC = 3.6×10^{-6} Leakrate ~~1.2×10^{-8}~~ 1.37×10^{-8} LN2 = 10.5"

* Leak detector was valved off just opened

ITC

113.6 109.3 108.0 102.5 99.8 74.6 123.6

11:15 110.5 106.7 105.4 93.9 91 61.3 110.7 OVC = 9×10^{-7} LD = 1.8×10^{-8}

17:15 9.4 11.8 12.6 8.2 11.6 7.2 4.0 OVC = 1.8×10^{-7} LD =

Di4 Ω lead resistance => super conducting switch is below Tc

18:30 Magnet temps around 6K, think we started to collect LHe, but dewar goes empty!!

Switch to 2nd dewar of LHe OVC = 2.0×10^{-7} LD = 2.7×10^{-8}

19:17 Magnet is filling with liquid. LHe is reading out

LHe = 15%

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21:45 We filled magnet to 90% → dropped to 80% immediately after pulling transfer line.
OVC ~ 2×10^{-7}

Started ramping leads ~ 1.5 hours ago at standard rate.
Heat switch for shim coils is energized

T1	T3	T4	T5	T6	T7	T8	70% LHe
4.4	4.3	4.2	4.3	4.3	4.2	6.6	8.8" LN2

with the leads energized boil is ~70 slpm @ ~70A

At full field 77.245 Amps!
Go to persistent mode (shim heater is off too) boil-off ~32 slpm
Stay @ field 10-15 minutes.

23:15 Magnet ramped down without incident.
Turn off all heaters and leave for the night

LHe = 55% LN2 = 8.5 in

6/02/11

8:21 LHe = 20% LN2 = 6.9 in Tg = 14.2 K

Magnet leads are still very frosty.
fill LN2 to 11"
fill LHe → we ran out of LHe @ 0% !!

"Borrow" a 500 l dewar from HDice (thanks guys!)
2:00 Start filling again. 500l reads 29.5" at beginning (500l)

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05/02/2011

Stopped LHe transfer

16:45 OVC = 1.8×10^{-7} torr LR = 2.5×10^{-8} $\frac{\text{Atm} \cdot \text{cc}}{\text{sec}}$

ITC

4.4	4.4 (ch3)	4.3	4.3	4.4	4.8	5.3

He level "0" after blowing ~166 Liquid liters

possible plating problem (air on LN2 dewar leak)? Heat load from somewhere. wasn't there yesterday

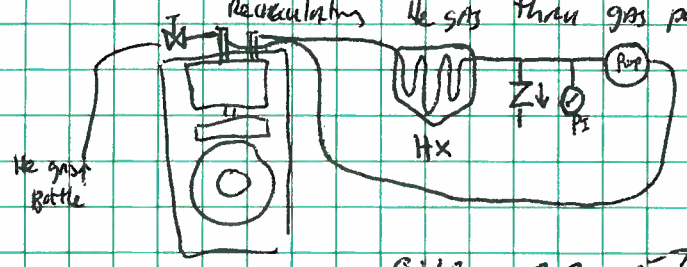
16:50 ITC

4.3	4.3	4.2	4.2	4.3	5.9	18.8

OVC was leak check No observable leak, @ 2×10^{-8} range.

11:10 WARM Up G2P Magnet

Recirculating He gas thru gas panel Room temp HX with Bellows pump from Frost



~1 psig He gas Recirculating

OVC = 2.2×10^{-7} torr

ITC

11:15	4.4	6.4	6.6	8.8	9.4	23.4	64.1

11:43 OVC = 5.8×10^{-6} torr

ITC

24.1	25.5	24.9	30.3	31.1	53.4	93.2

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12:12	OVC	8.7×10^{-6} torr						
	ITC							
	38.3	38.4	38.3	44.6	45.6	66.3	115.9	
12:42	OVC	1.1×10^{-5} torr		stopped	He recirculation			
	ITC							
	44	44.2	44.3	47.5	48.3	80.8	126.9	
1:00	OVC	1.2×10^{-5} Torr						
	ITC							
	44.6	44.2	44	46.5	47	82.2	141.1	
13:30	45.4	44.6	44.4	46.0	47.4	84	146.8	
	OVC	1.3×10^{-5}						
13:45	49.3	48.1	48.3	55.1	55.8	83	133.4	
	OVC	1.4×10^{-5}						
13:55	50.8	49.6	49.9	57.1	57.5	86.1	136.6	
	OVC	1.6×10^{-5}						
14:00	52.4	51.2	51.5	58.9	59.3	89.2	135.8	
	OVC	1.7×10^{-5}						
14:10	53.9	52.6	53	60.6	60.9	91.9	143.8	
	OVC	2.1×10^{-5}						
14:20	55.6	54.1	54.7	62.4	62.6	94.3	147.4	
	OVC	2.7×10^{-5}						
14:35	57.9	56.2	56.8	64.8	64.8	96.1	151.4	
	OVC	3.9×10^{-5}						
14:47	59.9	58.1	58.8	66.7	66.6	98.2	155.1	
	OVC	5.8×10^{-5}						
15:05	62.4	60.3	61.1	69.3	69	100.9	160.4	
	OVC	8.0×10^{-5}						

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3:35 ITC

66 63.8 64.6 73.1 72.4 106.6 166.4

OVC 1.5×10^{-4} torr

June 4 2011

16:40 OVC = 2.5 mtorr

ITC = 167 155 157 171 165 177 240

June 6 2011

8:29 OVC = 7 mtorr

ITC 501 238 6.7 229 230 255 238 201 248

06/06/2011

11:15 open OVC valve to leak detector. Background leakrate is 1.2×10^{-3} Atm cc/sec and falling

11:17 5.9×10^{-4} Atm cc/sec and falling

15:30 LD on OVC, no blower or turbo

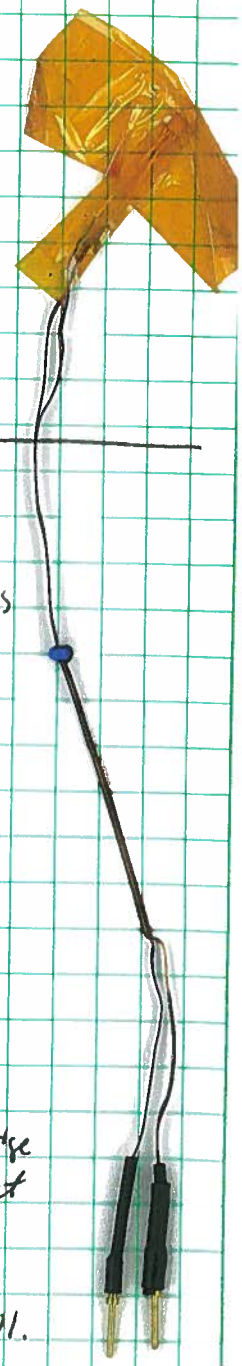
LD = 1.62×10^{-6} atm cc/s pressure 1 mtorr

Pump out magnet space to LD = 1.62×10^{-6} no change

Note: The ~~top fridge~~ top of the cryostat has a hole for the 1K fridge we have this covered w/ a 10" flange now. This means the magnet sees ~20% of the 300K radiated from this surface

I (kdk) estimate ~ 2W from this.

This matches well w/ the 32 slpm boil off observed on p. 11.



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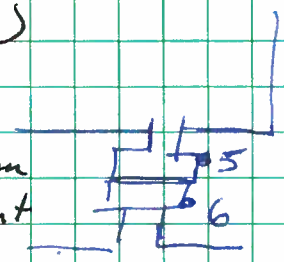
White	Bead	pt 103	Bottom of Helium Dewar
Black	Bead	pt 103	Top Donut
Quad	lead	DT	Indium flange
Quad	twist	DT	LN2 shield, Bottom

D sub

Mixer [redacted]	ch 1	Quad Twist	LN2 shield Bottom (east)
	ch 2	Quad lead	Indium Flange (South)
	[redacted]		
Shield	ch 5	white Bead	Bottom of Helium Dewar
	ch 6	Black Bead	Top of Magnet Doughnut



6-14-11

10:15 LN_2 cooldown of magnet

~~R_1 R_2 R_3 R_4 R_5 R_6 R~~

R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
343.7	343.7	344.7	342.2	350.1	349.4	321.9	311

T_1	T_2	T_5	T_6	P_{vac}	Leak
296.28	296.55	296.85	297.12	2.6×10^{-4}	1.03×10^{-7}

10:18 Turbo open

10:21 Picture* taken of Leak rate

P_{vac}	Leak rate
2.4×10^{-4}	4.54×10^{-8} & dropping

Flow meter ~ 90 SLPM He

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11:24 Big temperature gradients across the indium seal

$T_5 = 207.6$ $T_6 = 290$ K

11:27 LN_2 Dewar empty, change to new Dewar

12:34 R1 – R9 are now reading in Kelvin

13:12 R1 was reading the value for R8, it has been changed

14:18 Pressure already be starting to rise up at 5.1×10^{-5}

14:30 OVC Pressure creeping up

	Multimeter Reading	Lake Shore
15:45	Ch. 1: 349	400.1
	Ch. 2: 313.8	361.7
	Ch. 3: 298.6	344.3
	Ch. 4: 356.7	402.6
	5: 395.0	431.2
	6: 385.2	422.3
	7: 366.7	367.3
	8: 380.2	362.1

16:02 OVC went to shit 44.5 m torr leak rate 2.86×10^{-8} atm cc/sec

16:08 Stopped LN_2 transfer leak rate ↑ picture #2 1.1×10^{-6} and climbing

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06/14/2011

LN2 Cool Down DATA

Time	Povc (Torr)	Leakrate (atm*cc/sec)	Flow (SLPM He)	R1 Ω	R2 Ω	R3 Ω	R4 Ω	R5 Ω	R6 Ω	R7 Ω	R8 Ω	T1 (K)	T2	T5	T6
10:37	2.1×10^{-4}	3.59×10^{-8}	110	341.8	344.0	342	340.5	348	347.4	322.9	310.6	296.3	296.3	295.7	297.1
10:45	1.9×10^{-4}	3.56×10^{-8}	159	340.7	343.2	342	340	347.6	346.6	323.5	310.6	296.3	283.6	286.8	296.8
11:12	6.7×10^{-5}	3.37×10^{-8}	155.8	339.0	341.7	339.0	337.8	345.4	344.6	329.5	313.2	296.3	283.9	287.1	294.6
11:18	3.4×10^{-5}	3.2×10^{-8}	149.0	339.2	341.4	340.1	337.8	345.6	344.7	325.6	313.1	296.23	273.72	233.06	291.95
11:23	2.9×10^{-5}	3.17×10^{-8}	145	338.8	341.0	339.8	337.7	345.1	344.4	329.0	312.4	296.2	269.7	280.1	289.6
11:40	2.4×10^{-5}	3.02×10^{-8}	195	346.4	344.8	348.1	345.4	355.1	352.0	347.4	318.4	296.14	261.49	190.41	293.2
11:51	2.2×10^{-5}	2.95×10^{-8}	189	335.2	344.1	342.4	340.9	345.0	346.7	340.2	326.1	296.1	244.9	187.3	270.9
12:02	2.3×10^{-5}	2.81×10^{-8}	117	335.8	339.6	338.0	337.2	350.2	346.0	333.3	319.4	295.9	218.2	185.3	257.9
12:10	2.3×10^{-5}	2.87×10^{-8}	169	335.7	343.6	341.9	340.2	362.5	348.1	334	320.8	295.9	212.8	189.6	255.2
12:23	3.7×10^{-5}	2.80×10^{-8}	166	Kelvin	341.8	340.3	339.0	350.9	351.5	354.2	332.4	295.7	192.9	183.5	236.8
12:34	3.0×10^{-5}	2.75×10^{-8}	162	128.5	146.8	153.6	158.6	90.8	90.7	88.8	125.8	295.6	201.9	183.0	225.5
12:47	2.7×10^{-5}	2.72×10^{-8}	158	147.3	152.6	157.6	166.6	79.1	79.3	88.4	141.2	295.3	209.2	181.7	210.0
13:00	4.0×10^{-5}	2.67×10^{-8}	~~149.9~~	~~166.1~~ 143.9	~~155.1~~	~~156.0~~ 156.7	166.6	97.7	79.1	88.6	133.4	294.6	208.3	180.4	203.6
13:14	4.0×10^{-5}	2.62×10^{-8}	145	156.1	154.2	159.8	164.4	85.4	92.6	89.7	116.4	294.6	202.0	179.4	200.4
13:29	4.2×10^{-5}	2.59×10^{-8}	New	164.2	156.5	158.1	163.4	103.1	111.2	110.1	204.1	294.0	191.2	178.0	198.0
13:43	4.4×10^{-5}	2.57×10^{-8}	77	166.4	159.6	160.4	164.2	101.4	109.7	96.5	155.8	293.6	189.2	177.1	196.9
13:57	4.3×10^{-5}	2.54×10^{-8}	137	158.0	156.3	160.5	164.4	95.7	53.4	84.3	112.6	293.1	187.3	176.4	194.9
14:08	4.6×10^{-5}	2.54×10^{-8}	163	155.5	150.5	157.1	159.2	78.5	96.9	88.2	111.4	292.7	186.8	175.7	192.8
14:22	5.2×10^{-5}	2.53×10^{-8}	157	154.8	148.5	155.7	156.0	73.7	102.6	87.5	106.5	292.0	184.3	174.7	191.3
14:30	6.0×10^{-5}	2.52×10^{-8}	157	153.6	148.1	154.6	154.4	73.4	105.7	87.7	103.4	291.6	182.65	174.0	190.3
14:35	6.4×10^{-5}	2.52×10^{-8}	155.3	152.4	147.7	154.4	156.3	63.8	107.7	86.5	100.7	291.4	181.80	173.6	189.7
14:41	6.8×10^{-5}	2.51×10^{-8}	154.4	151.4	146.5	153.8	156.4	63.4	107.3	85.7	101.4	291.2	181.0	173.3	189.3
14:46	7.6×10^{-5}	2.51×10^{-8}	153.4	150.4	145.6	153.7	156.5	62.8	107.6	85.8	100.1	290.9	180.3	172.9	188.8
14:55	8.1×10^{-5}	2.51×10^{-8}	149.8	146.2	144.8	153.3	156.6	61.9	106.9	85.6	99.8	290.6	179.0	172.2	187.9
15:02	8.4×10^{-5}	2.50×10^{-8}	147.4	148.0	144.3	153.2	156.8	62.9	106.9	84.6	99.6	290.2	178.1	171.7	187.3
15:08	9.3×10^{-5}	2.50×10^{-8}	143.6	147.1	143.1	152.3	156.1	59.1	105.3	84.9	98.1	289.9	177.3	171.2	186.7
15:15	9.4×10^{-5}	2.49×10^{-8}	141.9	146.3	142.8	152.0	156.0	60.7	105.5	83.5	99.6	289.6	176.4	170.7	186.1
15:26	1.1×10^{-4}	2.48×10^{-8}	187.8	131.5	114.3	153.7	63.7	74.8	84.1	108.9	110.7	289.1	176.3	170.1	185.0
15:35	1.5×10^{-4}	2.45×10^{-8}	New	113.8	110.1	149.1	63.2	73.2	53.7	93.5	105.6	288.6	175.5	169.1	184.2
15:41	1.3×10^{-4}	2.42×10^{-8}	186.2	97.7	104.6	151.2	63.8	68.9	54.0	93.1	105.1	288.3	173.5	168.7	183.5
15:47	1.3×10^{-4}	2.36×10^{-8}	184.2	89.4	107.7	143.9	63.3	52.5	51.1	95.6	105.2	287.9	172.4	168.4	182.9
15:57	1.8×10^{-3}	2.68×10^{-8}	187.0	64.7	92.8	132.2	63.1	49.1	52.9	93.4	100.9	287.3	147.9	152.2	162.8
16:02	2.8×10^{-2}	2.82×10^{-8}	185.0	65.7	82.88	64.3	64.3	63.3	53.9	96.1	103.7	286.7	118.73	135.1	140.6
16:11	4.6×10^{-2}	9.5×10^{-7}	0									285.0	107.5	122.1	127.5

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16:12 Vacuum pump open, pumping on LN2 baffle

16:17 He bottle open to magnet space. Only able to pump Magnet space to 6 inch Hg
16:18 leak! picture #3

16:20 9 in Hg filling w/ He again Leaks
16:23 pumping out leak rate falls again 2.9×10^{-6}
w/ 1 atm of He in magnet leak rate falls along w/ ovc = 2 atm
16:36 Closed upper ring valve pumping out Magnet & backfill w/ He

16:40 Magnet space 19 in Hg, back filling w/ He

17:40 leak opens again. Povc = 2×10^{4} and climbing

17:45 pressure got as high as 19 mtorr, but now has begun to turn back around.

18:20 Out of LN2. There may be LN2 at bottom of the coils, hard to say.

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LN2 Cool Down DATA

Time	Povc (Torr)	Leakrate (atm*L/sec)	Flow (SLPM He)	[illegible]	R2	R3	R4	R5	R6	R7	R8	T1	T2	T5	T6
16:14	32.2 mtorr	4.7×10^{-7}	0	61.3	94.1	137.1	116.7	87	87	88	113.3	284	111.6	124.2	130
16:25	3.3 mtorr	1.7×10^{-6}	0									284	145.9	146	160.1
16:36	12 X	2.3×10^{-8}	0									283	173.9	158.5	175.9
16:57	5.6×10^{-5}	2.5×10^{-8}	200									282	171	159	174
17:20	4.8×10^{-5}	2.9×10^{-8}	0									281.6	171	159.5	176.9
17:25	4.5×10^{-5}	2.4×10^{-8}	High?									281.3	169.1	159.3	175.2
17:32	5×10^{-5}	2.5×10^{-8}	"									280	165.5	159.2	173.2
17:37	5.7×10^{-5}	2.9×10^{-8}	"									280	163.8	159.0	173.2
17:40	2×10^{-4}	2.9×10^{-8}	"									280	163	158.7	172
17:46	13.1×10^{-5}	2.9×10^{-8}	"									279	124	140	147
17:52	9×10^{-4}	3.2×10^{-8}	"	63.6	61.7	61.8	63.9	49.6	54.1	75.5	141	279	128.0	145	154
17:59	4.4×10^{-4}	3.0×10^{-8}	"	63.7	61.6	62.0	63.7	49.6	55.0	75.3	145	279	140	150	166
18:14	6.7×10^{-7}	2.6×10^{-8}	"									278.4	152	154	166
18:26	3.6×10^{-5}		—	61.0	60.2	75.4	78.2	59	62	82	95				

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June 15 ~~2010~~ 2011

8:40 OVC = 6.1×10^{-6} T1 = 261 T2 = 147 T3 = 156 T4 = 164 not much warmer

Allen bradley's: 72.6K 70.1 71.1 73.1 57.6 62.1 94.1 194

No ice anywhere.

10:47 Moved leak detector to behind turbo

P ovc = 5.7×10^{-5} Leak = 6.12×10^{-8}

11:04 Purging and backfilling magnet space w/ helium doesn't show a leak. Moved LN_2 probe to the magnet space. We will attempt to get some more LN_2 and fill up the magnet space so as not to waste yesterdays effort

15:27 began filling with LN_2

P ovc = 5.1×10^{-5} Leak: 5.76×10^{-8}

T_1 258 T_5 150

T_2 141 T_6 159

	Povc	Leak	Flow	T_1	T_2	T_5	T_6
15:47	4.9×10^{-5}	5.67×10^{-8}	87	258	135	148	157
16:00	4.8×10^{-5}	5.46×10^{-8}	79	258	134	147	156

16:27 magnet full, stopped LN_2 transfer

LN_2 level probe reads 10.1

Magnet fill was very easy. The transfer was very calm. We filled through the LHe fill port and exhausted through the ball valve @ that port and through the ogms panel (butterfly valve open)

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6/15/2011

iNo Level

g2p Magnet Cool Down (He □ / LN2 □)

Time	Povc	Leak Rate	Flow	R1	R2	R3	R4	R5	R6	R7	R8	T1	T2	T5	T6
16:05	4.8×10^{-5}	5.43×10^{-8}	—									258	133	146	156
1615	4.8×10^{-5}	5.42×10^{-8}	—	110.6	5.4	106.5	105.9	109.6	107.0	99.3	116.4	258	133	146	156
1625	4.8×10^{-5}	5.38×10^{-8}	—	110.4	10.1	106.5	105.8	109.6	107.0	99.3	106.2	258	133	146	155

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June 16

18:00 Since everyone is too "busy" to make some simple notes...

OVC = 2.6×10^{-5} LD = 4.1×10^{-8} LN_2 = 8.1"

T1	244	T5	138	R1	R3	R4	R5	R6	R7	R8
T2	121	T6	146	110	106	105.6	109	107	99	107

June 17

8:50 OVC = 1.8×10^{-5} LD = 3.2×10^{-8} LN_2 = 7.2"

T1 = 241 T5 = 136

T2 = 119 T6 = 144

15:50 OVC =

16:57 leak detector is shut down for the weekend

OVC = 1.4×10^{-5} LN_2 = 6.7"

T_1 = 240.83 T_5 = 135.63

T_2 = 118.75 T_6 = 143.96

June 19 2011 OVC = 9×10^{-6} T1 238 T5 134

9:45 LN_2 = 4.1" T2 117 T6 142

June 20 2011

8:15 OVC = 3.2×10^{-6} T_1 238.0 T_5 134.19

LN_2 = 2.8" T_2 116.7 T6 142.11

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June 22 TIC 501 being re-calibrated $LN_2 = 0.0''$

OVC = 1.7×10^{-6} we now have turbo AND Diff pump on OVC

T1 = 239 T5 = 134

T2 = 117 T6 = 142

9:10 start top off of LN_2 in mapped space

9:23 LN_2 = 4.3" stop fill

June 23

8:16 $P_{ovc} = 1.7 \times 10^{-6}$ $LN_2 = 2.9''$

$T_1 = 239$ $T_5 = 134.6$

$T_2 = 117$ $T_6 = 142.6$

June 24

POLTAR

11:43 LN_2 level 1.2", began filling to top off for weekend

11:55 LN_2 level 3.0", stopped filling

June 27

9:47 Leak detector is behind turbo again

OVC = 1.6×10^{-6} Leak = 1.7×10^{-9}

start LN_2 removal

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9:47 leak rate has been rising steadily

Leak = 2.67×10^{-9} OVC = 1.6×10^{-6}

10:10 leak rate is still rising

Leak = 4.9×10^{-9}

10:45 Leak rate 8.0×10^{-9} OVC 1.7×10^{-6}

11:00 No more LN_2 in magnet. Pump and purge magnet w/ helium

OVC = 1.7×10^{-6} leak = 93×10^{-9}

11:30 Pumping out remainder of LN_2 now. LD has "burps" but no clear indication of leak when I back-fill w/ helium.

12:20 Pump magnet to -30" Hg. Still no indication of a leak

Begin filling LN_2 jacket.

Due to power glitch last Friday, the vacuum in our LHe transfer line is not great ~ 1×10^{-4} torr.

T1 = 238.7 T5 = 136.8 OVC = 1.6×10^{-6}
T2 = 118.49 T6 = 142.94 LD = 1.2×10^{-8}

MC501	111.3	107.7	107.3	110.2	108.3	195.4

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13:40 Stab LHe dewar, begin LHe cool-down OVC = 1.3×10^{-6}
note: we been pumping in parallel w/ 8" Diff pump
I valved off Diff pump → OVC = 1.5×10^{-6} ; LD = 1

17:55 Magnet has been ~4K for a half hour, but we still haven't seen any movement on the level probe.

18:35 10% liquid helium!

Transfer is calm and seemingly slow

Magnet exhaust on gas panel is open
Ball valve on fill stack is open. Bottom port is closed, ball valve on magnet exhaust is closed, butterfly is open

18:55 30% LHe

19:17 LHe = 45%. I closed the valve that exhausts at the fill stack to see if that has a negative influence on the fill

Flow = 126.4

19:37 LHe = 72%

19:45 Stopped filling 85% liquid helium AMI probe = 13 in
Measured 8 inches in helium dewar.

20:00 Flow = 35 slpm

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June 28 2011 Gillian Welch's new album is released today...

$OVC = 1.2 \times 10^{-7}$ $LD = 2.5 \times 10^{-8}$

T1 96.7 T5 under LHe boil-off = 15.3 slpm

T2 11.1 T6 under 8.0" LN_2 40% LHe (Oxford)

4.0" LHe (AMI)

~~Clos~~

Close Butterfly valve on top of magnet → flow spikes to 200 slpm

Magnet level drops to 35%! Flow is steadily dropping.

Not sure what is happening...

Pressure oscillation? Or maybe warm gas trapped at top of magnet ring is forced ~~into~~ back down into the dewar...

Flow levels off at ~ 50 slpm ⇒ an additional 2 watts of heat!

Open valve again → flow drops immediately

Moral: Keep butterfly valve open.

9:00 start LHe fill LHe = 40%

Butterfly valves open, close{ Gas panel open, all other

9:30 Magnet full LHe = 98% no big deal

10:00 Magnet ready to be ramped up. I will ramp @ 1.2 A/min to 38.623 ⇒ 2.5 T

Shim heaters on @ 150 mA (75 mA each)

Main heater on

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10:12 Ramp is going fine. Flow while ramping = 50 slpm

10:38 magnet at 2.5 T, 38,623 Amps
shim heater off, main heater off

11:30 LN_2: 7.6, 0.1931 T DC, He: 6.8, OVC: 3.1×10^{-8} Torr

12:00 LN_2: 7.5, 0.1931 T DC, He: 6.7, OVC: 3.6×10^{-8} Torr

12:30 LN_2: 7.5, 0.1930* T DC, He: 6.6, OVC: 3.8×10^{-8} Torr, Flow: 20.6
Jixie ran tape on the window thus moving the probe

13:00 LN_2: 7.4, 0.1906* T DC, He: 6.5, OVC: 4.4×10^{-8} Torr, Flow: 20.6

13:30 LN_2: 7.3, He: 6.4, OVC: 4.1×10^{-8} Torr, Flow: 20.6

14:00 LN_2: 7.2 He: 6.2, OVC: 4.3×10^{-8} Torr, Flow: 19.9

14:30 LN_2: 7.2 He: 6.1, OVC: 4.1×10^{-8} Torr, Flow: 19.6

15:03 LN_2: 7.1 He: 5.9, OVC: 4.6×10^{-8} Torr, Flow: 15.6

15:28 LN_2: 7.0 He: 5.8, OVC: 5.2×10^{-8} Torr, Flow: 16.1

15:51 LN_2: 6.9 He: 5.7, OVC: 5.5×10^{-8} Torr, Flow: 16.6

17:15 Ramping magnet down to zero. LN_2 = 6.7 LHe = 57%

17:40 start LHe fill

17:50 magnet off switch heaters off

18:01 Decided to top of LN_2 while I'm at it
LN_2 = 6.6"

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18:20 stop LHe fill ~90%

18:30 stop LN_2 fill LN_2 = 11"

June 29 2011

8:18 Magnet looks pretty good this morning.

Flow = ~15.6 slpm LHe = 47%
LN_2 = 8.7"

Turn on switch heaters and begin ramping magnet up to 5T

8:37 start LHe fill
9:00 80% LHe, stop LHe fill

9:58 magnet ramped up and stopped at 77.245 A
put into persistent mode

LN_2: 8.6 LHe: 6.8 Flow: 30.0

10:29 LN_2: 8.5 LHe: 6.6 Flow: 27.6

11:03 LN_2: 8.4 LHe: 6.4 Flow: 22.3

11:30 LN_2: 8.4 LHe: 6.4 Flow: 21.2

12:00 LN_2: 8.3 LHe: 6.3 Flow: 20.3

12:32 LN_2: 8.2 LHe: 6.0 Flow: 16.1

13:02 LN_2: 8.1 LHe: 5.9 Flow: 17.1

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13:32 LN_2: 8.0 LHe: 5.8 Flow: 17.8

13:58 LN_2: 8.0 LHe: 5.8 Flow: 17.2

14:28 LN_2: 7.9 LHe: 5.6 Flow: 17.1

15:00 LN_2: 7.8 LHe: 5.5 Flow: 17.0

15:29 LN_2: 7.7 LHe: 5.4 Flow: 16.8

14:04 LN_2: 7.6 LHe: 5.3 Flow: 16.8

14:30 LN_2: 7.6 LHe: 5.2 Flow: 16.5

18:37 Heaters all off LHe: 45%

June 30 2011

8:10 Flow: 13 slpm LHe: 20% LN_2: 5.1"

11:00 LHe = 8% Flow = 12.8 slpm ; The Butterfly valve on top of magnet vents is cracked open ⊘

open fully ⊖ ⇒ 12.8 slpm
Closing valve to where it is barely cracked open → 12.2 maybe

Close valve fully ⇒ flow increases to ~ 145 slpm
decreases to 55 slpm in 3 minutes
40 slpm in 5 min
21.5 slpm in 18 min
20.5 in 20 min
18.1 in 25 min
13.5 in 3 hours

OPEN valve again → 12.3 slpm

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07/07/2011 Filled OVC w/ N_2 to ~ 200 Torr initial pressure was 0.2 mtorr. 4 "pings" were noted @ 1 mtorr, 80 torr 90 torr & 130 torr.

07/08/2011 Continued filling OVC with N_2 from ~230 Torr to ~500 Torr.

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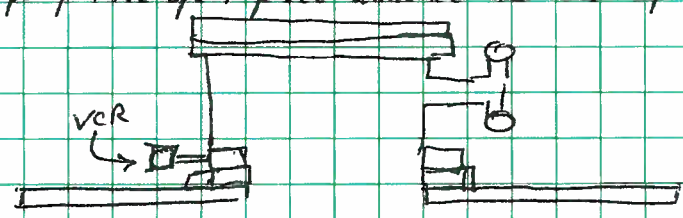
We have the rotating seal & pump tube spool piece attached to the top of the cryostat for leak checking.



LD is 2.7×10^{-9}
w/ no addition pumps on OVC

Spray everything, including into the VCR for differential pumping of Rot. Seal
⇒ No leak.

Rotate seal ~ 15-20° (very hard to rotate!) while spraying into VCR
After ~ 60s delay LD increases to max 8.4×10^{-9} & dropping slowly.

Sep 15 2011

OVC is pumped down w/ pfeiffer leak detector

Background : 6.2×10^{-9} evacuate magnet space and backfill it w/ helium

with 1 psi helium leak rate = 6.19×10^{-9}

10:00 Diff pump on and gate valve open

11:15 Move leak detector over to fridge space, still pumping

2:05 Began Pressure Test 62A Separator / Frige
Started leak Rate 6.1×10^{-9} atmcc/sec Vac. Pressure 4.8×10^{-3} TORR
Finished leak Rate 1.3×10^{-5} atmcc/sec Vac. Pressure 4.5×10^{-3} TORR

* Note : Run Valves are leaking by which is expected!

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9/15/11

62P Separator / Frige.

2:16 Pressure Test concluded

2:36 pm put leak detector back on OVC

3:01 pm Begin pumping out Frige to prepare for back fill with He for reverse leak check

Leak rate on OVC 8.3×10^{-10} atm cc/sec

4:35 Pressurized Fridge space to 4psig leak rate flat @ 7.5×10^{-10} $\frac{\text{atm cc}}{\text{sec}}$

9/17/11 OVC = 9.3×10^{-5} torr

Put leak detector on OVC Pressure goes to 1×10

~~Start with fill~~

Power cycle cold cathode. Now read 6.5×10^{-5}

9:55 start LN_2 fill at magnet space

leak rate = 9.5×10^{-10}

Magnet is vent through the gas panel, at the siphon port, out through the bottom traps

Pressure 3.2 PSI lower to ~2 PSI

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	OVC	leak	1	2	3	4	5	6	7	8
10:35	3.7×10^{-5}	5.4×10^{-10}	156,	422,	169,	162,	177,	167,	116,	131
11:00	2.6×10^{-5}	5.5×10^{-10}	157,	465,	164,	162,	160,	167,	140,	137
11:35	1.7×10^{-5}	5.9×10^{-10}	158,	48,	164,	164,	141,	151,	106,	129
12:00	since	liquid	spurting	out	of	the	bottom	tap,	close	it
12:20	8×10^{-6}	9×10^{-10}	140,	40,	163,	79,	152,	153,	115,	105
12:45	change	LN_2	level,	leak	looks	to	be	opening	up	
12:50	1.7×10^{-4}	4×10^{-8}	97,	44,	77.6,	76.9,	76.8,	76.8,	109,	98

13:20 the leak is very bad now
OVC = 1.2 torr on the pirani gauge, we put the blower cart on the magnet.

13:20	1.2 torr	3.4×10^{-8}	76,	36,	77,	76,	76,	77,	98.3,	93
14:00	6.2×10^{-2}		76,	32,	76,	75,	75,	74,	74	

15:00 Magnet full of LN_2

→ It took about 5 hours to fill LN_2
Open gate valve for the Diff. Pump

OVC = 5.2×10^{-4} torr

Fridge Therms:
1 255 (nose)
2 248 (Bot Hx)
3 246 (Top Hx)
4 236 (Sep)

We have fridge mech. pumps running
pressure 0 mbar

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9-18-2011 15:00 OVC = 1.4×10^{-5} LN_2 boil off = 7.7 slpm according to Hastings helium flow meter

ITC 501	75.0	38.7	75.4	74.9	74.6	75.3	76.1	76.7
fridge	25 218	215	221	271	241			

9-19-2011 8:40 OVC = 1.2×10^{-5} LN_2 boil off 7.2 slpm

ITC 501	75.0	34.9	75.4	74.9	74.5	75.3	76.1	77.9 ✓ warmed up a bit
fridge	25 218	206.6	215.4	268.5	239.2	296.9Ω	289.8Ω	

9:15 Start transfering LN_2 from LHe space to LN_2 shield.

14:00 No more liquid coming out of magnet, but we will wait a bit longer.

15:30 We've pumped out LN_2 & started LHe cooldown from a 500l dewar (450 liters only)
OVC = 1.5×10^{-6}

ITC501	76.1	77.0	76.4	76.0	74.4	75.7	84.0	80.1

Valves on Magnet: Butterfly open exhausting thru gas panel And valve from bottom of

15:50 start LN_2 fill

16:15	75.4	76.9	68.8	65.2	64.3	55.3	26.2	40.7

OVC = 4.5×10^{-7}

~~17:30~~	~~70.0~~	~~68.9~~	~~61.4~~	~~58.1~~	~~40.9~~				
17:30	69.7	35	60.9	50.9	56.4	41	14.7	19.2	← ITC 501
18:00	62.9	32.2	58.4	41.9	53.4	34.1	10.5	13.7	3.4×10^{-7} torr
18:30	43.2	26.1	62.1	26.8	57	22.4	10.9	14.3	3.9×10^{-7} torr

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Witnessed & Understood by me, ↳ Right side coils cooling faster than left side

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~~18:35~~

19:01 LN_2 full 11"

19:00	23.7	17.9	42.3	22.1	36.8	16.4	11.7	14.9	4.6×10^{-7} torr
19:35	10.3	10.9	13.0	13.9	11.5	9.1	9.2	8.7	5.9×10^{-7} * fluct
19:58	4.3	7.2	4.3	4.7	4.1	4.5	4.7	4.9	5.9×10^{-7} (swings between 3 and
20:30	4.3	7.1	4.2	4.3	4.0	4.2	4.2	4.5	

OVC = 1.7×10^{-5} torr grrr

close valve from bottom of coils..

20:58 some LHe level LHe = 15%

21:55 82% LHe stop transfer OVC = 1.7×10^{-5} torr holding steady

LS218 199 297 Ω ← These have not budged

206 289.6 Ω ←

261

234

9-20-2011

10:25 Magnet Level = 0% Flow = 38.7 OVC = 1.6×10^{-5}

we will top off the magnet once the jumper is ready

11:35 start LHe fill, butterfly open, venting only through the gas panel

13:30 Magnet Full

14:30 Stabbed the jumper Seperator pump all the way open

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14:40 We had a lot of trouble w/ the siphon U-tube: ~~It was too~~ tight
1) It was not completed until about 10 AM today
2) only pump it to ~ 10 mtorr before use
3) It was too tight & we had to run a 3/8" drill thru the fridge-side bayonet...
4) It appears to be ~6" too long - or stops 6" from the ~~intended~~ intended spot.

More woes: Magnet boil-off is very high. up to 120 slpm.
This maybe due to venting magnet thru the stack w/ dewar t-line port...
The flow controller for separator doesn't work. we are throttling flow w/ manual valve on gas panel.

OVC = 1.5×10^{-5}

fridge pumps on, but R & B valves closed; sep flow 80 SCFH

LS 218:	185.7 nose	368 Ω	baffle 86 K ~~no~~ no way ?
	194.3 Hx	305 Ω	baffle 262 K
	242.9 Hx		
	160.4 sep		

14:45 open R & B 3 turns each flow ~ 20 slpm

15:00	LS 218	186	64	fridge flow 16
		193	154	mag flow 72
		204		
		114		
15:15	LS 218	186	84	fridge 14.5
		189	153	mag 68
		165		sep 30 scfm (I closed valve slightly)
		88		definitely see press. osc. in sep
15:30		184	59	fridge 16
		184	150	mag 75
		126		
		71		
16:15		167	30	fridge 22
		163	86	mag 51
		64		sep 55 scfm
		34		

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16:30 158 32 fridge 23 OVC = 1.5×10^{-5}
151 89 Mag 50
53 Sep 29 slpm (flow controller working now)
32

Time	Nose R1	~~HX~~ R2	HX R3	Sep R4	Baf R5	Baf R6	Mag Flow	Fridg Flow	Sep Flow	OVC torr	Mag Level
~~16:45~~	~~[illegible]~~										
16:45	152	144	47.4	32.5	32.7	95.6	47	24	29	1.5×10^{-5}	30%
16:55	start LHe transfer. Stopped Sep. pump → warmed to 42 K										
17:00	142	131	38.6	25.1	18.3	76	>200	27	60	1.4×10^{-5}	40%
17:30	LHe Transfer done				LHe = 85%						
17:31	109	86	20	15.8	15.3	77	176	36.6	62	1.4×10^{-5}	85%
17:55	69	42.6	140	9.7	15.1	101	72	47	62	1.5×10^{-5}	
18:13	getting LHe in separator now				~~fridge~~ 16.4%						
18:15	30.8	13.5	7.5	4.23	17.3	17.7	~~[illegible]~~				

19:15 We have liquid in nose, up to ~ 20%
Can't get the largest pump on, so close run valve → pump on

1.26K 4.01 4.14 4.21 8.6K 27.13K 38 47 slpm 46 slpm 1.4×10^{-5} torr magnet 45%

HX is shit!! est. pumping speed ~ ~~[illegible]~~ 0.9 torr

$$\frac{760\ \text{torr}}{0.9\ \text{torr}} \times \frac{47\ \ell}{\text{min}} \times \frac{60\ \text{min}}{\text{hr}} \times \frac{1\ \text{m}^3}{1000\ \ell} = 2{,}400\ \text{m}^3/\text{hr}$$

What should we expect?
Pump is probably 3000 m^3/hr @ 50 Hz → $3000 \times \frac{60}{50} \times .65 \Rightarrow 2{,}340\ \text{m}^3/\text{hr}$

21:21 We have over-filled the fridge after loading the carbon-fiber insert (it went in well)

1.62K 1.67K SOVER ⊥ T under 14.0K 51K nose level = "ERR"
OVC = 1.5×10^{-3} sep level = "ERR"

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21:23 We filled magnet dewar to 65% before dewar went empty
Fridge = 15 slpm Run valve & Bypass CLOSED
Sep = 15 slpm
mag = 46 slpm and dropping - I've seen it as low as ~30 slpm
mag = 60%

21:40 Sep = 100% → Josh found that cdk had left the helium backfill valve open to fridge → we condensed an entire helium cylinder into the fridge!
Go home.

Aug 21 2011

8:25 Magnet level went to 0% overnight, which caused the fridge to warm up

R1 54 K OVC = 1.5×10^{-5} ton
R2 47 K
R3 43 K
R4 41 K

9:00 Start up fridge while Magnet fills Sep → 60 slpm Run & Bypass open
5% LHe in magnet fridge → 50 slpm

	R1	R2	R3	R4	R5	R6	magnet	fridge	sep.
	44.8	47.0	26.1	10.9	25.9	59.0	200+	44	56
9:10	40.0	44.0	24.4	8.4	20.7	43.0	200+	47	56
9:15	25.4	33.0	19.3	4.3	14.4	22.7	200+	57	56
9:25	1.96	3.34	SOVER	4.21	5.12	10.6	200+	57	56

16% in Sep. Bypass Closed, Run @ 2 turns
30% in nose → Run valve → ½ turn open
90% in nose → Run → ¼ turn open

9:40 More trouble w/ Sep. FC → we remove it...

1.69	2.66	4.36	4.37	10.3	28.9	200+	4.9	40 ← manual control

↳ 8 ton ⇒ 80 m^3/hr

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9:45 85% in magnet, stop fill

10:40 Josh has closed the Run valve
Fridge flow → 9.7 slpm

12:15 test anneal oven.
Bellows pulled up to extension of 12" (max is 12.3")

5.9	7.4	5.1	4.7	10.2	34.0	mag = 45 slpm	sep = 0%
						fridge = 26 slpm	nose = 0%

Bypassed Closed, Run = ½

P.S. Has max output of 2A. Heater is 35Ω
20% → 5.6 W → up to ~ 35 K on stick, still rising slowly
30% → 12.6 W →
40% → 22.4 W
50% → 35 W @ 75 K heater off
overshoots to 77K/68K & ~~steady by~~ starts dropping
ramp back up to 40% slowly rising again 80.5/71
85/75 K James lowers ladder 1"
Top stable @ 87.7 K Bottom @ 74.6 ⇒ This is worse

12:40 heater off, Run → 2 Bypass 1

12:45	50	52	22	6.9	15.8	28	fridge 47 slpm	
12:50	31.3	41	24	4.2	14.5	20.3	fridge 53	16% sep
12:55	16	27	18	4.2	13	17	fridge 66	20% sep

15:45 Carlin was ramping magnet to 5T.
Pressed pause at 60 amps to change ramp rate.
Magnet quenches – very mildly.

Magnet ramped to 60A at 1.2A/min. Sat at 60A for 20-30sec. Carlin dialed ramp rate setting down to .6A/min without touching set point. Hit "hold" button and gas panel immediately started venting. Seconds later, analog voltage went to +10V. Moments later P/S display ~~started~~ flashing 00000. Moments later still, platform started venting

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17:35 Topping off LN_2 shield.

Sept 22 2011

8:45 We start cooling magnet again from a 250l dewar from HDice. Thanks guys!

	Fridge	77	93	161	161	TOVER	TOVER				
ITC501		T1	T2	T3	T4	T5	T6	T7	T8	OVC	LN2
		5.8	8.4	6.4	6.5	6.6	7.0	7.1	8.4	2×10^{-7}	7.9"
9:00		4.3	—	4.2	4.3	4.0	4.3	4.2	4.4	1.3×10^{-7}	7.8"

9:20 Magnet = 20% OVC = 1.3×10^{-7} torr (what happened to the leak?)

9:30 Start pumping on separator. Open Run 2 turn, Bypass 1 turn.

No separator flow. Jumper has plugged.

Pull Magnet side of jumper → warm, unplugged.

10:15 Separator started again

10:16 Begin ramping Magnet

LS218	R1	R2	R3	R4	R5	R6	OVC
10:16	83	98	75	167	253	Tover	1.4×10^{-7}

sep flow = 70
fridge flow = 20

We see magnet flow increasing very high → over 200 slpm
This is not good!
Magnet quenches @ 8.24 Amps !!

10:30	90	101	137	107	68	300	1.24×10^{-7}

Lost no LHe. Let boil-off calm down.

10:35 switch heater off; shim heater off
Try ramping leads only.
Magnet flow is 75.
Ramp leads to 10 Amps. Magnet flow is 75.
Now repeat w/ shim heater at 150 mA
Ramp leads to 10A. Magnet flow 77. No real change.
Switch heater on. shim heat @ 200 mA → Magnet flow 85
Ramp magnet to 5 Amps. Boil-off is 120 @ 3 Amps → 35 slpm increase
→ 2 watts

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Note: we expect 2-3 watts of heat from persistent switches
All switch heaters off. Magnet flow → drops to
→ zero field reads ~ 0.2 mT (I think)

11:30 We place gauss probe on can. Ramp to 3.7 Amps.
Gauss probe goes to 14.5 mT.
Turn off switch heater. Gauss probe drops! 8 mT → 5.5 mT in 1 min.

11:45 Seems like the field decay was slower when the fridge cooled.
Repeat test w/ liquid in nose...

Gauss Probe continues to rise for several minutes after we pause P.S.

12:20 Set Current to 3 Amps then persistent mode. Measured Voltage on Voltage taps
voltage measured as $\vec{B}$ field dropped

pins	volts
21-22	.2 → .06
21-20	.04
20-19	.1
19-18	.04
18-17	.06
17-16	.1
16-15	.01
14-15	1.7

2:00 Persistent sw off (Heater ON) Removed (+) lead checked coil resistance.
Coil leads ~ 64.5 Ω
measured coil resistance across voltage taps

14-15	(coil 5)	64.5 Ω	
15-16	(coil 4)	3.67 Ω	(Voltage tap lead resistance because coil is Superconductor)
16-17	(coil 3)	3.61 Ω	(Voltage tap lead resistance " " " " ")
17-18	(coil 2 & 6)	3.61 Ω	
18-19	(coil 1 & 7)	3.70 Ω	
19-20	(coil 8)	3.65 Ω	
20-21	(coil 9)	3.60 Ω	
21-22	(coil 10)	3.69 Ω	

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14:43 Test voltage taps again Power supply is at 3.0 Amps switch heater on. Leads say 3 Amp w/ clamp meter

Lead	Voltage	
14-22	1.89 V	
14-15	1.65 V	coil 5
15-16	.167 V	coil 4
16-17	.009 V	coil 3
17-18	.003 V	coils 6+2
18-19	.002 V	coils 7+1
19-20	.005 V	coil 8
20-21	.002 V	coil 9
21-22	.006 V	coil 10

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Insert is in now. Test microwave power

Fridge flow 20 slpm. microwaves ON → 20 slpm. No power.

try again 21.6

18 slpm → slpm ~ 1/4 W OFF →

Put in 1 W w/ anneal heater. $1W = \frac{I^2}{35\Omega} \rightarrow I = .170\ A$

→ 24 slpm according to Hastings max 2A → 8.5 %

→ 28 slpm according to calibrated flow tubes

→

Magnet Off. Magnet level ~ 0%

Fridge pumps ON, R & B valves closed. Sep. pump off OVC = 1.5×10^{-7}

Fridge flow 6.1 slpm @ 1 torr (1.35 K) Magnet flow 20.6 slpm

FRI Sep 23 2011

Magnet 0% 4.2 – 4.2 4.2 4.0 4.2 15.6 21.0 OVC = 2×10^{-7}

Magnet Boil off = 7.8 lpm

Fridge: ERR ERR 54.4 76.8 141.3 152.7 TOVER TOVER

LN_2 = 3.8". Seems to have dropped fast... Look for short between Magnet & 80K

Nose level: V+ (pin 1) and I+ (pin 6) = 30 Ω

V+ and V− (pin 2) = 64.7 Ω → Tc wire ~ 35 Ω

I+ (pin 6) and V− = 77.2 Ω

Separator level: V+ and I+ = 29.4 Ω

V+ and V− = 43.5 Ω → Tc wire = 13 Ω

I+ and V− = 48.8 Ω

LN_2 has been blown out of the shield.

Warming up the magnet.

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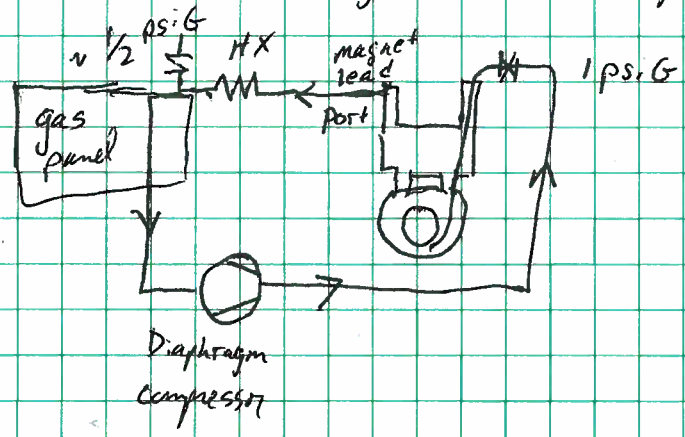
We are circulation helium gas thru the magnet to speed up the warming.



ITC501 37 — 37 38 40 41 62 80 OVC = 8.8×10^{-7} torr

Sat Sep 24 2011

@14:35 OVC ≈ 7.5×10^{-6} still circulating ^4He thru the magnet.

ITC501 91 — 91 92 94 96 122 131

Close OVC gate valve & turn off Diff Pump. & CC gauge
Back fill OVC w/ N_2 to 100 torr
Leave circulation pump running.

Sun Sep 25 2011 OVC = 150 torr

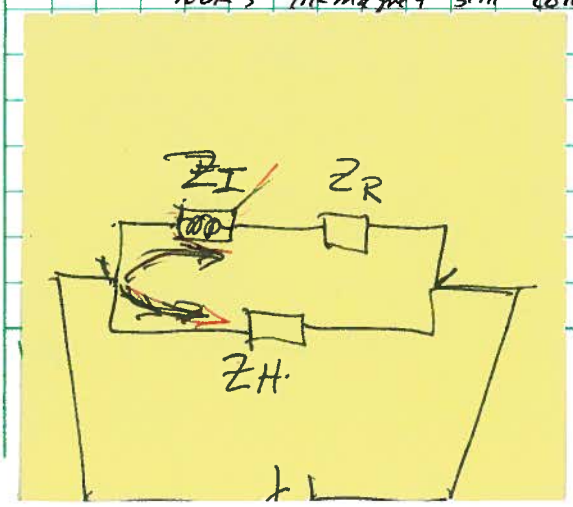
14:33

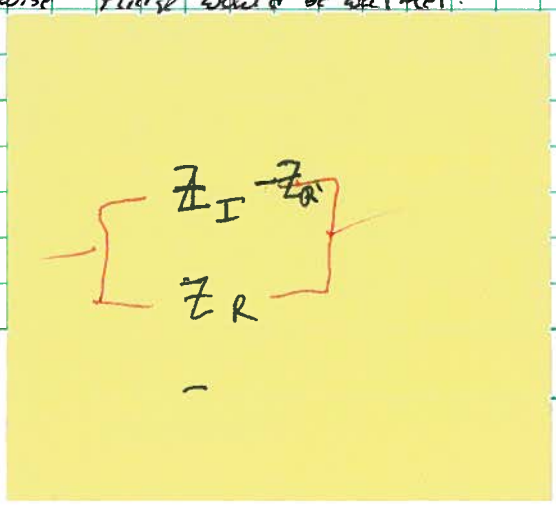
ITC501 146 — 151 150 162 154 144 140

Keep circ. pump on.

LS218 228 242 291 259 TOVER TOVER

→ looks like magnet still cold; otherwise fridge would be warmer.





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Mon 26 Sep 2011

8:28 OVC = 160 torr

TC501	153.2	—	158.8	157.8	173.0	163.3	145.5	140.7
25218	248	264	306	274	—	—		

Resistance of leads & voltage taps.

Coil		Red on 14	Red on 175	
5	14-15	1408	1604	← reverse multimeter leads
4	15-16	190	190	
3	16-17	232	232	
2-6	17-18	129	129	
1-7	18-19	129 ~~232~~	~~232~~ 129	
8	19-20	232	232	
9	20-21	237	237	
10	21-22	1158	1240	

pin 14 is 'a' on orford drawing

pin 22 is 'K'

no 'g', no '.'

1.45 kΩ short to ground [Red current lead → gnd

1.52 kΩ Black current lead → gnd

Note: we measure 2 Ω → gnd on pin 20.

Resistance To gnd		
	14 → ⏚	1.15 kΩ
	15 →	108
	16 →	96
	17	244
	18	258
	19	182
	20	1.6 Ω
	21	181 Ω
	22	1.13 kΩ

Tues 27 Sep 2011

Magnet disconnected from dewar today & taken to machine shop.

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10-07-2011 Magnet Returned from Machine Shop Y core Removed @ welds. Not much wire to work with.

Pots

J1 – J2	146.8 Ω	
J2 – J3	144.3 Ω	
* J3 – J4	450 Ω	* Broken wire
* J4 – J5	124 Ω	* good wire left in pots
* J5 – ⏚	Short 0.6 Ω	* good wire in J5
* J4 – J5	123 Ω	* good wire J4 to Bad wire J5 (also Short to ⏚ 0.6 Ω)
* J5 – J6	108 Ω	* good wire J5 to J6
J6 – J7	164 Ω	
J7 – J8	162.7 Ω	
J8 – J9	128 Ω	
J9 – J10	12.9 Ω	
J10 – J11	12.9 Ω	
J11 – J12	131. Ω	
J12 – J13	161 Ω	
J13 – J14	163.9 Ω	
J14 – J15	130.5 Ω	
J15 – J16	130 Ω	
J16 – J17	182 Ω	
J17 – J18	173 Ω	
J18 – J19	161 Ω	
J19 – Blk lead	169 Ω	
J1 – Red lead	148 Ω	

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10-07-2011

Pots to ⊣|ı

Red lead	1.89 KΩ
J1	2.3 KΩ
J2	2.69 KΩ
J3	2.9 KΩ
J4 (Broken)	3.3 KΩ
J4 (good)	123.8 Ω
J5 (Broken)	0.3 Ω
J5 (good)	0.5 Ω
J6	108 Ω
J7	239.9 Ω
J8	233.8 Ω
J9	248.7 Ω
J10	245 Ω
J11	243 Ω
J12	157 Ω
J13	164 Ω
J14	0.2 Ω
J15	130.5 Ω
J16	159 Ω
J17	719 Ω
J18	950 Ω
J19	1.35 KΩ
Blk lead	1.79 KΩ

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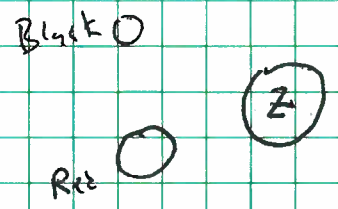
Monday Oct 10 2011

9:30 Step 1: empty "red" main lead pot



There are two super conducting wires inside

1 is the main lead one goes to the persistant switch (probably) Removed pot screws

Step 2: disconect and empty "black" main lead pot

small wire going from black lead to black voltage / diode lines, inside the pot. The same wire was in the red pot, but broken

In both pots, there is a third, small, short wire that is coming out the pot from the bottom

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Step 3: Pull lead pots off along with the plate they are on.

The short wire goes, along with one of the long wires, into brown insulation, which seems to go to the persistor switch. The other side enters a black insulated wire, presumable the coil

Step 4: undo tie wraps from under main lead plate, Insulation is not great

Step 5: cut cable ties inside tube leading from donut. Also cut some black nylon string which was wound around the wires.

Step 6: Pullet the broken wires through into the magnet space. The short to ground still exists between both the broken and not broken wires, even though we are at the point where the insulation looks good.

Step 7: Proceed to empty other pots w/ splices in them, starting with J1

Pullet J1 got off. Two wires were pulled out. One, labeled J1 has a splice in it. That one was pulled back into cone. The other (also labelled J1) seems to be okay except the insulation is bad, it has been covered in poly tubing presumably during the SANE repair

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Step 8: empty J2 solder cup. Both superconducting wires have splices in them, so we fish them both through to the cone and label them J2

Step 9: empty J3 solder cup. One wire has a splice, we fish that one through to the cone. The other has a piece of tubing covering bad insulation, we leave that one be for now. Both are labelled J3

Step 10: Pull J4 and J5 solder cups (emptied previously) and label the non-broken wires.

J4 wire needs new insulation, J5 wire looks fine, but on closer inspection there is a bad spot on the insulation

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10/10/11

J1 Red → J1 Black : ~~[illegible]~~ open
" → J2 Black : open
" → J2 Red : open
" → J3 Black : open
→

J1 Black → J2 Red : 431 Ω
" → J2 Black : open

J2 Red → J2 Black : open

J2 Black → J3 Red : 234 Ω

J3 R → J3 B : open

J3 B → J4 R : 453 Ω

J4 R → J4 B : open

J4 B → J5 R : 123. Ω

J5 R → J5 B : both shorted to ground

Measuring Shorts to Ground

J5-B : 0.50 Ω
J5-R : 0.30 Ω
} Black is 0.1 inches longer

J14 : 0.15 Ω

Leads : 0.10 Ω

15:00: Removed woods metal in J14 to investigate short.
After removal, short remains

J5 B - J14 0.60 Ω
J5 R - J14 0.40 Ω
J5R - J5B 0.60 Ω

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Pulled the J14 pot. w/ no change in the short to ground.

CLEANED UP J1 BLACK, J3 RED, J4 BLACK, & J5 BLACK.

REMOVED BAD SECTIONS OF INSULATION FROM EACH.

SLID NEW INSULATION ON EACH.

NEED TO SEAL JUNCTION AT OLD AND NEW.

TEFLON HEAT SHRINK MIGHT WORK. dlg

Left 1/4" gap between old/new insulation just so you know where it is. It moves easy.

Short on J14: $\boxed{0.2\ \Omega}$

0.087 on leads (Keithley)

0.11 is about 9 inches

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10/12/11

Separating wires from J14 pot.

Red Main → J1 R : 546 Ω

J1 B → J2 R : 431 Ω

J2 B → J3 R : 233 Ω

J3 B → J4 R : 451 Ω

J4 B → J5 R : 123 Ω

J5 B → J6 : 118 Ω

J6 → J7 : 174 Ω

J7 → J8 : 172 Ω

J8 → J9 : 140 Ω

J9 → J10 : 13 Ω

J10 → J11 : 13 Ω

After separation:

J11 → J12 : 142 Ω

J12 → J13 : 204 Ω

J13 → J14 B : 211 Ω

J14 R → J15 : 133 Ω

J15 → J16 : 137 Ω

J16 → J17 : 181 Ω

J17 → J18 : 175 Ω

J18 → J19 161 Ω

J19 → Black M : 355 Ω

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Red wire on J14 is shorted to ground

Oct 14

REMOVED J6 + J15 SOLDER CUPS.

START MEGGER TEST

J9 to GND 1.1 Gohm → 1.5 Gohm

J18 to GND 1 Gohm

J1 BLK to GND 317 Mohms

J2 BLK to GND 54 Mohms

J3 BLK to GND 10 Mohms

Oct 17 2011

empty solder pots J7 and J8

REMOVED J7 + J8 SOLDER POTS + SCREWS

J8 CONNECTION WILL NEED TO BE SEPARATED TO REMOVE PLATE. (WIRES GO IN DIFFERENT HOLES)

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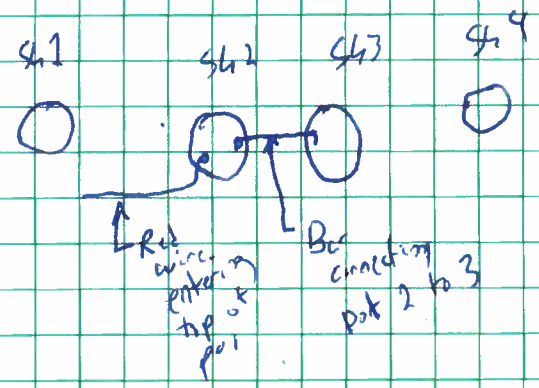
Oct 18 2014

Prepare to remove wires from shim pots. I labeled them sh1, sh2, sh3, sh4



REMOVED sh1, 2, 3, + 4

REMOVED S 11 SOLDER POT (Shim Red)

Red shim lead pulled back (labelled "Shim Red") so plate can be removed.

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Oct 19 2001

Torque test of set screws on large magnet plate on coil side
start at 20 inch lbs

~~Screw Outer Inner Torque~~
~~Out~~
~~IN~~

Maxed out wrench @ 50 in lbs, looking for better wrench

switch to dial

1 out	110
1 in	>166
2 out	140
2 in	130
3 out	90
3 in	>150
4 out	>190
4 in	110
5 out	>145
5 in	45
6 in	24

broke

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Redo dt as rings

1 out	110	1 in	116
2 out	140	2 in	130
3 out	90	3 in	115
4 out	190	4 in	110
9 out	93	8 in	100
10 out	145	10 in	~~110~~ 90
11 out	~~140~~ 170	11 in	140
12 out	187	12 in	140
17 out	130	17 in	110
18 out	170	18 in	60
19 out	191	19 in	90
20 out	180	20 in	50

5 out	145	5 in	45
6 out	185	6 in	24
7 out	168	7 in	65
8 out	190	8 in	30
13 out	180	13 in	140
14 out	202	14 in	30
15 out	169	15 in	60
16 out	181	16 in	30
21 out	173	21 in	90
22 out	206	22 in	80
23 out	203	23 in	50
24 out	130	24 in	25

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Flip magnet on its side.
weight : 870 lbs

Back off setscrews in 1-2-3 .. 24 order,
first with the outer ones, then the inner

Pulled off stainless former.

There is a burn through on the

5-4 coil package, right where the leads
enter the epoxy. Looks dead to me

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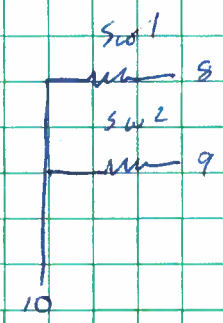
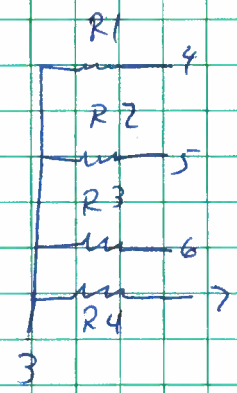
11/2/11

Labeling Fischer connector Pins on magnet lead for temp sensors and persistant heat switch as

10 3
9 1 4
8 2 5
7 6

resistances
3-4: 335 Ω
3-5: 324.9 Ω
3-6: 340 Ω
3-7: 344 Ω
10-8: 118.6 Ω
10-9: 117.2 Ω





12/12/11

- Performed leak test on G2P polarized target He dewar modification. Hall B Magnet refit.

* There are ~~4~~ 2 PBH 12/12/11 welds: ~~2 tube to bottom dewar plate~~ PBH 12/12/11, 2ea. tube to 4½" conflat flange.

Leak rate start: 1.3×10^{-8} ATM cc/sec
Leak rate stop: 1.3×10^{-8} ATM cc/sec

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Hall B	cryostat	color	new	milspec
1				?
2				
3	AB common	Red	E	AB com
4	AB	Orange	N	AB 1
5	AB	Yellow	M	AB 2
6	AB	Green	L	AB 3
7	AB	Blue	K	AB 4
8	Main heater 1	Violet	C	Main heater
9	Main heater spare	Grey	S	Main heater spar
10	Main heater com	White	D	Heater common

Hall B	Pin				color	Hall A Vac	Hall A MIL
1							
2							
3	AB com				Red	5	E A/B C
4	AB	C6	downstream	Bottom	Orange	10	K A/B 4
5	AB	C7	downstream	Top	Yellow	9	J A/B 5
6	AB	C5	upstream	Bottom	Green	11	L A/B 3
7	AB	C8	upstream	Top	Blue	8	H A/B 6
8	Heater spare				Violet	16	S SW spare
9	Heater main				Grey	3	C SW main
10	Heater com				White	4	D SW com

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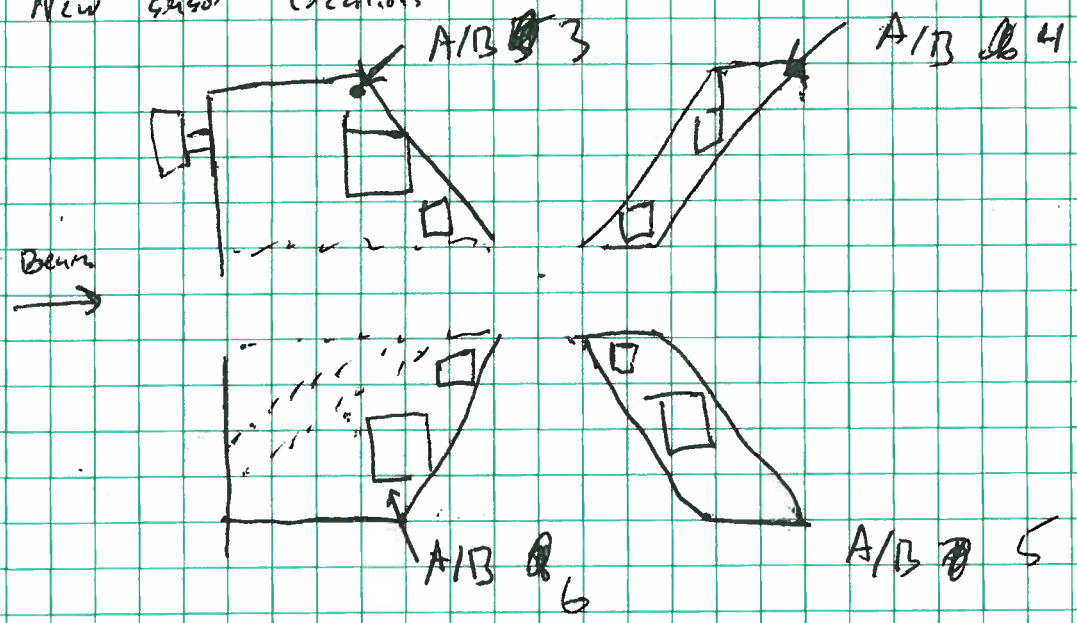
New sensor locations



Dec 22 2011

9:15 Magnet plumbing is assembled.

8.2×10^{-7}

Possible leak, but the reading is erratic.
Let it clean up a little then try again

10:30 The feedthrough plate was not tight, and still leaks a little. We bagged it and leak checked everything else. No leaks w/ a 6.6×10^{-7} background

12:30 6.8×10^{-7}
2:30 1.0×10^{-5}
2:35 6.4×10^{-6}
2:36 1.4×10^{-5}

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Jan 5 2012

Magnet space* passed reverse leak check in the 10^{-9} range. Good news.

Jan 6 2012

Fridge space passes reverse leak check on the 10^{-9} range and passed a leak check to air at the 3×10^{-6} level

---

01/17/2012

Leak check of G2P Window

Placed cell in PIG and reverse leaktested.

Background 6.4×10^{-9} $\frac{atm\ cc}{sec}$

Pressurized cell w/ He to ~ 5 psig. Cell leaked @ 4.5 psig leak rate leveled off @ 9.6×10^{-7} $\frac{atm\ cc}{sec}$

w/ Pump on, Background @ $1. \times 10^{-6}$ $\frac{atm\ cc}{sec}$ pumped out cell background falling.
Pressurized cell again w/ He leak @ 0 psig

Cell #1 leaks

leak check test fixture in PIG & Passed

01/17/2012 Pressurized Cell #2 @ 5.0 psig w/ He

Background 4.9×10^{-9} $\frac{atm\ cc}{sec}$ No leaks

Cycled pressure &
Background 4.9×10^{-9} $\frac{atm\ cc}{sec}$ No leaks

Cell #2 leak tight

Dave Mackin measured cell thk

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1/17/12 G_2P Cell Thickness Cell #2

Avg Thickness in Thin Section $(4.8 \pm 0.4 \times 0.001)''$

01/22/2012 Background on leak detector 1.6×10^{-7} atm-cc/sec after pumping for 2 days
Valved off leak detector from OVC leak rate drop to 0.1×10^{-8} atm-cc/sec

Pressure 1.9×10^{-3} Torr
Background 1.6×10^{-7} atm-cc/sec

Pumped out Magnet space & backfilled w/ He to ~ 2psig

OVC 1.6×10^{-7} atm-cc/sec

Pumped out Magnet space & vented w/ air

OVC 1.6×10^{-7} atm-cc/sec

Pumped out Frog space & backfilled w/ He to atm

OVC 1.6×10^{-7} atm-cc/sec

Pumped out Frog Space & backfilled w/ He to atm

OVC 1.57×10^{-7} atm-cc/sec

- Blank leak detector of after above test

Leak detector background 9.12×10^{-9} Atm cc/sec

20:52 Leak detector is pumping on scattering chamber again. Thin window and beryllium window attached background is @ 1.2×10^{-3} and falling with no leak yet.

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Jan 23 2012 8:30 OVC: LD = 1.67×10^{-7} & 2.5×10^{-3} torr.

01/23/2012 leak check of Helicoflex gaskets 20° & 90°

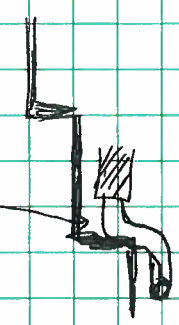
OVC Background 2.2×10^{-7} atmcc/sec

Jan 24

10:00 Target is on platform. Turbo cart on lower deck has been pumping all night
P_{OVC} : 2.5×10^{-6}

leak background in the leak detector is high, (5×10^{-8}) but everything is cleaning up now with the leak detector hooked up on the upper platform

16:30 We tried to insert the 1K fridge into it's pumping tube, but the Run valve body bottomed out on the tube's step.



Since the tube at bottom of Run valve is only ~ 1" long we removed it. Now the well simply spray out the bottom of the valve. Should be OK.

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Leak check magnet.
LD ONLY on OVC BKground 9.7×10^{-8} → rising slowly ; magnet @ -30"
Back fill magnet to 2psig 1.0×10^{-7} I think OK.

Feb 9 2010

8:12 Buffer dewar was filled yesterday, and diff-pump on OVC was turned on.

After the night on PID

Buffer LL = 77.5% T_{supply} = 3.9 T_{return} = 5.0

P_{ovc} = $1.5 * 10^{-4}$

IP steppers: T-line : reverse, 200 pulse/turn
Run & bypass : normal, 400 pulse/turn

checked LN fill sequence: OK
checked LHe fill sequence: OK → changed valve positions from 0-100% to # turns (0-5

Current PID settings (These WILL change)

EV9180 Inp haLL91101

set	75%	Max	8
ST	60	Min	5
Gp	20	Dmax	1
Gi	.1	Dmin	0.2
		No	

EV9180A Inp haTD9178

set	5.5	Max	8
ST	30	Min	5
Gp	-10	DMax	1
Gi	-.05	DMin	0.2

EV9178 Inp haP191104

Set	1400	Max	100
ST	20	Min	10
Gp	-0.5	dMax	5
Gi	-0.01	dMin	0.2

EV91120 Inp haLL91102

Set	50	Max	5
St	10	Min	0.50
Gp	2.0	dMax	0.2
Gi	0.05	dMin	0.02

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missing after reboot ALL PID ~~for EV9118OA~~ info All changes to LN2/LHe fill
⇒ Camon not working properly. Sue!!

Feb 10 2012
8:40 OVC = 8.9×10^{-5} torr
LHe = 77% pretty stable. charts show occassional
burps where inlet temp rises to 10-20 K for ~10 minutes
about 1x per hour

Checking LN2 probe w/ a bucket of LN2 → 55% reads as 0.5!?
change CALC record from "C*0.1" to "C*10"
Reads back properly now – but noisy 50% ± 10%

Feb 14 2012
With OVC @ 3.5×10^{-5} Torr and @ 0° running rotary seal is leak-tight
meaning the Differential Space is leak tight. @ ~45° outter oring on differential
space opens up & mechanical pump can only hold it @ ~25 inHg (Not good)
Good news, OVC vacuum is still good @ 3.5×10^{-5} Torr. Will think about
Sol^ns

9:08am Restarting LN2 fill after Loss of supply from Cryo.

Calibrating volume of 3He VP system. Load 0.3 L bottle w/ 42.5 torr
Rest of system is at 0 torr
Open bottle to system: Pressure: 34.3 torr.

System volume: 300 ml · 42.5 torr = 34.3 torr · (300 ml + x)

$300\,ml + x = \frac{300\,ml \cdot 42.5\,torr}{34.3\,torr} = 371.7\,ml$ (vol of piping & baratron = 71.7 ml)

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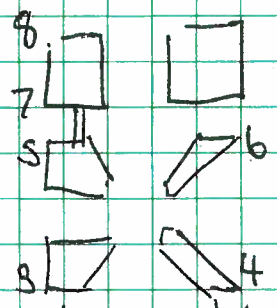
15:45 start LHe cool down transfer line
@ 4 turns open
exhaust is being vented out of hall

T191103

	P_{ovc}	P_{mag}	R_3	R_4	R_5	R_6	Dewar Bot R_7	Dewar Top R_8	Flow
15:50	1.4×10^{-5}	1073							>100
16:13		6.78×10^{-9} on the leak detector							
16:20	5.6×10^{-6}	1063	147	153	254	166	109	124	174
16:55	5.0×10^{-6}	1094	148	154	255	167	89	111	>100
	Leak Detector 8.4×10^{-9}								
17:30	4.3×10^{-6}	1094	148	154	—	168	72	95	>100
	leak detector 8×10^{-9}								
18:20	1.8×10^{-6}	1104	149	156	—	168	37	53	>100
	leak detector 9.4×10^{-9}								
18:56	7.5×10^{-7}	1084	149	156	—	167	36	44	>100
	LD 9.2×10^{-9}								



19:00 - Magnet fill valve to 0.70

19:05 - One pop-off leaking slightly. Backing fill valve to 0.60.

19:12 - Pop-off warmed w/ heat gun. No longer leaking.

19:26	3.5×10^{-7}	1093	149	156	—	165	25	36	>100
	LD: 9.2×10^{-9}								

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Time	OVC P	Mag P	R_3	R_4	R_6	R_7	R_8	Flow
19:44	1.2×10^{-7}	1150	149	157	165	14	20	>100
	Pop-off went - warming w/ heat gun							
	PID flipped out - opened valve to 4 turns							
	setting to 0.5 turns							
20:11	3.5×10^{-7}	1075	149	157	164	24	33	>100
20:34	2.8×10^{-7}	1074	149	157	163	24	32	>100
21:00	3.0×10^{-7}	1100	148	157	162	24	33	>100
21:03	Pop-off going again. Lowered the transfer line valve position to 0.5 turn							
21:56	2.2×10^{-7}	1089	147	156	159	24	33	>100
	LD: 1.0×10^{-8}							
	Josh left to sleep, will return ~3 am.							
	James alone until then. Calling TO worker							
22:20	2.0×10^{-7}	1085	146	156	158	24	33	>100
22:46	2.2×10^{-7}	1086	146	156	157	24	32	>100
23:04	2.1×10^{-7}	1086	145	156	156	24	32	>100
	LD: 1×10^{-8}							
23:33	1.9×10^{-7}	1086	145	156	155	23	31	>100
24:00	1.9×10^{-7}	1088	144	156	154	23	31	>100

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Witnessed & Understood by me, LD: 1×10^{-8} James Maxwell

Date 2/15/12

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Time	OVC	$M_g P$	R_3	R_4	R_6	R_7	R_8	Flow
24:21	2.5×10^{-7}	1087	143	156	153	23	31	>100
	LD: 1.1×10^{-8}							
24:49 - Opened fill valve from 0.60 to 0.65							LD: 1×10^{-8}	
	1.5×10^{-7}	1094	143	156	152	22	30	>100
LN2 level is dancing between 1.5 & zero								
1:00 - Magnet dewar ~~pressure~~ cover 1120 - pop-offs went, warmed w/ heat gun, turning valve back to 0.6								
1:32	1.6×10^{-7}	1087	142	155	149	22	30	>100
	LD: 1.1×10^{-8}							
2:10	2.5×10^{-7}	1088	141	155	147	22	29	>100
LD: 1.1×10^{-8}								
2:37	1.4×10^{-7}	1089	140	155	146	22	29	>100
3:05	1.4×10^{-7}	1088	139	154	145	21	28	>100
3:46	1.4×10^{-7}	1092	138	154	143	21	28	>100
4:11	1.5×10^{-7}	1090	137	154	142	21	28	>100
4:45	1.2×10^{-7}	1089	137	153	140	21	28	>100
5:25	Pressure in the magnet dewar spiked up for no obvious reason. Went up with the heat gun an re-sealed the parallel plates & relief.							
5:36	1.3×10^{-7}	1092	135	152	138	20	27	>100
6:04	1.3×10^{-7}	1090	134	151	136	20	27	>100

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6:45	1.3×10^{-7}	1090	132	150	134	20	24.9	>100

leak rate is 1.25×10^{-8}

8:54 1×10^{-7} open vent on gas panel. Open t-line valve to 1.5 turns speeds cooling

02/15/2012

11:20 Connected Ball vall on maget dewar fill stack to Cryotarget vent line & wedged open parallel plates outside hall A. Opened Parker valve on Maget dewar fill stack. Maget pressured droped from ~3 psig to ~1 psig. Flow [redacted] thru gas panel droped to ~16.8 SLPM as expected. As of Now there is No check valve in line w/ Parker Valve, Magnet Must be kept @ > 1 psig to avoid back flow.

	OVC	Mag P	r_3	r_4	r_5	r_6	r_7	r_8	Flow
11:51	4.3×10^{-8}	1057	119	143	—	120	6.6	8.5	129

leak rate: 1.8×10^{-8}

12:30 - Fill valve opened to 22 for no apparent reason, noticed ice on transfer line. Closed fill valve and warmed transfer line to close.
- Attatched check valve on cryotarget vent line

13:45	3.0×10^{-7}	1121	113	139	-	110	6	7.5	>200
14:13	3.3×10^{-8}	1111	111	138	-	108	6	7.5	>200
14:33	3.4×10^{-8}	1112	109	137	-	106	6	7.4	>200
15:25	3.7×10^{-8}	1113	106	134	-	101	5.9	7.3	>200

15:35 LN_2 supply pressure is up quite a bit ~3 barr, Might get some liquid

16:39	5×10^{-8}	1105	97	125	-	83	8.1	10.2	>

17:25 - Filling LN2 from Dewar

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17:59 LN2 filling 2.5%

18:00 We have a line connected directly to W.R. from the top of the magnet — it bypasses the gas panel.
Shortened hose between bottom tap of the magnet and the bellows pump.
Trying to pull as much gas out of bottom as possible. Problem is keeping relieves closed on magnet.

LN2 is full @ 50% — coming out of top. Stop fill.

	OVC	Mag P	R_3	R_4	R_6	R_7	R_8	Flow	leak rate
18:42	3.4×10^{-8}	1307	84	119	84	10	13	43	—
19:20	3.2×10^{-8}	1311	78	116	68	10	13	40	1.5×10^{-8}
20:00	3.5×10^{-8}	1316	73	115	64	9	12	40	1.6×10^{-8}
20:41	4.1×10^{-9}	1304	67	115	59	8.5	10.9	39	1.7×10^{-8}
21:00	4.1×10^{-9} ?	1302	65	116	57	8.1	10.4	39	1.7×10^{-8}

Big Spike in OVC pressure, went away & now OVC is very low, must be weirdness w/ cold cathode

Diff pump is on on the panel, but indicator panel shows off again

21:21	1.0×10^{-8}	1306	62	115	54	7.8	9.9	39.8	1.8×10^{-8}
21:43	9.8×10^{-9}	1304	59	114	52	7.6	9.5	39.8	1.8×10^{-8}
22:00	1.1×10^{-8}	1299	58	113	50	7.5	9.3	39.0	1.9×10^{-8}
22:39	1.2×10^{-8}	1305	61	109	$\frac{r_5}{97}$ 46	7.0	8.5	39.8	2.0×10^{-8}

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22:42 Γ_3 began increasing while Γ_5, which was thought to be unresponsive, began decreasing. Possibly a change in gas flow.

23:07 opened fill valve to 5 turns, closed warm return to gas panel and closed (slightly) vent to try to increase flow to magnet.

	ovc	Pmag	Γ_3	Γ_4	Γ_5	Γ_6	Γ_7	Γ_8	flow	leak rate
23:08	1.1×10^{-8}	1330	61	107	90	44	8	9.7	0	2.0×10^{-8}
23:20	1.2×10^{-8}	1323	60	105	87	43	7.7	9.3	0	2.1×10^{-8}
23:40	1.3×10^{-8}	1331	60	102	83	42	7.5	9	0	2.2×10^{-8}

23:54 Fill valve closed completely then reopened and went crazy. We closed the valve completely which read −43.7 on the encoder. Pressed 'Preset' to reset to 0 position and reopened to 5.

24:40 Fill valve reopened, heated ~~[illegible]~~ fill valve and again closed and reset to 0 position and reopened to 5.0 on the magnet transfer valve control.

	ovc	Pmag	Γ_3	Γ_4	Γ_5	Γ_6	Γ_7	Γ_8	leak
	1.3×10^{-8}	1318	65	93	70	37	7.2	8.3	2.42×10^{-8}
1:09	1.1×10^{-8}	1312	54	91	68.5	36.9	6.9	8	2.4×10^{-8}
1:30	1.0×10^{-8}	1326	50.4	88.5	65.2	35.1	6.5	7.6	2.5×10^{-8}

1:49 David came by and filled nitrogen and checked fill valve. Tweak valve setting to bring up pressure a little.

2:15	1.2×10^{-8}	1311	41.9	83	58.3	29.5	6	6.8	2.63×10^{-8}
2:50	1.0×10^{-8}	1345	45.5	77.4	50	28.8	6.2	7	2.67×10^{-8}

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0145 slowly opened Mag fill from 5 to 5.75 over ~ 1 hr. magnet pressure is below 1360 which is below popoffs.

0300 Temps Dropping Slightly faster

ESR 4K flow to Hall A

0130 → 31.8 g/s

0300 → 32.6 g/s

Flow to hall is erratic however and these numbers do not reflect actual Buffer Dewar flow

	OCV	Pmag	T_3	T_4	T_5	T_6	T_7	T_8	flow	leak
0337	1.1×10^{-8}	1327	42.7	69.6	44	27	5.3	5.9	0	2.82×10^{-8}
pk										
0400	9.8×10^{-8}	1296	41.3	65.5	40.9	26	5.3	5.9	0	2.81×10^{-8}

	OVC	Pmag	R_3	R_4	R_5	R_6	R_7	R_8	flow	leak
4:38	1.2×10^{-8}	1328	39.6	57.4	34.5	24.1	5.2	5.7	0	3×10^{-8}
5:14	9.7×10^{-9}	1315	37.3	47.3	29.9	23.1	5	5.5	0	3×10^{-8}
5:51	1.2×10^{-8}	1324	29.2	34.7	22.6	19	4.8	5.1	0	3.1×10^{-8}
6:20	9.4×10^{-9}	1315	17.1	19.4	12.5	9.1	4.6	4.7	0	3.1×10^{-8}

6:27 $R_6 = 4.5$ K closing bottom tap

6:40	9.8×10^{-8}	1307	5.2	6.2	4.7	4.6	4.5	4.6	0	3×10^{-8}
6:57	1.2×10^{-8}	1317	4.4	4.5	4.7	4.6	4.5	4.6	0	3.2×10^{-8}

Turned off purge to fridge. The fridge is very cold now. I am going to turn the purge back, but at a lower level

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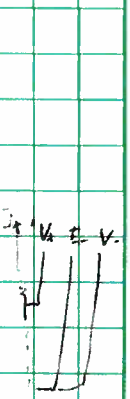
7:15 LHe level reading out: LHe = ~10 % on dial only reads ~ 6% on computer

7:45 LHe 15 % on panel 12.7 % on computer
7:34 21 % 18.6 % looks like a ~ 2 % offset between front panel of LHe level probe and the EPICS value



7:50 LHe = 28.2 % on computer

Nose level:

1 V_+		1-2	19.15Ω
2 V_-		1-6	29.1
6 I_+		1-7	18.1
7 I_-		2-6	29.5
4→5	6.2Ω	2-7	19
		7-6	28.7

6 looks like I_+

Sep.

4-5	7.75Ω
1-2	18.4
1-6	28.8
1-7	17.7
2-6	29.8
2-7	19.3
6-7	29.0

Both level probes (Sep & Nose) read "ERR" I think because they are both covered in LHe! All fridge temps ~ 4.4K.
Turn on mech. pumps → temps drop to ~ 2.1 K (all read same temp)
This matches boiling pressure, ie we are on V.P curve.
Open ~~He~~ to it bulb → still too warm, ~~outside~~ above 1.8 K (100 torr)

10:45 Batch fill process started on ~~Bay~~ Magnet dewar w/o a hitch
OVC pressure = 8.6×10^{-9}

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Batchfill completed successfully, but it frosts up around the valve stem.
This has been happening a lot. There must be a leak past the stem's o-rings.

Fridge (no sep running, R/B valves closed)
2.3 slpm nose = 1.17 K ^3He = 15.9 torr (1.14 K) ^4He = 0.5 torr (1.17 K)

^3He seems a little warm – liquid column too high?

12:38 ramping magnet @ 3 A/m to 80 A

time	I (A)	voltage (V)
12:40	8.	3.1
12:45	21.9	3.43
12:50	39.3	3.7
12:55	55.4	3.96
13:00	72.4	4.23
13:04	80.0	

13:05 ramping magnet → changed setpoint rate to 2 A/m to 100 A

OVC He leak rate 1.8×10^{-8} atm cc/sec

13:15 changed ramp rate to 1 A/m, setpoint 115A
Voltage 2.66V

I	I	V
13:21	105.9	2.76
13:32	115.3	2.4
13:40	119.6	2.49

13:46 I = 121.6 Hold Heater off V = 2.01
13:47 magnet in persistent mode
14:01 ramp up leads.
14:02 Heater on. Begin Ramp down.
Leak rate is 1.8×10^{-8}

~~[illegible]~~

14:50 Magnet fill starting

15:10 Magnet full (70%) 5:37 1.9×10^{-8} atm cc/sec

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18:40 Magnet level 44.5%
25% drop in 3½ hours, or 7% hr. → 2 hours before filling...

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21:06 - Magnet is 35% full. Turning batch fill MIN to 40% from 20% to watch it fill. Watching to see if valve freezes. Turned MIN back to 20%. Filling

21:33 Fill finished a few minutes ago, but pop-off opened & froze. Took a while to get it closed. Transfer valve did not freeze. Set MAX to 70%

Filled ok to 75%
Sep. & nose levels still read "ERR"
Cernox in nose reads 2.33 K; pressure is 0.207 torr (1.06 K)
→ nose is not in liquid!

Sep = 4.31 K → still liquid.

Nose level probe
1-2 (V_+ V_-) = 18.9 Ω → no difference
2-7 (V_- I_-) = 18.7 Ω resistance of NbTi = 0!

9:50 Stop fridge pumps & back fill w/ helium
→ OVC → 1×10^{-5} probably out gassing stuff frozen on 7" pump tube recovering, 5×10^{-6}

nose @ 6.35 K & sep @ 13.8 K level probes still read "ERR"!!

Resist: Nose		Sep	
1-2	26.4	1-2	42.0 → now 18 → probe going super!
1-6	29.0	1-6	29.1
1-7	24.3	1-7	41.2
2-6	34.7	2-6	33 → flaky 50?
2-7	18.8	2-7	18.8
6-7	33.3	6-7	29.2

so resistance of wire is ~ (1-2) - (2-7) = 26.4 - 18.8 ≈ 8 Ω

↳ 8 Ω / .79 Ω/mm
69 mm ~~[illegible]~~ 110!

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~~try loading 70 mm into nose probe (was 85 mm)~~ 194 7.6"

Nose level probe is (according to Test 7) ~ 194 mm (~7.6"). This is ~ 34 Ω

Sep level probe is " " " ~ 85 mm or 3.3" or 15 Ω

Something is screwy, but I don't know what it is...

Back fill fridge to ~½ psig. Fridge temps (cold to warm) Nose 5.4, 7.0, 7.1, Sep 8.1, 42, 171

Sep. pumps is OFF

Mech pumps back on. sep warming quickly

Note: MP 1 sounded awful – a high pitch whine.

Power off/on OK now...

10:40 OVC = 1.7×10^{-9} !!

LHe magnet = 73% → ~2% in 1 hour – seems to be getting better?

I suspect some was being siphoned from separator all along

8:00 Magnet level reads 100%, but based on status of boil off (virtually none)

I suspect the level probe is not working.

Power/off no good. Strip chart indicates a slow, steady rise since at least 5:30 AM

OVC = 1.4×10^{-7} (I guess the fridge is warming up & out gassing)

Fridge = 47 - 297 K (bottom = 47, top = 297)

LN_2 = 62%

I disable magnet fill

hmmm, I find that t-line valve, @ 0.00, can close to -.24

Valve has been cracked open overnight, allowing dewar to over fill.

Seat valve, and zero. LHe level eventually starts to fall.

84% → 61% in 100 min = 14% hour...

At request of Heidi Fansler, slow down the magnet fill valve

change step motor to 6 pulses/s from 60 s⁻¹

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11:11 To trouble-shoot level probes in nose & sep., I have connected 100mA current source between ~~1 & 2~~ ~~[illegible]~~ V.
pin 6 & 7 I_+/I_-. Look at voltage on pins 1/2 (V_+/V_-)

Sep. = 2.34 Volts V_+/V_- $R = 23.9\,\Omega$
4.500 Volts I_+/V_- $R = \cancel{45.0\,\Omega}$? ~~should have~~ extra
Consistent w/ my notes; I measured ~ 25Ω at room temp.

Nose = 4.44 Volts $R = 44.4\,\Omega$
This is consistent w/ my notes from Jan 23
where I measured 46Ω at room temp.

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Sat 18 Feb

12:35 start sep. pump again @ 10 slpm
I have a temp controller on sep. output hose (32°F)
open Run valve ~~½~~ 1 turn... Mech Pumps only running → W.R.
Nose & Sep level probes read "ERR" again — overheated? Power off for a while.

Fridge temps

	Nose(1)	Low Hx(2)	Up Hx(3)	Sep(4)	Low Baff(5)	Upp. Baff(6)	Fridge flow	
12:50	98.8	100.3	99.8	63.5	89.7	284	1.3	open Run to 1 turn
13:00	98.7	100.2	92.4	50.3	65.7	271	3.2	
	cooling a bit faster than I want, so sep flow → 7 slpm							
15:30	90	90	35	4.3	20	40	7	
	open bypass ½ turn. fridge flow goes up fast							
	weird, but OVC pressure goes up too → 1.7×10^{-7} torr (was 2×10^{-9})							
15:44	61.5	83.5	45.5	7.4	26.5	40.9	3.2	
15:55	49.4	74.4	39	6.5	26.3	38.6	4.2	OVC = 3×10^{-8}

OVC dropped suddenly as Upper HX started cooling; OVC rose when up HX warmed. Weird.

Replaced ILM w/ one on loan from D. Gaskell. It has 1 LHe & 1 LN2 channel.
Calibrate for Nose probe. Looks ok. 6% is a empty but cold.
Had to reboot IOC. Don't know why.

16:36	11.1	27.7	17.6	4.3	15.4	23.3	7.2	OVC = 1.9×10^{-9}

fridge cooling rapidly. Bypass 0.5 → 0.3 turns
Bypass 0.1 turn Warming slightly. Lower HX @ 16.5K. Won't get liquid thru run valve until this is cold
Note Up. HX = 4.76 K; Lower HX = 14.9 K → not excessive conduction between HX plates
flow rate dropped @ 0.1 turn (70 lpm) coming back up.
Bypass .05
Bypass closed & zero'd
Close run valve → 5 → turns. Start to see liquid in nose
Run valve 2.5 turns (Level @ 75%)
Level → 101% over filled.
Close Run 0.125 turns. Flow dropping 6 slpm now.
16:54 Heater on in order to burn away some liquid... 10% of high, whatever that means...

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Flow up to ~20 slpm ... estimate ~1.4W of heat.
Notice that upper and lower HX cool a bit when I turned on heater, due to increase flow of cold gas. This means low HX was not immersed in liquid.
Level now dropping ... 88%
Looks like level probe has a dead spot around probe OK ~67% may be a good control point
52% now. open run 0.125 → 0.20 turns
Run now @ 0.35. Each time I open it up HX warms a bit → dumping more 4K liquid from sep. onto HX plate.

5:20 Note that sep. flow has been zero since reboot!
fridge seems OK but set it at 7 anyway.

17:48 All blowers ON.
flow = 3.5 slpm ~ ^3He = 7.0 torr ^4He = 0.09 torr nose = 0.96 K
nose level = 67% and steady looks like all thermometers agree.
upper HX 3.0 K Lower = 2.66 → High because of low flow

flow ~ 2.5 – 3.5 ⟨3.0 slpm⟩ @ .09 torr this gives only ~1500 m³/hr
I suspect ^4He = .09 torr is bottomed out
^3He = 5.3 torr

18:06 All blowers OFF. Mech pumps ON. Bypass vac valve open
Run valve on poorly tuned PID w/ max 0.25 turns
Sep @ 7 slpm.

Watch transfer line open @ 6 pulses/sec → takes ~1 min to open 0.4 → 3.0

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~~Sunday~~
Monday Feb 20 2012

9:45 LN_2 = 0. Someone has disabled the LN_2 fill.
OVC = 4×10^{-9}
Start LN_2 fill using house LN_2. LN_2 pressure only 1.4 Atm!
Stop LN_2, this isn't going to work. Try it w/ the dewar on platform.

Anneal Heater 35.55Ω at controller

10:30 I closed the valve on the line James installed between magnet boil off and warm return.
Now all boiloff has to go through flow meter on gas panel

After 5 minutes, seems level @ 36 slpm. & 1050 mbar
Total consumption now: 36 (magnet) + 7 (sep) + 3 (fridge) = 46 slpm
= 46 * 60/740 = gas/liquid Ratio
= 3.7 liq liters/hr

Open valve up again

13:53 - OVC Pres: 3.2×10^{-9}

17:00 Rumors of correlation between magnet fill and ESR contamination.
Start a fill @ 45% and watch ~~[illegible]~~ CCT 60HLA = 9.0 ppm
No change in contamination after 30 minutes
17:25 Backfill fridge w/ gtle. Prepare to load target insert.

Load Bottom cell from Bottle #2 (1/23/12 NIST irrad. 110 min)

18:30 - Start Magnet Ramp Procedure; going to 80A @ 3 A/min
18:33 - Heater on, To Setpoint @ 18:34
"Magnet On" sign comes on ~ 6 A
18:51 - Magnet @ 52 A

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19:06 Summary fault when trying to transmit microwaves. Related to $+C_z$ extension cables??

19:36 Changed ramp rate to 0.5 A/m to 121.6A

[moved power supply onto platform to bypass extensions. worked.

19:46 Magnet @ 120A, Baseline taken

20:00 - RFMod to 600 to find signal, lifting current

213.0 MHz @ 121.825 A

Heater off, Leads Ramped Down

One Point TE: Area = -0.0691, He ~~Pressure~~ Temp = 4.36K

CC = -5.4391S

Position isn't set, so field may be off. (DON'T USE TE)

21:06 Field is off!! Position was bad.

NMR Computer thinks its 17:15 @ 20:07

22:25 - Polarization 38.3%, Frq 140.18, Inc 964

22:35 pumps off

22:50 Pol = 40. target @ 146.367

23:20 Pol = -17.6 Rt = 978

23:38 Pol = -19.8 line seems very narrow

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23:40 switch to top target. (2.9" down)
signal is well centered, and a little bit negatively polarized, with a bit of a shoulder

23:54 Ramp down magnet.

Tuesday, Feb 21st, 2012

1:04 - Magnet Ramped down, μWaves off.

11:15 Turned off 2 mech. pumps
w/ 1 Mech pump $P_4 = 1.66$ torr $T_1 = 1.36$ K

14:40 $T_{Nose} = 1.48$ K $P_3 = 38.17$ torr $P_4 = 2.44$ torr
pump out & zero ^{3}He baratron

15:15 $T_{Nose} = 1.42$ $P_3 = 36.54$ torr $P_4 = 2.33$ torr

16:30 Moved pressure switch for Big Blower from platform to pumping line near blower.

17:47 - Ramping Magnet

Polyfit Area	Insert Temp	Fridge Temp	3He Pressure

22:11 We have been thermalizing the top target for ~ 2 1/2 hours, with no sign of it leveling off. I am going to give up and hit the microwaves

Init ten points (assuming 1.58 K) -3.0584 = CL

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22:32 ~~Time~~ Polarizing negative

time	frequency	EIO position	polarization (up/down)
22:33	140.441	982	-28.4%, increasing
22:35	140.452	984	-34.2%, increasing
22:39	140.458	984	-31.3%, increasing
22:44	140.458	984	-39.3%, increasing
22:49	140.458	984	-42.8%
23:00	140.454	983	-46.5%
23:08	140.458	982	-49.1%
23:18	140.456	980	-50.4%
23:20	& Microwaves off		-50.6%

23:20 Microwaves off, blowers off, ramping magnet down

Feb 22

4:50 Back fill fridge to pull stick
Move target up. current encoder value is $\boxed{49497}$ + 194 on motor

Top cell back in slot 1 bottle 2 110 min
Bottom cell in bottle 2 110 min

5:30 load top cell w/ #4 NH3 11/19/11 150 min
Bot cel w/ #5 NH3 11/17/11 250 min

5:46 stick is in the fridge. Pumps are on.

5:55 Put bottom cell on beamline encoder is $\boxed{32129}$
distance is 8.25" steps are 123207

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18:14 - Magnet sweep complete; Gates locked, Beacons on, Interlock Rack Starting to Ramp Magnet; to 80A @ 3 A/min

18:48 - @ 80A to 100 A @ 2A/min

19:00 - 100A to 115A at 1A/min

19:42 - NMR Tuned, Baselines taken on Top, Bot for 400 RFMod

20:57 - TE taken on bottom cup, aver area -0.444149
average temp 1.457, average CC -3.07421

20:58 - Taking TE on top cup

21:10 - TE on bottom cup, average CC -6.497728

21:11 - moving to bottom cup to polarize

21:25 start polarizing negative.

21:35 lost liquid. Microwaves off. run at .5
12000 blower off.

22:00 microwave on 1200 off

22:25 Pol = 54.1% f = 140.172 GHz

22:40 Pol = 61.2% f = 140.192 GHz

22:51 Pol = 63.2% f = 140.19 stop polarizing.
move to top target

23:00 switch to top target

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23:09 47.9%

23:16 53.2% FM on 2 V_{pp} 1 kHz

23:21 57.5% f: 140.2 possible improvement from FM on

23:26 9. to 4 V p to p

23:34 66.4% f: ~140.150 4 V_{pp} T: 1.17 K

23:36 Try 6 V_{pp} FM

23:41 Turn off FM, target improves

23:51 70.1% f: 140.20 flow: 24.9

23:53 power off put everything to bed for the night.

1:03 Magnet off.

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$t_1 = \frac{T}{\ln\left(\frac{P}{P_0}\right)}$

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Monday Feb 27 2012

Jamie Brock drilled 2 intermediate holes in the LN_2 level probe for the LN_2 jacket. This improved level readout - it no longer stays pegged at 63% for several days.
Chris Keith adjusted pressure switch for Big blower.
It is now 0.5 torr, based on ^4He manometer reading.

17:46 Magnet P.S. current set to 60.9135 A for 2.5 T

18:01 Ramping to 60.9135A at 3A/min

18:30 Ramping down to zero polarization

19:14 Ramping to 60.9135A at 3A/m

20:54 taking TE on top cup: cc −0.2405481
temp 1384

21:04 Pumps on, microwaves on, polarizing positive

time	frequency	E10 position	Polarization
21:05	70.108	1189	9.5% (rising)
21:08	70.101	1187	12.7%
21:11	70.097	400 (?)	16.5%
21:19	70.063	1010 (?)	25.6%
21:29	70.024	1153	34.1%
21:44	70.010	1148	37.3%

21:49 changing μwave cathode voltage to increase power → didn't help!

21:54 stopping microwaves, flow drops from 40 to 10.4

$t_1 =$

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Wed Feb 28

2:50 try using anneal heater to warm target sample.
Move stick to home position (all the way up) Encoder = -106
home = 0000

Target thermometers still below 1.4 K
Nose level = 33% (was 50% → fell as I raised target ladder.)

Header resistance at LS 336: 38.4Ω
flow ~4 slpm
On High: 10% flow goes up to ~ 15 slpm
Top target warms to ~10K, but bottom still @ 1.45 K

Heat	Top	Bottom	ΔT	
20%	26.5	9.8	16.7	Both rising
30%	29.7	14.4	15.3	
	35	18.1	16.9	
	45	28	17	flow now 7 slpm
	47.7	47.6		
50%	49	59	?	ΔT reversed

move to encoder = 6000 this brought ΔT → 0 for a short time
now back to encoder = 0

20%	71	60	11
	72	60	run valve open 2.5 turns. No effect.
	72	62	pretty steady

encoder → 6000 (~~~~?)

$\boxed{\text{7680 encoder steps per inch.}}$

Both cooling slowly. flow = 19.8 slpm
encoder → 12000 noticably cooling
70.6 59.0 fridge Temps 73 45 9 4.3
50% 69 58
encoder → 18,000
72 59 seems like ΔT = 12 K no matter what
encoder → -4000 → hit a limit.
20% 60 55.5
30% 73 70 still creeping up.

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7680 enc. / in.

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4:00 Test annel over.

Move back to 49497

Remvalve = ½ turn By pass = 1 turn

Lesson learned. Move target high as possible ~4000

Used 30% to warm. 10% or so to maintain.

Wed March 1 Pulled Target Stick

OVC jump up to 2×10^{-7} Torr when Fridge was backfilled.
From 2×10^{-9} torr

Pumped at Fridge & OVC 1.0×10^{-8} & dumping

Recovered chips into their original bottles
(see pg 84)

13:40 prepare to load stick again.

Top	cell	#13	NH3	1/25/12	Nist	140
Bottom	cell	#15	NH3	1/26/12	Nist	120

16:40 About 2 hrs ago, I closed the valves on the pumping cart.
Now the rotary vane pumps are pumping thru the blowers.
Temperature stabilizes at ~1.5 K and flow 3 slpm.
These are good conditions for T.E.

Friday March 2
~~-365083~~

17:43 Software showed IDC Amp. Would not move
Position was -365083, out of beam

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20:31

~~[illegible]~~ IDC showed amplifier fault. Cleared with power cycle. Afterwards IDC would run the home routine but wouldn't run anywhere else

Turns out IDC's internal settings for max. velocity and max. accel were lost. Here are the good settings:

AMAX	150,000 steps/sec²		A Nom	150,000
VMAX	75,000 cts/sec		V Nom	50,000

21:19 Magnet fill valve was reading 22 turns open, but the magnet level was dropping. I went into the hall sected the valve, and then ~~[illegible]~~ reset the ED2. I then open the valve the normal 3 turns. Everything seems to be working fine now.

22:10 Change Target to Carbon (C_{12}-40). current is ~~[illegible]~~ noticed that LHe level drops quickly from 34 - 7.7 % in one iteration. Have to switch off again. Josh controlling buff/sup valve from home.

22:30 Change Target to home (zero position). Josh still controlling buff/sup valve from home.

6:19 Buffer supply valve encoder jumped to 18 turns and magnet LHe emptied. Opened valve to 14 and I will manually fill magnet until controlled access.

Changed PID loop Min: 0 → 10, Max: 6 → 14 ⇒ seems to be worse

NEVERMIND

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Mar 03, 2012

9:30 Fill Magnet manually. to ~60.

10:00 Reset the Magnet fill valve encoder in the Hall

10:00 Dave M. calculation implied the target LHe can not be drained. (Jixie will have to deal)

23:10 Moved target to Carbon 12 -40 no rasters on with 100 uA. no run taken (3 min junk run)

23:36 moved back to Cross hair 3 μA no raster (pulsed)

Mar 04 2012

1:38 moved to no ~~raster~~ target, and back to crosshairs with raster on, 100nA

2:02 moved target up ~1 mm Searching for crosshair

30k steps up
2217749
2247749 → lumi trip (hit cup?)
2187749
2157749
2127749
2097749
2067749
2037749
2007749
1977749
1947749 → tripped on opposite side of cup, moved to 2067749

3:15 encoder offset ~ 2067749 − 2184069 = −116320
moving to CIZ (40 mil) encoder position: 1292249 − 116320 = 1175929

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11:08AM MCC Called and said Target Magnet tripped, even though its not on

2:47PM Switched to CH2 target material

~~stepping offset = 1175929~~

~~3883499 - 1175929 = 2707570~~

~~given value offset~~

OFFSET = 116320 as found in previous shift

3883499 - 116320 = 3767179

3:23PM FAST RASTER ON

16:17 Moved target to zero for empty target tests and temp studies (Lamp not working)

20:00 Chris C. Setup cup temps read out from Lake shore. Two that should be good for low temp are still higher than the temp above the hose in the frig.

20:57 I noticed that the two good (for low temp) read outs when to zero again.

21:20 All temp readouts came back and left again.

2:33 Calculated position (steps) for center of CH2/empty hole $\boxed{4028999}$, String Pot: $\boxed{11664}$

5:50 Moved target to 1292249 (C12).
No motion on the camera
Encoder values are: 0.000 and 3645.86

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March 6th, 2012

Witness @ 2.5T = 1.3788 KG

Magnet Test Procedure

	Target Mag (A)	Septa (A)	B (mT)	C (mT)	Mag Voltage (V)
14:50	12	95	~~-1.748~~ 0.319	~~0.310~~ -1.743	3.0A/m adds ~3. ✓
14:57	24	190	0.627	-3.44	
15:03	36	285	0.927	-5.14	0.54
15:10	48	380	1.23	-6.85	0.72
15:15	60.9135	475	1.55	-8.68	0.91
15:23	72	570	1.84	-10.23	1.1
15:30	84	665	2.15	-11.97	1.28
15:38	96	760	2.47	-13.63	1.47
15:49	108	855	2.80	-15.28	1.69
16:13	120.8	950	3.18	-17.00	1.95

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2.5 Tesla FSD settings:

Low	Alarm	1.30986	kG
High	Alarm	1.44774	kG

17:50 Magnet is ramped down. We will trip off the septum magnet and (with Jack's help) measure the induced voltage in the target magnet

Current for 2.5T is ~ 60.9135 A

19:33 - Ramping Magnet to 2.5T; to 60.9135 A @ 3.0 A/m

19:48 - Magnet ramped to 2.5T

19:50 - Move position to (C_{12} - empty)

24:00 Moved to NH_3 and ramped Magnet down
Still try to get the beam on the dump faster.
Need to check target magnet polarization.

00:40 started ramping magnet to 2.5 T

00:45 moved target to "home" position

02:15 ramping magnet down
MCC not able to tune beam into the dump tonight.

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March 7 2012

09:30 Ramped target magnet to 2.5 T (60.9 A @ 3A/min)

11:12 At MCC's request - lowered magnet to 2.4 T (58.476 A)

12:15 Magnet ramped to 0 T

16:48 Ramped Magnet to 2.5T (60.9135A)
Position is Home

18:25 TD1980 buffer dewar temp alarm
temp rose rapidly, now back to normal
reset alarm

21:00 ramp magnet to zero at request of
MCC for short controlled access

22:08 4k alarm, self-corrected

22:16 ramp to 2.5 T, beam permit

March 8 2012

3:34 Moved target to 4025624 (165552), roughly between CH2 and empty target, slow raster on, current set to 50nA pulse → 500nA pulse

4:34 Moved target down 80k steps to 4105624

4:46 Moved target to empty hole, 4174499.

4:50 Jogged target down 59055 steps (~2mm)

4:53 Jogged target down 118110 steps (~4mm)

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4:58 Moved to CH2, motor step 3883499

5:02 Jogged stick up 118110 steps (~4mm)

5:07 Moved stick up to crosshair (2217749)

5:12 Jogged stick up 411K steps again 60K steps, to crosshair, to CH2, Jogged down 117K, to crosshair

7:00 Moved HRS out of the elastic region and mapped empty cell again → found it!!

9:00 Moved to C12 - 40mil target

9:28 Moved Home

9:55 Moved to C12 (Empty Hole); Slow Raster On

10:13 Moved to in between holes (4020000)

need to move 1/3 cm

78000 steps per inch

295275 per cm

⇒ 98,425 for 1/3 cm

$$\begin{array}{r} 4020000 \\ +\ 98425 \\ \hline 4118425 \end{array}$$

should be roughly center of C12 (Empty)

→ Moved to this location @ 13:20

13:29 jogged to 4160425

13:34 jogged to 4064425

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March 8 2012

13:40 jogged to 4082425
13:45 jogged to 4091425
this is centered on C12 (small)

optical encoder:	41898
linear encoder:	1613.92
steps:	4091425

old: 4174499
new: 4091425
83074

New offset — 83074 to stepper

14:35 Moving to C12 old: 1292249
− 83074
1209175

encoder values:
→ optical 12388
→ linear 3064

16:16 restarted PDP due to Labview freeze

18:38 momentary rate 5kHz, probably beam crash
back to normal now

time	main flow	top temp	bottom temp
18:45	3.5	18.8	17.7
19:00	4.0	16.8	15.8
19:15	5.0	16.1	15.3
19:30	5.0	15.3	14.5
19:45	5.0	14.7	14.0
20:00	4.0	15.9	15.0
20:15	4.5	15.4	14.6
20:32	4.0	15.4	14.7
21:00	3.0	16.0	15.3
22:00	3.5	16.4	15.6

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time	main flow	top temp	bottom temp
23:15	4.5	18.7	18.5

22:58 linear 3054 James is moving target
optical 12386 remotely

160 000

March 9 2012

00:01 - Move Home for tune beam

1:12 Move to U2-40mil for position check

- 160,000 to see border

Did Test of Target Positions - posting in Halog

1:36 Moved to Carbon 40 mil target 12380

TIME	Main Flow	Run Valve	Temp
2:15AM	4.XX	.60	23.96/24.18
2:30AM	4.XX	.60	23.86/23.61
2:45AM	4.XX	.60	22.75/23.00
3:05AM	4.XX	.60	22.23/22.49
3:25AM	4.XX	.60	21.71/21.92
3:35AM	4.XX	.50	21.46/21.69

No liquid helium check

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TIME	Main Flow	Run Valve	Temp
3:50AM	4.XX	.50	21.42/21.65
4:00AM	4.XX	.50	21.42/21.66
4:10AM	4.XX	.60	21.44/21.66

- 4:15 Began refilling nose w/ helium. Set Run Valve to 1.50
  Turned on bypass valve set it to .10
  Closed bypass valve
- 4:25 Turned Run Valve to .1
- 4:35 Nose level 56.6% so I turned PID back on and we are asking for beam now
- 6:30 Moving target to TOP CUP NH3
- 6:45 Moving target to ~~Bottom cup NH3~~ CROSS-HAIR
- 7:05 Moving target to Bottom NH3
- 7:27 Ramping magnet down

11:35 Magnet is rotated and we are ready to do the simultaneous septum and target magnet ramp (just like on March 6th) only this time @ 6° field orientation.

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Target Current	Septa	B (mT)		C (mT)		Mag Vol (multiple ramping)
12	95	-0.049		-12.998		2.970
24	190	-0.091		-26.140		
36	285	-0.141		-39.02		3.620
48	380	-0.197		-52.05		3.870
60	475	-0.253		-65.12		4.040
72	570	-0.309		-78.14		4.230
84	665	-0.36		-91.22		3.340
→ 96	760	-0.42		-104.3		3.5[illegible]
108	855	-0.41	-0.46	-117.6	-107.5	2.750
120	950	-0.47	-0.52	-132.6	-132.7	

Septa off

5.0 T FSD settings

High : 2.89548
Low : 2.61972

$C' = (-30, 0, 50)$ $B' = (197, 0, 35)$

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Witnessed & Understood by me, Date 3/9/12 Invented by: [illegible] Date

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16:00 - Magnet Ramp Down Complete

19:50 - nose level tripped warning (50%) self-recovered

20:20 - The magnet power supply was ramped down (121.818A) "automatically" from (121.898A to 121.326A) with (121.326A) 50-100 nA beam on. Also notice warm return peak at 200 for some reason. I changed the magnet current back to 121.825A and thing appear normal.

21:09 moved target to C12-40 for target alignment w/ slow raster at 100nA pulsed

22:18 finding center between small holes

$$((\text{upper} - \phi/2 \cdot \frac{\text{steps}}{\text{in}}) + (\text{lower} + \phi/2 \cdot \frac{\text{steps}}{\text{in}}))/2$$

$= 3929988$

22:29 move target to C12 hole

23:48 move target home

00:54 - Closed Rn Valve flow was ~6.8 before with full of Helium, Rate is ~3.7 kHz

00:59 - μWaves on

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1:24 - Move Target to Carbon 12 - 40 mil

1:30 Taking Beam on Carbon 12 - 40 mil

Rate is 2.7 KHz.

1:33 Rates is now 0.0 KHz, so no more Lite

with Run valve closed, low Lite, flow is ~1.5

opened Run valve to ~~0.1~~ 0.2, flow is ~ 2.6

4:22 No helium.

Ram valve between: 0.3.0 - 0.50

Top / bottom temp: 14.99 - 17.02 / 14.1 - 16.58

Main flow between: 3.5 - 4.8

13:58 - Taking TE on Top

14:06 - Run Valve in manual @ 0.10

15:48 - Run Valve to 0.18

15:55 - Run Valve to 0.2

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16:03 - Run Valve to 0.3

16:32 - Level in Nose over 100% - continuing w/ TE

16:37 - TE on Top Done

CC: -1.2948 saved in te_031012_top.txt

16:40 - Moved to Bottom

16:48 - New Baseline on Bottom

17:11 - Run Valve to 0.27

17:17 - Bottom TE Done

CC: -1.343 saved in te_031012_bot.txt

17:18 Move to Top

17:24 - Start Polarizing

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Event Num	Date	Time	Method	Temp	Area
1331417759	10-Mar-2012	17:15:59	He4 Pres	1.599	-2.385652e-01
1331417692	10-Mar-2012	17:14:52	He4 Pres	1.600	-2.338157e-01
1331417625	10-Mar-2012	17:13:45	He4 Pres	1.603	-2.386503e-01
1331417558	10-Mar-2012	17:12:38	He4 Pres	1.608	-2.370458e-01
1331417490	10-Mar-2012	17:11:30	He4 Pres	1.614	-2.369837e-01
1331417423	10-Mar-2012	17:10:23	He4 Pres	1.617	-2.340172e-01
1331417356	10-Mar-2012	17:09:16	He4 Pres	1.618	-2.352890e-01
1331417289	10-Mar-2012	17:08:09	He4 Pres	1.618	-2.339295e-01
1331417221	10-Mar-2012	17:07:01	He4 Pres	1.613	-2.397414e-01
1331417154	10-Mar-2012	17:05:54	He4 Pres	1.609	-2.360781e-01
1331417087	10-Mar-2012	17:04:47	He4 Pres	1.608	-2.369102e-01
1331417020	10-Mar-2012	17:03:40	He4 Pres	1.607	-2.356948e-01
1331416952	10-Mar-2012	17:02:32	He4 Pres	1.607	-2.394677e-01
1331416885	10-Mar-2012	17:01:25	He4 Pres	1.606	-2.345922e-01
1331416818	10-Mar-2012	17:00:18	He4 Pres	1.606	-2.357174e-01

Material Type: Proton
Target Position: 1 (Top) X Bottom
Points Used: 15
Average Area: -2.364332e-01 +/- 5.134303e-04 (0.22%)
Average Temp: 1.609 +/- 0.002 (0.10%)
Average TE Polarization: 0.3177%
Average Cal Constant: -1.343905e+00 +/- 1.068406e-02 (-0.80%)

Event Num	Date	Time	Method	Temp	Area
1331415388	10-Mar-2012	16:36:28	He4 Pres	1.608	-2.451067e-01
1331415321	10-Mar-2012	16:35:21	He4 Pres	1.609	-2.434184e-01
1331415253	10-Mar-2012	16:34:13	He4 Pres	1.610	-2.421990e-01
1331415186	10-Mar-2012	16:33:06	He4 Pres	1.610	-2.462544e-01
1331415119	10-Mar-2012	16:31:59	He4 Pres	1.611	-2.476439e-01
1331415052	10-Mar-2012	16:30:52	He4 Pres	1.613	-2.426013e-01
1331414984	10-Mar-2012	16:29:44	He4 Pres	1.614	-2.434777e-01
1331414917	10-Mar-2012	16:28:37	He4 Pres	1.616	-2.417305e-01
1331414850	10-Mar-2012	16:27:30	He4 Pres	1.617	-2.451634e-01
1331414782	10-Mar-2012	16:26:22	He4 Pres	1.619	-2.420863e-01
1331414715	10-Mar-2012	16:25:15	He4 Pres	1.620	-2.460483e-01
1331414647	10-Mar-2012	16:24:07	He4 Pres	1.621	-2.440057e-01
1331414580	10-Mar-2012	16:23:00	He4 Pres	1.623	-2.430937e-01
1331414513	10-Mar-2012	16:21:53	He4 Pres	1.624	-2.435960e-01
1331414445	10-Mar-2012	16:20:45	He4 Pres	1.625	-2.478654e-01

Material Type: Proton
Target Position: 1 (Top) Top
Points Used: 15
Average Area: -2.442860e-01 +/- 5.092321e-04 (0.21%)
Average Temp: 1.616 +/- 0.001 (0.09%)
Average TE Polarization: 0.3163%
Average Cal Constant: -1.294877e+00 +/- 1.134290e-02 (-0.88%)

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19:03 Magnet current spontaneously ~~generated~~ changed to 121.3 again. lost polarization back to 62.3% after changing current.

21:18 magnet current spontaneously changed again. Reset magnet to set point back to 62% polarization.

21:52 Magnet current spontaneously changed again.

Sunday March 11th, 2012

0:43 - Switching to Bot, Moved Target Taking New Baseline

8:41 Turn off Beam and prepare target for anneal

10:00 ~ Anneal - Move Target to Parked, Pumps off

Took Top to 75 K for roughly 15 minutes, excursion of Bottom to 92K for a few seconds otherwise it was 4K less

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10:46 - Taking Baselines w/ Pumps on
Magnet @ 121.828

11:08 Polarizing Top cell, Negative. Going pretty nice. -83.69% after ~15 min

11:17 Waiting for polariz to stabilize. @ 86.9% & increasing

Current in magnet @ 121.828A

11:40 Turn on beam 50 nA

2:17 Lost polarization, current dropped to 121.37A

12:55 tried "lower" end of spectrum, went from ~140.514 → 140.501 & saw very sharp loss of polariz. for 1-2 data points

13:44 tried upper end ~ 140.551 & lost polarization quickly

14:20 From 140.52 → 140.53 GOOD
→ 140.51 BAD (sharp Δ)

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14:43 EIP popped out temporarily when I tapped on bellows >4 times
Returned after ~1 minute

15:37 Target seems optimal 140.538

16:18 Notice magnet current was at 121.828 rather than 121.825A going to just leave it, its only a small shift as to not interrupt data taking. Wait for no beam.

March 12nd, 2012

00:32 - New Baseline, on new Eventfile, Basefile

Saw lost events, fixed by new eventfile

9:13 Beam off for next 30 min (MCC called)
Find out if we should kill μ-waves when this happens.

10:20 Beam back

11:23 Δ sweeps to 300 to better tune μ-waves
Δ back to 600 to keep files small

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3.12.12

12:00 Stopped recording events for gep, they are prepann

12:16 Kill μ-waves, starting T_1
Killed roots

15:30 Nearly equilibrated, pol ~ +0.2%
looking steady

15:49 - Taking Baseline
New event & Base files

17:17 - Move to Bottom, take new Baseline

17:46 - New Baseline

18:00 - TE's Done

18:06 Target @ Home. μwaves on to remove helium.

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Event Num	Date	Time	Method	Temp	Area
1331586643	12-Mar-2012	17:10:43	He4 Pres	1.511	-2.331498e-01
1331586577	12-Mar-2012	17:09:37	He4 Pres	1.510	-2.359151e-01
1331586510	12-Mar-2012	17:08:30	He4 Pres	1.510	-2.352448e-01
1331586444	12-Mar-2012	17:07:24	He4 Pres	1.510	-2.353991e-01
1331586378	12-Mar-2012	17:06:18	He4 Pres	1.510	-2.374301e-01
1331586312	12-Mar-2012	17:05:12	He4 Pres	1.510	-2.327894e-01
1331586246	12-Mar-2012	17:04:06	He4 Pres	1.510	-2.340645e-01
1331586179	12-Mar-2012	17:02:59	He4 Pres	1.510	-2.379247e-01
1331586113	12-Mar-2012	17:01:53	He4 Pres	1.510	-2.388561e-01
1331586047	12-Mar-2012	17:00:47	He4 Pres	1.510	-2.391973e-01
1331585981	12-Mar-2012	16:59:41	He4 Pres	1.510	-2.367408e-01
1331585915	12-Mar-2012	16:58:35	He4 Pres	1.510	-2.389691e-01
1331585848	12-Mar-2012	16:57:28	He4 Pres	1.510	-2.400569e-01
1331585782	12-Mar-2012	16:56:22	He4 Pres	1.510	-2.404446e-01
1331585716	12-Mar-2012	16:55:16	He4 Pres	1.510	-2.386725e-01
1331585650	12-Mar-2012	16:54:10	He4 Pres	1.509	-2.415748e-01
1331585583	12-Mar-2012	16:53:03	He4 Pres	1.509	-2.402004e-01
1331585517	12-Mar-2012	16:51:57	He4 Pres	1.509	-2.383355e-01
1331585451	12-Mar-2012	16:50:51	He4 Pres	1.509	-2.388449e-01
1331585385	12-Mar-2012	16:49:45	He4 Pres	1.509	-2.372217e-01

Material Type: Proton
Target Position: 1 (Top)
Points Used: 20
Average Area: -2.375516e-01 +/- 5.515011e-04 (0.23%)
Average Temp: 1.510 +/- 0.000 (0.01%)
Average TE Polarization: 0.3385%
Average Cal Constant: -1.425241e+00 +/- 1.420630e-02 (-1.00%)

Event Num	Date	Time	Method	Temp	Area
1331589769	12-Mar-2012	18:02:49	He4 Pres	1.522	-2.294623e-01
1331589702	12-Mar-2012	18:01:42	He4 Pres	1.521	-2.284427e-01
1331589636	12-Mar-2012	18:00:36	He4 Pres	1.521	-2.266508e-01
1331589570	12-Mar-2012	17:59:30	He4 Pres	1.521	-2.288146e-01
1331589504	12-Mar-2012	17:58:24	He4 Pres	1.521	-2.315649e-01
1331589437	12-Mar-2012	17:57:17	He4 Pres	1.521	-2.333809e-01
1331589371	12-Mar-2012	17:56:11	He4 Pres	1.520	-2.270623e-01
1331589305	12-Mar-2012	17:55:05	He4 Pres	1.520	-2.311886e-01
1331589239	12-Mar-2012	17:53:59	He4 Pres	1.520	-2.285790e-01
1331589172	12-Mar-2012	17:52:52	He4 Pres	1.520	-2.319482e-01

Material Type: Proton
Target Position: ~~1 (Top)~~ Bottom
Points Used: 10
Average Area: -2.297094e-01 +/- 7.010253e-04 (0.31%)
Average Temp: 1.521 +/- 0.000 (0.01%)
Average TE Polarization: 0.3361%
Average Cal Constant: -1.463368e+00 +/- 1.323280e-02 (-0.90%)

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3/12/12

19:08 Moved to C12-40 target - went to optical 12343 ideal 12384
linear 3070.11 3150

optical encoder close to nominal
linear encoder 82 Ω off → 400 Ω/inch → 157 Ω/cm
~0.5 cm off?

20:21 Moved to HOME - got an Amp Fault, target expert said this was ok.

21:30 Target nose is refilled

cd to PDP

labview ~~PDP~~ System\ Start.vi -- Configs/g2p.xm

March 13th, 2012

2:00 - Computer Latency Issues

Polarize Bottom Positively

00:35 Estimated Time for nose drain and optics run in 2 hours.

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01:14 MCC: "EXIT VALVE 1HOHC SHUT"

This does NOT seem to be a target valve.

02:10 MAGNET is filling → 100% VALVE from dewar may be stuck open again.

Required Access to melt ice ball.

02:55 Out of Hall

March 14th 2012

9:20 refill the LHe in the magnet.

12:13 Pulled the target material and put in new bottles labeled top and bottom 3/14/12

12:55

Top	cell	is	#3	NH3	1/23/12	Nist	11C
Bot	cell	is	#6	NH3	1/24/12	Nist	120

Tune NMR and refill mag. ESR is set to Band 3-4 CE 70 GHz

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Current 60.882 A for 2.51 T

21:20 TE on 2.5T top CC -3.469678 (-3.61%)
bot CC -3.041533 (-5.46%)

1:38 Took new baseline ~~forth~~ top cup (use home rather than changing current)
Date: 3-15-12
Time: 1:29:15
ns: 300 rf: 106.5
cell: top rf-mod: 400
gain: 1

3:00 Magnet level 100% full again batch fill man, not responsive to close. Buffer staying at 71.3%.

3:57 Change magnet current by ± 0.5 A to help Alex / MCC in checking tuning parameters. Return current to original setpoint 60.8882 T.

6:00 Buffer Dewar at 68.7%

7:45 Buffer Dewar at 75.6%

8:35 Started ramping down magnet

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16:01 - Adding Event Fragments to Logger:
MagVolt, Top Cx, Bot Cx, Op Encoder, Str Encoder, Step Encoder, Position
Top RuO, Bot RuO → Input PT_Encoder
MagVolt added to TEB Frag write in SMC
Position, Op Encoder, Step Encoder, Str Encoder added TEB Frag in TMC
These didn't work, need Gen Event?

4:00 moved target to 3942550 for target check at request of shift leader and penjia with slow raster on.

4:30 Trying several encoder position between holes with several beam position to meet center BPM.

$\boxed{\text{found offset } -88803.}$

6:25 Move to top ~~400~~ 4794175 - 88803 = 4705372

(Error showing when switching NMR channel Yale Gain modern

6:50 New baseline 16 Mar 2012 06h 49m 57s
2000 sweeps 59.882 A (Top cup) Gain 1
rf-freq: 106.5, RF-mod: 400

TOP TE cc: -3.506042 (-7.28%) 15 points
BOT TE cc: -2.987381 (-5.91%) 15 points

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11:08 - Take new Baselines - Tune look Bad.

12:00 - Access to Re-tune done, New Baselines Taken

14:00 - Taking TE on Top

CC: -3.3396

15:00 on Bot: -3.0216

Moved to Carbon 40 mil

Old Position: 1209175

Offset: -88803

New Position: 1120372

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Modifications to Magnet/Dewar transfer line cdk

On Thursday March 16 we modified the transfer line to address both the radiation damage to the optical encoder and the leak in the needle valve stem seal.

We pulled the line from both the 500l dewar and the magnet.
Replaced the optical encoder w/ a 10-turn, 10kΩ rotary potentiometer.
It is read by Ch. 7 of the Lakeshore 218 temp. monitor.
We set it up so the pot reads 1kΩ w/ valve closed, 2kΩ @ 1 turn open, 3kΩ @ 2 turns etc.

We also removed the needle, and machined the brass sealing surface to accommodate 4 additional O-rings. The single O-ring that was in there wasn't in great shape, not especially elastic.

20:53 – James turns on roughing and bypass valves
blower 1 on after interlock cleared
roughing valve closed
blower 2 on after interlock cleared
blower 3 on after interlock cleared
bypass valve off

3:30 Polarized To ~50% without beam.
pid loop not able to keep up having to use man. run valve again.
45% with beam. ~~[illegible]~~ Main flow ~40

3:40 Now taking production data at 45% polarization,

run valve PID with Max chg at 0.50 works well with microwave + beam. (Was set on 0.20)

5:45 Polarization is not that responsive to microwave

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Mar 17. 2012. Yuncheng HAN

9:15 Beam stop because the sept mag Beep.
Target Polarization 32.9%

9:20 Fire Alarm In HallA

9:40 Target Alarm. Nose level ~ 101.1
Manually control.

9:55 James Maxwell remotely control the target
to ramp down the magnet.

10:05 Turn off the microwave.

10:30 Target Magnet current ⇒ 0.

13:30 Blower 1-3 stopped.
Roughing / Bypass valve opened.

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Checking target mover

Homed	ED2 : 0	Zeroed	Pot: 3655.6 Ω	
going to C12 40	ED2 : 12382		Pot: 3078.0 Ω	drifting down... 3077 3076
going to Empt Crosshair	ED2 : 21859		Pot: 2615 Ω	dropping
→ Bottom Cell	ED2 : 31475		Pot 2129 Ω	dropping down 1Ω/10s
→ CH2 Hole	ED2 : 38916		Pot: 1779 Ω	"
→ C12 Hole	ED2 : 41896		Pot: 1635 Ω	"
→ Top Cell	ED2 : 4902		1256 Ω	
→ From other direction				
→ C12 Hole	" : 41898		1637 Ω	"
→ CH2 Hole	" : 38918		1754 Ω	"
→ Bottom Cell	" 31476		2167	"
→ Empty Xhair	" 21861		2621	"
→ C12 40	" 12384		3072	"
→ Home	" 2		3657	

3674 Ω
3663

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Mar. 27 - K. Aniol
2012

~20:30 Buffer dewar level falls to ~45%
This happened while the HRS spectrometer raised from 1 GeV to 2.2251 GeV.
Maybe coincidence or may represent increased demand on ESR?
Or maybe an intermittent sensor

~21:00 Toby sets up magnet rampup to 2.5T
Setpoint = 60,882A, rate = 3A/min

21:10 Reset alarm handler so for the Buffer dewar below 45 is red alarm, previously 50 red 60 yellow. This PID probably needs to be adjusted so each TO doesn't peak out. It will naturally fall below 50 and sometimes 45 as is.

Wed, March 28th, 2012

13:33 - Moved to C12-40 for optics
closed run valve to empty nose
13:45 - Not ready to empty yet - set run to 0.1
13:55 - PID back on run valve

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14:18 - Closed run valve

14:40 - Emptying Nose - turned off Alarms on Low Nose Level

Remember to turn back on Alarm after no He runs are done!!

15:18 - Helium drained; set run valve to 0.1

Top Cx = 15.97 ; Bot Cx = 10.07

Wed. Mar 28, 2012 K. Amiot

C12_40 Tgt with He removed

16:45 set run valve to ~~0.20~~, 0.10 Top Cx = 13.22K Bottom Cx = 11.93K $I_{Beam} = 0$

↑ enter was not hit after 0.20 was punched in

man mode = yes

Time	Run valve setting	T (top) °K (Cx)	nose level	T (bottom) (°K) (Cx)	Beam (nA)
17:00	~~0.20~~ 0.10	14.03		12.67	0
17:15	~~0.20~~ 0.10	14.81	8.9	13.51	0
17:15	0.25 changed		9.0		0
17:20	0.25	15.23	9.0	14.09	
17:25	0.25	15.67	9.0	14.61	0
17:25	0.30 changed				
17:30	0.30	16.00	9.0	14.98	0
17:36	0.30	16.12	9.0	15.10	0
17:50	0.30	16.14	9.0	15.14	0
18:05	0.30	16.15	9.0	15.18	0

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T3 (HZ)	Time	runvalve setting	T(top) °K CX	nose level	T(bottom) °K CX	Beam (nA)
15	18:09	0.30	16.15	~~15.18~~ 9.0	15.18	0
00	18:16	0.30	16.21	9.0	15.27	100
100	18:26	0.30	16.35	9.0	15.45	100
200	18:26	0.35 changed.				
200	18:26	0.35	16.39	9.0	15.51	100
700	18:36	0.35	16.27	9.0	15.44	100
800	19:03	0.35	16.16	9.0	15.31	100
00	20:02	0.35	16.15	9.1	15.36	100
00	20:55	0.35	16.35	9.1	15.61	100
000	21:16	0.35	16.52	9.2	15.80	100
390	22:00	0.35	18.13	9.0	18.06	100
390	22:00	0.45				
390	22:06	0.55	19.04	9.1	19.07	100
	22:13	0.55	19.36	9.1	19.44	100
	22:17	0.55	19.44	9.1	19.53	
	22:21	0.55	19.51	9.1	19.60	100
	22:21	0.75				
500	22:31	0.75	18.85	9.2	19.01	100
600	22:41	0.75	16.85	9.2	17.12	100
600	22:49	0.75	8.07	9.3	9.01	100
	22:49	0.65	1.66	9.3	1.66	100
	22:50	0.55				
1800	23:00	0.40	1.60	28.6	1.59	100
1900	23:01	0.30	1.55	38.9	1.61	100
1911	23:03	0.10	1.51	45.7	1.62	100
	23:04	0.00		41.4		

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Witnessed & Understood by me: Date

turn on μwave
Dustin

Invented by:

Date

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Thurs March 29th, 2012

14:17 - Taking New Baseline on Bottom

16:15 beam down, taking TE

17:25 go to HOME for Beam Tuning while we wait for polarization to flatten for TE
New calibration constant posted in halog

23:15 Beam off per MCC for ~1 hr. Toby decided to do a baseline for the topcup and do a TE measurement.

23:45 TE result cc: -3.482815 and baseline taken

Friday March 30th, 2012

8:19 am : Moving to top NH_3
Unlock magnet controls, go to setpoints, click hold, click heater on. Waited till lead connected. Change field from 60.882 to 59.882 then click to setpoint, then hold.

Start new event file and new baseline. Select top proton & 5 NMR tune, DC current, 8000 sweeps, click baseline, create a new baseline, one point.

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baseline done (but not symmetric). Hold field.

Go back to field 60.882. Hold then turn off heater.

Leads out and ramp to zero.

Enter last TE value.

Chose new baseline. set for 300 sweeps. Take data.

turn microwave.

Going to positive polarization.

12:00 - Stop Beam for $\boxed{\text{Anneal}}$

Moved to "Anneal", Going to 75k for 15 mins

12:09 Heater - Medium Range - 30%

12:11 - 40% ; 12:12 - 50% - White Top

12:14 - lost liquid on Top, it goes to BK; Bottom still covered

12:20 - 80% ; Bypass to 0.1 & Run to 0.25 ; 90% ; 85%

12:30 - Heater range High - 45% → 50% → 60%

12:45 - High 45% - Run 0.25 ; Bypass 0.20 - Looking Good!!

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12:46 - 77K on Top

12:50 - Run to 0.3 , 33%

12:59 - Bypass to 0.25 looks better

~15 minutes w/ Top ≈ 79K; Bottom ≈ 71K

20:04 - Moved to Top , Bypass to 1

Mar. 30 Seeing K. Ariel

1600 - Möller in progress

~1800 - Möller finished

Try to do a TE but LABVIEW hangs up.
Can not start RF

top -P polarization
bottom +Polarization

20:06 TE done on top / bottom cups
top cc: -3.483413
bot cc: -2.926854

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22:00 get beam tuned now, polarize TOP to −41.4% before beam degrades polarization

01:30 Several sources of excitement since midnight
Mar 31
R. Michaels EIP Read Problems
at 140 MHz should be 70, see halog

OVS vacuum bad, 10^{-5} range.

01:30 Chris Keith, James Maxwell, and Josh Pierce come in and take access to hall.

A valve was found closed. Open now.
The EIP was fixed upon access.
Magnet field being ramped up.
We may be back in business.

04:30 pol ~ −30% upper tgt 2.5T

08:30 move targe to carbon, 2 minutes later

move it back.

09:02 AM move targe from top cell to carbon

09:14 move target from carbon to empty-cross

09:22 move target from empty-cross to home.

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09:34 move target back to top_cell
12:30pm move target to home for harp-scan
1:56pm move target back to bottom.

17:58 - Start Anneal Procedure, Moved to "Anneal"
Roots off, μWaves off; Go to 80K for 20mins

18:04 Heater to High 20%

18:23 - Run Value to 0.2; Bypass at 0.25, Heater 35%

18:24 Run 0.1, Bypass 0.3, Heater 45 → 50%

18:28 Run 0.1, Bypass 0.4; Heater 50% → 55%
Good!!

18:32 - Getting close, Heater → 80%

18:33 ~~[illegible]~~ 80K for Top, Bottom 77K
Bypass to 0.5, Heater @ 25%
Bypass to 0.45, Heater to 30% → 35%

18:36 Bypass at 0.45, Heater to 55%

18:38 Bypass 0.5, Heater 50%
Bypass to 0.6, Heater 30% → 40%

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18:51 - Run 0.1, Bypass 0.0, Heater 43%

18:53 - 20 minutes complete

Top ~ 83K, Bot ~ 77K

set Sep Flow to 15, Bypass to 1.5

↓ Run to 0.5

30

19:21 - Fridge full, move to Top, polarize +

20:00 New Baseline, new event file

polarized Top target Negatively

to -55 %

Still need TE, do later

run value working ok if emptied more

with fill on man. with .60 then set to PID

request 70nA for production

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21:49 dilution Run

21:49 move to home position

22:09 move to C12-40

22:20 move to dummy cell

22:40 move target to top cell

4/1/12

4:35 - begin dilution run → moving to C12

5:00 - moved to dummy

5:20 - moved to empty

11:36 - Created new eventfile and basefile

18:10 - moved target to bottom, did a baseline for bottom cell

18:20 - move target back to top cell for production run

20:37 move target to home

20:52 move target from home to Carbon

21:00 move target from carbon to empty cross

21:11 move target back to top for production run

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4/2

At around 13:10, fire alarm in the hall, ramping the magnet down.

18:53 Ramped the magnet up

Moved target to Home position
Moved target to C12 hole position
Moved target to NH_3 bottom
Polarized to 35.8%

April 3rd, 2012

9:30 - Taking TEs on Top Bottom

hit with μwaves to see TJ

TJ ~ 2 minutes!!

10:20 TEs interrupted for access

Fixed several software bugs (see Nalog)

Magnet ramped back up

15:05 - Taking new baselines (new files started)

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15:30 - TE on Top - went to 10% w/ μWaves first

Top CC: $\boxed{-3.4929}$ @ 1.2K

Bot CC: $\boxed{-2.8055}$

17:26 - TEs done, closing roughing, turning on Roots 1;

temp ~ 1.03 K

18:39 TE (at ~1,025 K) is done Bottom cup

Bot CC: -2.800724

Top CC: -3.487 @ 1.02 K

19:13 - Anneal Start

Trying Automatic - 25K → Go - Doesn't Work

Go to 85K for 20 mins

19:25 - Bypass 0.2, Run 0.1, Heater 35%

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19:30 - Run 0.1, Bypass 0.45, Heater 40%

19:35 - Run 0.1, Bypass 0.5, Heater 40% → 45%

19:47 - Run 0.1, Bypass 0.6, Heater 50%

19:48 - Getting close - Heater 50% → 45% Bypass to 0.65

Start clock - 19:50

19:59 - Bypass to 0.68, Heater to 43%

20:10 - 20 mins done - Top ~ 86K ; Bot ~ 81K

Open bypass to 1.5, Separator flow to 30

Moved to Top

20:37 - Cups to 4K, closing Bypass, opening run

21:00 Moved target to blame Positron

21:40 NX session got frozen Restarted

~22:10 Moved target to C12-hole Positron

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April 4

0:00 – 4:00 optics (Event rate indicates first two runs likely had Helium still without a 0.6 kHz)

4:15 PDD must be run from PDP-pregosh for now.

6:00 polarizing top cup positively in accordance with Dons Theory after anneal

8:00 ~~[illegible]~~ in two hours at 30 nA just change 50 nA.

11:20 moved target to carbon hole to check the beam position.

11:30 Yuev is going to tune beam, so move the target to home

11:40 moved target to CH2-hole to check beam position

~~11:57~~ ~~moved target~~ to

12:08 ~~while~~ ~~for~~ the target is stacked while moving target

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2:45 turning off target magnet in order to let beamline people to fix harp.

16:45 Ramped the magnet up (60.882A)

16:50 Moved target to Home Position

17:40 Moved to C12_40 Position.

18:20 Moved to TOP Cell Position
Started polarizing positively

19:05 Turned off microwave, Moved to C12_hole Position

19:40 Moved back to TOP. Polarized to 35.7%

04/05/2012

01:34, creat a new event file

04:07, move target to carbon

04:17, move target to home

04:24, move target to empty cross

04:32, move target to top

07:50 change cell to bottom
bottom cell polarization is -46.3%

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15:10 Turn off microwaves and blowers close run valve in preparation for anneal

15:12 Move target to anneal position

15:17 Run .1 Bypass .2 Heat 35%

15:20 Run .1 Bypass 2 Heat 45

15:22 Run .1 Bypass .4 Heat 50%

15:25 Run .1 Bypass .6 Heat 50% $T_1 = 45$ $T_2 = 54$

15:41 Start anneal clock. $T_1 = 85$ K $T_2 = 80.5$ K

Run .1 Bypass .63 heat 45%

15:46 Heat @ 43%

15:54 Heat @ 41%

16:00 Heat @ 38%

16:06 Heat off. Bypass @ 3 turns. Separator @ 35

16:28 fridge is taking a long time to recover. We suspect that there may be a problem w/ the separator pump which is not able to run at a very high flow, or seemingly to draw up much liquid. This has slowed the cooling of the separator dramatically. 5.4 K after over 22 min

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16:34 some liquid in the separator now. cooling is speeding up

16:36 cells under liquid

16:45 fridge ~~[illegible]~~ cold. Separator pump seems to be running at half speed

Reset energy integrator.

Top = 3.0725 x10^16
Bot = 1.1044 x10^16

April 6

01:16 – Move to C12-40 for dilution
Turn μwaves off
Switch to manual PID control, set .10 (nose level up to 90%)
01:25 – Move to dummy for dilution
01:38 – Move to empty for dilution
02:00 – Moving back to BOTTOM CUP
Polarization dropping like a rock

04/06/2012

08:30, move to C12-40 for dilution
08:45 move target to empty-cross
09:21 target move to home
09:58, target quench, call for controlled access to investigate
10:04, switch to manual PID control, set 0.0 pumps off
11:15 target is back to 2.5T
01:10 move target to C12-hole
01:20 move target to C12-40
01:38 move target to top-cell

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4/17/2012 Yuncheng

8:10 Move target to C12-40

8:20 ——— to Empty_cross

8:30 ——— to Home

8:40 top-cell NH_3

8:45 Manually fill the Nose

9:10 Manually fill the Nose.

11:20 Nose level → 101.1

when manually set mom setpt = 0.00,

Nose level → -1.00

Called Jonathan, and he remotely take control

12:55 move to C12-40

1:05 ——— empty_cross

1:20 ——— Home

1:38 ——— NH_3 top_cell

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April 7

Microwave off, Blowers off run, bypass open go to anneal positions

14:22 run 0.1 bypass 0.2 heat 35%

14:25 run 0.1 bypass 0.2 heat 45%

14:28 run 0.1 bypass 0.5 heat 50%

14:34 ⟶ Top: 60K Bot: 50K

14:42 ⟶ TOP: 80K BOT: 77K

14:45 ⟶ TOP: 87K Bot: 78K
run 0.1 bypass: 0.63 heat 45%

— Start Clock 14:45 —
14:49 : TOP: 88 BOT: 81
14:50 (bypass: 0.65)

14:53 bypass: 0.63, TOP: 88K, BOT: 82K

14:56 bypass: 0.65, TOP: 89K, BOT: 83K

15:08 bypass: 0.63, TOP: 86K, BOT: 80K (Strange degree dip)

15:15 - Stop anneal Heat off
bypass 3 Turns, separator @ 35

15:25 Temps coming down

15:45 Temps all cool and levels back to normal
setting all back on PID.

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~~April 7~~
~~18:00 Taking new Base line~~
~~Sweeps 2000~~
~~Current 60.882~~
~~Cell Bottom~~
~~RF 0.6 - 50~~
~~RF Mod 400~~

04/08/2012

04:12 move target to home

04:21 move target to carbon

04:30 move target to empty-cross

04:43 move target to bottom.

07:11 move target to home

07:21 move target to carbon

07:32 move target to empty-cross

07:41 move target to button cell

DILUTION
- 10:35 move to C12-40 turn off μ-wave and put PID in manual mode
- 11:00 move target to HOME
- 11:05 move to cross-hair target

11:20 moving to TOP NH_3 and beginning to polarize positive +44% polarized

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14:00 Move to CR_40 for dilution μ-waves ~~[illegible]~~ off
keeping an eye on PID

14:13 Move to cross-hairs for dilution

16:22 move to dummy for dilution

16:37 move to CR-40 for dilution

16:49 move to home for dilution

17:05 move back to NH_3 TOP for production

19:05 move to dummy for dilution

19:22 move to CR-40 for dilution

19:30 move to home for dilution

19:42 move back to NH_3 TOP for production

22:18 move to dummy for dilution

22:26 move to CR-40 for dilution

22:38 move to home for dilution

22:54 move back to NH_3 TOP for production

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04/09/2012

01:00 move target to home

01:09 move target to carbon

01:19 move target to empty-cross

01:30 move target back to top for production run

07:47 move target to home

07:56 move ~~target~~ to empty-cross

08:04 move target to carbon

9:09 Target is ramping down for controlled. Pumps are off for annneal later today

9:22 Magnet @ zero amps, going to unhook mag. leads

9:48 Magnet leads locked

10:43 Moved to top, emptying the nose w/ μ waves

10:51 Nose level reads 8.6% moving to anneal position start anneal

Heat 35% run .1 bypass .2

Anneal

10:55 Top: 42 K Bot 32.5 K

10:57 Top: 38 Bot 38 10:58 Heat: 45% run .1 bypass .1

11:00 Heat 50% Top: 48 Bot: 55 run .1 bypass .5

11:03 Top: 50 Bot: 56

11:06 Top: 62 Bot: 67 open bypass to 0.6

11:09 Top: 68 Bot: 71 Heat to 55%

11:12 Top: 77 Bot: 77 ~~run~~ bypass to 0.63

11:13 83 81 Heater to ~~83%~~ 53% bypass 0.60

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11:15 T 87K B 83K Heater 45 bypass 0.65 run .1
11:17 T 87 81 K Heater 50% " "
11:20 89 84 K Heater 52% " "
11:21 accidentally closed bypass (hiccup in temps is from that)
start clock
Heater 55% run .1 bypass .7
T:92 B:87
11:26 T:95 B:87 run .1 bypass .63 Heater 47%
11:32 T:95 B:88
11:46 Anneal done separator flow 35.00
run 1.0 bypass 2.0
avg 91.5 deg for 25min

Anneal

12:30 taking baselines for top and bottom while field is off

17:10 Magnet ramped Run valve set at 0.17
~~waiting~~ collecting TE
Top TE: -3.440260 Temp 1.25K He4 1.22K He3

17:27 Move to hot

17:43 TE Bottom: -2.782998
take 2 -2.772648

4.11 7:04 James are ramping down Tanger magnet

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4/12/12

Polarized / Top Cap / negative polarity.

8:30 Start the polarizing process.
Microwave on. ~~start at~~

8:50 Beam On at polarized → 42.8 %

12:00 turn Microwaves off beam undergoes tuning for at least half an hour, continue w/ beam problem.
(since 11:00)

12:00 target ~~mo~~ is moved to C12 – hole
12:48 C12 – 40

1:00 Move to NH3 Top Cell.

target is quite stable at around 31% polarization. (to 30%)
from 1 pm to 4 pm.
the stable achieved microwave frequency is at around 70.371 (±0.01) w/ bellows 1295 (±50).

Turn off m-w
Pause → Monitor WATCH LEVELS!
Move target
Change NMR channel
Choose baseline

Polarize top positive

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7/13/2012 Day Shift

8:08 Continue with production at positive bottom Cup.

7/14/12 * Anneal *

Heat	run	bypass	Temps Top	Bot
35	0.00	0.2	17	5
40	0.10	0.3	20	20
45	0.10	0.4	32	33
50	0.10	0.4	47	42
50	0.10	0.5	57	62
50	0.10	0.6	62	67
55	0.10	0.63	77	79
53	0.10	0.63	80	78
50	0.10	0.63	84	81
52	0.10	0.61	93	88
45	0.10	0.60	95	88
[36	0.10	0.63	99	87] *

This one moves Top down and Bot up.

Sep. flow 35 by-pass 1.5
cooling triggered filling hose

Reset Charge Integrator

Close bypass once bottom heat exchanger is 4K
open run 1.5
Close bypass and set run 0.17 and pid
put flow back to 5.0

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4/16/12 Monday

01:24 polar g2p2 crashed, hard lockup. Reset in hall. Working again.

Questions about recent position and polarizations.
Shift operators moved from crosshair to NH3-bottom and began polarizing to ~30%. DAQ and position readback agreed that they were still crosshair even though polariz read ~30% and responded to μwave.
Shut off μwave for ~10 to 15 min, reboot computer, ~~[illegible]~~ saw ~9% pol. @1K. μwaves back on; quickly back to ~30%

01:56 target move to home

02:07 target move to carbon

02:25 target move to empty-cross

02:35 target move back to bottom cell

04/17/2012

01:55 move target to home

02:05 move target to carbon

02:15 move target to empty-cross

02:25 move target to bottom cell

06:28 move target to home

06:38 move target to dummy

06:42 move target to carbon.

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bottom CC = -2.703 15 seconds ending at 915

Top CC = -3.3087

getting at ~ 1.45 K

11:20 We removed the target material and stored it in ~~[illegible]~~ dewar 1, slot 6

labeled Top and Bottom 14NH3 G2P 4/17/12

Replaced 0.04" carbon film w/ 0.125" carbon film

15:41 loaded stick w/ Gap recovered material (recovered 3/14) into top and bottom cups as per label.

We also have rotated the magnet to 6° and used Dave Meeking alignment tool and some help from the survey group we measured the field alignment. Initial numbers show that we should be able to report the ~~[illegible]~~ direction within 0.1° or less,

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I have set the hall probe for 5T

Low alarm	2.61977	kG
High alarm	2.89548	kG

For a reminder, ramp rates are

3 A/min	0 → 80 A
2 A/min	80 → 100 A
1 A/min	100 → 115 A
0.5 A/min	115 → 120 A

5T will be around 121.928 A

4/17/12 Swing Shift. TO: O. Rondon.

Target experts ramped up magnet and took baselines.

Next, we'll take TE's - Dustin Keller is doing the calibration

Bottom Target first done cc = -1.822T 1.225E-2

Top Target, we doing baseline (take at Gain 20, need Gain 1)

PDP page for input during Top TE, but still updated displays. Saved

TE data using te_getter. e-logged new TE's.

After beam tuning with target "Home" tried to center beam

on CH2 hole. It looks like there is a few mm offset,

of the inset because the beam needs to be steered down

a lot (>~5mm) to get it to center on the CH2 "Hole"

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11:30 μWaves and pumping cleared the nose, now on PID. μwave 07

TARGET IS AT 3950000 steps (between holes)

still trying to center the beam.

11:45 Amp fault in target motion.

12:30 Amp fault fixed in hall, had to jog motor past home and run home to reset encoder position

4/18/12 16:20 Increased separator flow 10 → 20

22:30 After Pol. leveled off, and started to decay, adjusted frequency up to 140608 KHz, which accelerated the decay, then reduced to ~~[illegible]~~ 140590, which improved things and then to 140570, which recovered back to −81.5%, but now there are large (± 0.3 − 0.4%) fluctuations. Reduced frequency to 140540 to see if oscillations stop.

4/19 6:20 turning of μwaves for T1 measurement, pumps off

$T_0 = 6:22$ $T_1 = 6:32$

$P_0 = -81.0\%$ $P_1 = -61.2\%$

$T_1 \approx 35.7m$

6:35 moved to C12

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4-19-12 Day shift. O. Condon

A look at t_1

$\Delta P = -13.63$ to -1.2 in 72 min.
$t_1 \sim 30$ min

Dustin is ramping down the magnet.

At 80 A, set point is not stable, changes rapidly over wide range, does not allow inputs.

Put magnet on Hold, turn heater off, persistent mode at 80 A

Dustin went to Hall, to control from there. Ramping continues.

Dustin found object sitting on downstairs computer's Keyboard, which caused the uncontrolled contents of the set point box.

11:00 Pulled insert. Unloaded top & bottom ammonia, placed back into the bottles from which they were removed, in Slot 5, dewar 2.

Rotated magnet back to 90°
We also will swap μ-waves; go back to 70 GHz.

Fill Bottom from bottle 7, slot 1, dewar 2 "NH3 1/24/12 NIST irra. 130 min"

Fill Top from bottle 4, slot 1, dewar 2 "NH3 1/23/12 NIST irra. 115 min"

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13:30 Set Witness FSD to correct values for 2.5 T

Low 1.30988
High 1.44777

15:04 Ramping magnet up

15:30 starting TE studies
looks like 60.830 is slightly to left
and ~~60.880~~ 60.9 is slightly to right

16:30 mid field location 60.859 A

points: 15 Temp ~ 1.49 K
Average cal. con. -3.508217 ± 0.0648 (-1.85%)

	I, A	T, K	Cal. const	Cup
15:45	60,859	1,491	-3,508217 ± 0,0648	TOP
16:28	60,830	1,494	-3,580132 ± 0,0483	TOP
16:48	60,900	1,494	-3,555299 ± 0,0704	TOP
17:13	60,859	1,525	-3,093341 ± 0,0676	BOT
17:42	60,830	1,526	-3,154043 ± 0,0573	BOT
18:05	60,900	1,526	-3,183850 ± 0,0849	BOT
18:27	60,882	1,254	-3,141093 ± 0,0666	BOT
19:38	60,882	1,249	-3,519091 ± 0,0576	TOP

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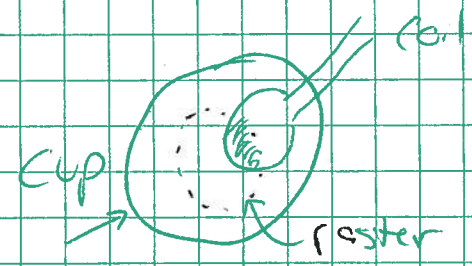
20:28	60,882	1,060	-3,482930 ± 0,0473	TOP
22:25	60,882	1,049	-3,085371 ± 0,0347	BOT
Apr 20, 2012				
15:10	60,882	1,420	-3,463260 ± 0,0348	TOP
16:00	60,882	1,481	-3,111906 ± 0,0314	BOT

22 Apr 12

0:15 New target center position offset 162404
-notes on desk indicate 1mm = 29528 steps



Pn Aoverlap

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4-24-2012 10:11 Beginning anneal - anneal position, blowers off, r-waves off heater at 30%, valves closed, bbelmboily off

	Heater	Bypass	Top (K)	Bot (K)
10:13	35%	.6	38	6
	35%	.3	25	10
10:18	35%	.3	23	23
10:26	45%	.38	49	45
10:35	49%	.40	67	70
10:42	40%	.5	68	61
10:58	43%	.64	76.1	70.4
			77	71

starting timer now 11am

11:15 about ↗ ↗ for 15min

cooling down

11:35 cold moving to Bot target

Swing 16:15 Frequency at 69982 improves Pol, but noise also back at >60%, so not clear which.*

* Actually, there is a clear correlation pattern of noise regulls and Pol, changes, see halog.

17:10 Josh Changed Set val 66 → 55 On Run Valve
" MaxPos 1.5 → 1 PID params.
" STime 30s → 60s to stabilize.

Dosting Changed " STime 60s → 30s

Moved to C12-40 found excess rate, bot input offset seems wrong (137876)
Tried earlier offset (162404) makes things worse.
Try offset 100,000, looks better
" new " $\boxed{70,000}$ OK use this as new offset.

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4-26-2012 9:30 ~~Target~~ Insert is being pulled & replaced with insert w/shorter bottom cell. "Same material is being used"

leftover material from ~~bottom~~ Bot old cell is being placed in bottle [~~Bot~~ 4-26-2012] and put in dewar [Polter 1] slot [#1]

Bottom cell nominal thickness is .511 inches

Insert in. Graphite in 10mm hole is 40mil thick

11:36 Cup Carbon is 125mil thick

Top NH3 same as previous insert

Bot NH3 " " but .511 in thick

4-28-2012 10:30 Anneal: aiming for top 85 bot 20min. trying to get warmer than the LN_2 "anneal"

currently @ 38K & 24K and liquid is out of nose

* ERROR TURNING RF OFF on PDP. Will Power cycle R&S during planned access

10:38 Top: 49K Bot 47K Bypass @ 0.3

10:47 Top: 75K Bot 67K Bypass @ .6 Heat 50%

10:55 Start Clock 87. & 81. Bypass @ .6 Heat @ 47

Steadyish @ 88K top & 82K bot

Turned heat down to 45%

Turned heat down to 42% (Run @ 0.0 Bypass 0.6)

11:15 20 Min at 88 & 84 done!

* MADE Access & reset R&S

11:40 Superfluid in the nose weeeeee

TE Result From 4-26-2012
Top: -3.020541
Bot: -3.687223

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4-30-2012 @ Pulled insert, Recovered $\boxed{\text{Top \& Bottom}}$ into $\boxed{\text{Top 4-26-2012}}$

6pm (18:00)

"Top 4-26-2012" now resides in $\boxed{\text{Dewar 1 slot 3}}$

Pulled "4-19-2012 Top" & "4-19-2012 Bot" from $\boxed{\text{Dewar 1 slot 5}}$ → placed in top & bottom cells ~~respectively~~ as labelled

~~[illegible]~~

The top was Topped off ~~[illegible]~~ with "#11 NH3 1/25/12 NIST" from Dewar #2 slot #3

150 min

Target field rotated to 6°

5T power supply attached

140GHz tube & power supply hooked up

18:40 Old insert was put in

18:45 change FSD settings to 5T

Low	2.61972 kG
High	2.79548 kG

19:07 New Baseline New Eventfile

Apr 29 Apr 30

20:20 — 02:00 TE on top cup

121.828 A 1.508 K $\boxed{-1.424592 \pm 0.00799 \text{ TOP}}$

April 30

signal centered @ 121.814 A

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May 6th, 2012

Anneal 14:45 Move to anneal

Roots Pumps off - Going to 90K for 15 mins

14:49 - Bypass - 0.1 ; Run 0.1; Heater 35%

14:53 - Bypass - 0.2; Run 0.1 ; Heater 40%

14:55 - Bypass - 0.6 → 0.4; Run 0.1; Heater 45% → 50%

15:04 - B = 0.4 , Run 0.1 ; Heater 50% still

15:06 B → 0.5 , H → 55%

15:11 B → 0.52

Start Clock 15:12 - Top @ 90K

B → 0.54 ; Heat → 51% → 48%

15:13 B → 0.6 , Heater → 42% → 45% → 50%

15:20 B → 0.65 , Heater @ 50% → 47%

15:27 Stop Move to Top

Bypass to 2, Sep to 30

16:06 - Fridge filled , Taking Baselines

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May 6th, 2012

16:21 - Start to Polarize Top

16:49 - Up to 75%, bringing beam

16:52 - up to 76.9%

16:57 up to 77%

17:20 up to 77.9% then drop down.

May 7th, 2012

20:53 - Start Anneal Procedure, Move to Anneal

Going to Bot @ 80K, 20 mins

20:56 - Heater on 35%, B → 0.2

21:01 - Heater → 40% → 50%; B → 1.0

21:10 - Sep → 30; B @ 1.0;

21:14 - H → 52 → 53

21:17 - H → 54 B → 2.0

Start Clock @ 21:28

21:49 - Done - Fill Fridge, Move to Top

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May 9 2012

Changing target material

New bottom: Bottle #10 NH_3 1/23/12 NIST irra. 150 min

New Top: Bottle #9 NH_3 1/24/12 NIST irra 125 min.

~~Remaining~~ Remaining material put in Dewar 2, slot 3

Old material returned to dewar 1, slot 5 From 4/30/12

18:00 we had some problems w/ LHe readback and OVC pressure
@ 16:00 both stopped working LHe(magnet) → 0 OVC pressure → Hi
Reboot IOC, LHe works again
Cold cathode gauge stopped working completely. We put another CC gauge right at inlet of diff. pump (port formerly used for leak detector)
OVC is now ~ 10^{-5} torr (had to bleed in some air).

May 10th, 2012

Magnet Quench ~ 00:30

Ramp in Back up ~ 3:30

@ 38 A ; 0.85 V (0 A/m) – Seeing slight bumps in magnet flow

3:59 @ 72A Ramp on 3 A/m : V= 4.79V

4:01 @ 80 A ; 1.83 V on leads
4:06 @ 85A ; 1.99 V on leads

4:16 @ 100 A , 2.35V

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May 10th, 2012

4:41 - Magnet @ 120.0A,
Move to Top

8:15 Finishing up top TE

CC Top = -1.596351 @ 1.541 K

Moved to bottom

8:43 Finished bottom TE

CC Bottom -1.862166 @ 1.548

~10:50 ish - Magnet current 0.5A low
11:30 - Magnet current found to be 0.5 A low - fixed
12:17 - Magnet current dropped by 0.5 A
12:45 - Magnet current dropped, by leaving in driven mode

14:08 - Added offset of -30,000 to target (still on C12)

14:13 - changed offset to -120,000

14:17 - Added another -30,000 → -150,000 total

15:08 - there was a brief excursion in magnet flow - see halog 383670

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15:20 Made an access to change some settings on the supply. We added Test 06 bit 2

T06 goes from 1 to 5 and I also lowered the inductance from 61.2 to 60.6.

17:40: Stop microwave, move target from Bottom to top NH_3

17:47 Beam stop, Enable Run valve Man Made = YZS, set setpt = 0.0

Nose level drop from 64.

May 12 Anneal close run

	heater	bypass	temps T	B
18:00	35	0.3	85	77
18:10	40	0.4	95	85
18:15	55	0.3	98	88
18:20	40	0.2	95	82
18:22	Heater off			

Power cycled R & S

Showing Error

(didn't read calibration input until PDP was restarted)

22:19 Make a new Event File.

5/13/12

00:20 Starting DILUTION RUNS

moving to HOME put PDP in monitor mode and turned off μ-waves

Taking 100 nA beam

Closed run-valve. made new event file

Moved to C12.40

Moved to

00:45 μ-waves back on and beginning to polarize top positive

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May 13th, 2012

T ~95, B ~86K for 25 mins

15:05 Start Anneal - H → 35, R → 0.1, ~~[illegible]~~

Waiting to go into hall to open Bypass

15:13 Run → 1.5, H → 20 ; Trying to warm a bit before access

15:16 Run → 1.5, Heater → 35

15:17 Run → 0.5, Heater → 35

R → 1, H → 25

Still waiting for access, Top @ 42K, Bot @ 35K

15:31 - In Hall Bypass → 0.5

15:33 - B → 0.3, Heater → 40, R @ 1.2

15:38 - R → 1.5, B @ 0.3, Heater @ 50

Top is about 3° colder than Bot, which is 3° colder than lowest Resistor

Flow is ~ 33

15:47 - Heater → 48 → 50

15:51 - B @ 86K, T @ 86K Start Time

11:04 - Start spreading apart - noticed temp on Sep ↑, open S

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~~Flow~~ 16:16 - Anneal Done, Going Home → Top
Did ~ 88K on Top, 86K on Bot

Position Offset is still -15000,
going to "Anneal" goes over limit, had to hit ESC, Home

During anneal, I had a hiccup due to Separator running out.
Make sure to open Sep to 30 first!

Other thing different → forgot to open pumping valves.

May 14th, 2012

10:20 - Start Anneal, going to ~85K for 30 minutes

10:26 - H → 35, B → 0.1, R → 1.5

10:31 - B → 0.2 ↓ 0.1, H @ 35, R @ 1.5

10:36 - B @ 0.1, R @ 1.5; H → 40, flow @ 26

temps tracking close together

10:46 - B → 0.15; R @ 1.5; H → 45, flow 25

10:48 - Start Time
(10:47)

temps not together. Position?

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5/15/12 5:30 magnet fill valve will not open to fill magnet space current level ~10
magnet is ramping down as a precaution

6:00 Josh, James and Jonathan went into hall and determined fill valve was torqued, problem seems fixed

6:30 ramping magnet back up to 121.819A

6:45 moved to bottom cell to see if we can still get a TE

May 16th, 2012

00:16 - Starting to Ramp up Magnet

TE result for bottom 2012-5-15. 19:35:51 ~ 19:48:30
Ave TE polarization: 0.337%
Ave Cal constant: -1.6 50683 ± 1.320872e-
Ave Temp: 1.517
points: 20

08:23 Prepping for anneal

08:37 Target motion vi not responding encoder reads zero ~~[illegible]~~
trying to get Bottom temp to 90K 20min.
At the lower limit switch

9:34 Starting @ 45% Heat run 1.5 bypass 0.1
9:43 Heater 50% Run 1.5 Bypass 0.17 T: 79 B: 77
9:48 H: 50 R: 1.5 B: 0.17 T: 91.4K B: 88K
9:56 40 R 1.5 B 0.21 T: 95 B 87K
10:14 Recovery fridge after 20min B≈90 T≈95

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Witnessed & Understood by me, Date

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23:43 - Start Anneal - trying bottom @ 90K for 25 minute
Run → 1.5, Bypass → 0.1, Heater → 35%

23:50 - Run: 1.5; Byp: 0.1; Heater → 45%; Separator → 30

23:53	Run: 1.5	Bypass: 0.3	Heater 50%	
	↓	↓	↓	
23:54	1.7	0.1	50%	
	↓			
23:59	2.0	↓	↓ 55%	
00:01	2.0	0.1	45%	-1.723367

Start Time 00:00 Top 97K
Finish Time 00:25 Bot 90K

5-17-2012

☆ TEish 12:25 Taking some perhaps unthermalized cold TE data on top while waiting for survey to finish may be useful

☆ 13:12 Turning off pumps for proper TE

14:54 closing run valve
15:10 don't think it's thermalized - closing run valve
suggest take a measurement no sooner than 16:00 - later if possibl

TE Top 15:52 10 points T=1.486K
Cal: -1.504006

not good → Move To Bot
Bot 10 points T=1.498
Cal: -1.781093

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May 18, 2012 Top Cup 20 points at 1,501 K

Cal -1,382325 ± 0,0208

8:22 - Magnet down, leads locked

11:00 Top and Bottom material removed into a single bottle

~~Bottom~~: "g2p May 18 Top & Bottom"

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$\frac{\text{ก}\ \frac{1.360}{1.780}}{16} = \frac{\text{ว}}{11:10}$

1.780 00:55

1.360 01:11

$\frac{\text{ว}}{\text{ก}} = \frac{17}{\text{ก}\ \frac{4.394}{7.265}}$

7.265 00:00

4.394 00:17

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cryo screen target sound: alsamixer

hapt Polarization

hapt VPT_3He

4He