VACUUM - 2017.11 - Activity reference

Thursday, November 09, 2017 2:40 PM

Today we moved the RGA and turbo pump back onto the system and began pumping. Below I will try to keep a record of pressure and things that we do. Use this sheet as a master reference and if further pictures or extensive notes need to be taken, create a subpage and put the link in the table below.

Date	Time (24 hr)	Action	Gauge read	Pressure [Torr]	Notes
2017.11.09	1400	Started scroll pump		760	Dry pump is going without turbo, pressure in pumping tee is steadily going down
2017.11.09	1445	Checked pressure	Gauge on scroll pump cross	6.4e-2	
	1518	Checked pressure	Gauge on scroll pump cross	4.6e-2	Going to turn on the turbo now
	1528	Spun up turbo	Gauge on scroll pump cross	1.8e-1	Turbo is fully on and valve to scroll pump is fully open. Will leave to pump and check periodically
	1541	Checked ion gauge	RGA ion gauge	1.2e-5	
2017.11.10	1202	Check pressure	Gauge on scroll cross	2.0e-2	
	1207	Check ion gauge	RGA ion gauge	1e-6	Ion gauge read 5 min after turning it on when it seemed to have settled
	1945	Check pressure	Gauge near scroll cross	1.9e-2	
	1948	Check ion gauge	RGA ion gauge	8e-7	5 min after turn on
2017.11.13	1337	Checked pressure	Gauge near scroll cross	1.5e-2	Turned on ion gauge, letting it settle now
	1420	Checked ion gauge	RGA ion gauge	1.5e-7	
	~1600	Opened bellows valve			Tom wanted to start pumping on the bellows near the source
2017.11.14	1313	Checked pressure	Gauge near scroll cross	1.4e-2	Turned on ion gauge
	1327	Checked ion gauge	RGA ion gauge	1.1e-7	Degassed ion gauge twice for 30s each, then let it settle for ~5 min
2017.11.15	1538	Checked ion gauge	RGA ion gauge	5.4e-8	Degassed ion gauge twice and let it settle. Still pumping on bellows and cross with RGA
2017.11.17	1636	Check pressure	Near scroll	1.3e-2	Turned on ion gauge
	1703	Checked ion gauge pres.	RGA ion gauge	4.3e-8	Degassed ion gauge three times and let it settle
2017.11.20	1638	Checked io gauge press	Near turbo	4e-8	Degassed once
2017.12.19	1530	Started turbo and scroll			Replaced the Sr in the nozzle and the zeeman window. Chamber was back filled with dry nitrogen preceded by an LN2 trap. Pumping now to see if pressure can get low enough to turn on the RGA
	1800	Checked Pressure	Near scroll	1.2e-2	
			Chamber ion gauge	9.7e-6	After 5 min warmup
2017.12.20	1005	Checked pressure	Near scroll	1.1e-2	
			Chamber ion gauge	8.5e-7	Degassed for 30s once, let settle for 20min
	1357	Checked pressure and turned on firerod	Chamber ion gauge	7e-7	Running 200mA through nozzle heater the nozzle thermocouple was at 166'C and the firerod thermocouple was at 168'C.
	1409	Turned off chamber ion gauge	Chamber ion gauge	5e-5	Turning on the nozzle started a lot of outgassing and the chamber ion gauge pressure was getting high so we turned it off to save the filament. Firerod is still heating up.
	1417	Reduced firerod variac			Tom was concerned about heating the nozzle too much so we backed off the firerod variac from 40% to 35%
	1702	Reading nozzle heaters			Firerod TC settled at 618'C and nozzle TC at 378'C
	1734	Check pressure	Chamber ion gauge	1e-5	
			Scroll gauge	1.1e-2	Flicking between 1.1e-2 and 1.3e-2 Leaving the nozzle heaters on overnight to bake out the nozzle
2017.12.21	1039				Fireord TC still stable at 612'C and nozzle TC at 376'C
	1100	Checked pressure	Near scroll	1e-2	Flicking between 1e-2 and 1.1e-2
			Chamber ion gauge	6.9e-7	Warmed up for about 20 min (pressure going doing consistently). Saw 6.9e-7 then degassed for 30s, pressure quickly got back into the 7.5e-7 range and is now slowly going back down
	1105	Turned on gauge	RGA ion gauge	5e-6	Initial pressure when enabling emission. Degassed twice and the pressure is dropping. Going to wait and few minutes and let the reading settle.
	1125	Checked pressure	RGA ion gauge	4.1e-7	
	1127	Turned no ion gauge	Source ion gauge	4e-6	Initial pressure, degassed twice for 30s. Letting the pressure settle now
	1145	Checked pressure	Source ion gauge	1.9e-6	
	1216	Flashing Ti Sub			Watched source ion gauge. Did 3 cycles of flashing using 35A for 1 min with 3 min period. Below are the highest and lowest pressures seen for the first three cycles.
2017.12.22	1127	Checked pressure	Chamber ion gauge	3.4e-7	Degassed 1x for 30s
	1130	Ti Sub cycling			Started Ti sub cycling and watched chamber ion gauge for pressure Did 6 cycles using 35A for 1 min with a 3 min period. Below are the highest and lowest pressures seen for these cycles

Cycle		Fil #2	Fil #3
1	High	3e-5	7e-5
1	Low	6.8e-7	6e-7
2	High	2.6e-6	4.3e-6
2	Low	6.2e-7	5.7e-7
3	High	3e-6	2e-6
3	Low	6.5e-7	4.5e-7

Cycle		Fil #2	Fil #3
1	High	8.6e-6	3e-6
1	Low	1.7e-7	1.7e-7
2	High	1.8e-6	7e-7
2	Low	1.8e-7	1.5e-7
3	High	1.7e-6	5.5e-7
3	Low	2e-7	1.6e-7
4	High	1.7e-6	6.6e-7

					4 Low 2.3e-7 1.7e-7 5 High 1.6e-6 6e-7 5 Low 2.7e-7 1.8e-7 6 High 1.6e-6 5.3e-7 6 Low 1.3e-7 1e-7
	1358	Ti sub cycling			Stopped watching the pressure on every cycle and instead switching between the 2 filaments in 20min intervals
		Checked pressure	Chamber ion gauge	4.7e-8	
	1613	Checked pressure	RGA ion gauge	1.3e-7	After 10 min settle and degassing 2x for 30s
	1616	Plugged in source ion			1x degas for 30s and let settle
	1619	Switched Ti sub filament			Turned off #3, #2 on
	1645	Checked pressure	Source ion gauge	1.1e-6	
	1700	Started heaters			Grouped heaters by similar resistances at 20% of total
	1745	Check temps			Spot checking of TC showed most about 45'C Increased variacs to ~35% values (these are the values shown in 2017.12.22 - Heater setting #1)
	1810	Checked pressure	Source ion gauge	3e-6	
	1835	Checked pressure	Chamber ion gauge	1.3e-7	
	1845	Checked pressure	RGA Ion gauge	6e-7	
	1911	RGA scans			Picture on page "RGA spectra"
2017.12.23	1342	RGA scans			Picture on page "RGA spectra"
	1444	Checked pressures	Source ion gauge	8.1e-7	
			Chamber ion gauge	2.4e-7	
			RGA ion gauge	1.9e-7	
	1515	Ti sub cycling			Started cycling between filaments in 20min intervals. Started with filament #2
	1522	Check temps			Link to thermocouple readings
2017.12.24	NA				Did not record activity on these days :/
2017.12.25	NA				Did not record activity on these days :/
2017.12.26	1110	Check temps			Link to thermocouple readings
	1211	Checked pressure	Source Ion gauge	1.9e-7	
	1305	Checked pressure	Chamber ion gauge	8.5e-8	
	1346	Checked pressure	RGA ion gauge	6.4e-8	
	1349	Ti sub cycling			Started cycling filaments for 30min intervals using 35A for 1 min with 3 min period
	1420	Ti sub cycling			#2 off, #3 on
	1453	Ti sub cycling			#3 off, #2 on Switching to 1 hour intervals
	1554	Ti sub cycling			#2 off, #3 on
	1655	Ti sub cycling			#3 off, #2 on
		Checked pressure	Chamber ion gauge	4e-7	
	1702	RGA scans			Picture on page "RGA spectra"
	1758	Ti sub cycling			#2 off, #3 on
	1836	Ti sub cycling			Stopped cycling to leave for the day
2017.12.27	0936	Checked pressure	Chamber ion gauge	8e-9	Initial reading 4.6e-8, degassed 2x for 30s then let settle for 5 min to get 8e-9. After another 5 min there was a sudden increase to 8.5e-9
	1008		Chamber ion gauge	8e-9	Pressure still increasing back up to 9.4e-9. Degassed once for 30s and let settle for 6 min before reaching 8e-9 again.
	1058	Checked pressure	RGA ion gauge	2.7e-8	Degassed for once 30s
	1135	Checked pressure	Source ion	1e-7	Degassed 2x for 30s
		Ti sub cycling			Turned on Ti sub using 35A for 1 min with 3 min period on fil #2
	1152	Check temp			Link to thermocouple readings
	1239	Ti sub cycling			#2 off, #3 on
	1346	Ti sub cycling			#3 off, #2 on
	1449	Ti sub cycling			#2 off, #3 on
	1550	Ti sub cycling			#3 off, #2 on Noticed the @2 tend to run @ 5.1V and #3 runs at ~3V. Also on the first run of #2 when cycling, the pressure readings tend to shoot up. Perhaps this indicates that #2 is dirtier than #3?
	1557	RGA Scans			Picture on page "RGA spectra"
	1648	Ti sub cycling			#2 off, #3 on
	1709	Check pressure	Source ion gauge	2.5e-7	
	1726	Check pressure	Chamber ion gauge	1.7e-7	
	1743	Ti sub cycling			Stopped cycling protocol
		Check pressure	RGA ion gauge	1.5e-7	
	1838	Check pressure	RGA ion gauge	2.3e-8	
	1852	Check pressure	Chamber ion gauge	5.6e-9	
2017.12.28	1237	Check temps			Link to thermocouple readings
	1258	Check pressure	RGA ion gauge	2.2e-8	Degass 3x for 30s. Each time I saw the pressure shoot up to ~1.5e-7 after turning off degassing protocol. The pressure reading then dropped lower than previous reading after about 2 min. Forgot to note this yesterday but I did check that we are still not being limited by back streaming from the turbo. I checked this by closing the gate valve to the system and watching the pressure on the RGA ion gauge fall quickly to about 1e-8. It looked as if the reading would keep going down slowly but I reopened the valve to allow the system to keep pumping.
	1312	Check pressure	Chamber ion gauge	5e-9	Degassed 2x for 30s
	1316	Check rpessure	Source ion gauge	8.7e-8	Degassed 2x for 30s
	1330	Ti sub cycling			Started Ti sub cycling protocol on Fil #3 using 35A for 1 min with 3 min period. Going for 1 hour intervals on each filament

	1351	RGA scans			Picture on page "RGA spectra" Saw some weird noise on the baseline that might have been due to having the Ti sub on while running the scans
	1430	Ti sub cycling			#3 off, #2 on
	1530	Ti sub cycling			#2 off, #3 on
	1630	Ti sub cycling			#3 off, #2 on
	1730	Ti sub cycling			#2 off. Stopped protocol
	1810	Check pressure	Chamber ion gauge	7.8e-9	
2017.12.29	1022	Check pressure	Chamber ion gauge	3.5e-9	After degassing 2x for 30s and let settle but then pressure went back up to 4.5e-9. I degassed once more and saw 3.5e-9 after about 5 min.
	1112	RGA scans			Picture on page "RGA spectra"
	1146	Check pressure	Source ion gauge	9e-8	Degassed 1x for 30s and pressure only came down slowly to about 8.7e-8
	1200	Check pressure	RGA ion gauge	2e-8	Degassed 2x for 30s and pressure settled after about 5 min.
		Ti sub cycling			Starting cycling protocol on fil #3 using 35A for 1 min with 3 min period and 1 hour intervals.
	1218	Check temps			Link to thermocouple readings
	1252	Increase temps			After finally getting all of my documentation squared away I was able to see that the tower heat has been consistently low. I am going to try increasing the H2 and H3 variacs to around 50V. This will be referred to as 2017.12.29 - Heater settings #2 H2 will go from 36V (30% of max) to 50V (42% of max) H3 will go from 42V (30% of max) to 50V (36% of max) • Note the different percentages are because the maxes are different between the variacs
	1303	Ti sub cycling			#3 off, #2 on
	1400				#2 off, #3 on
	1513				#3 off, #2 on
	1522	Check temps			Link to thermocouple readings
	1604	Ti sub cycling			#2 off, #3 on
	1658	RGA scans			Picture on page "RGA spectra" Wanted to check if the increased temperatures significantly increased the gas load in the chamber. There doesn't seem to be much impact except for hydrogen but the Ti sub is also cycling.
	1707	Ti Sub cycling			#3 off, #2 on
	1749	Check temps			Link to thermocouple readings
	1816	Ti sub cycling			#2 off. Stopped cycling for the evening
	1826	Check pressure	RGA ion gauge	6.8e-8	Degassed 2x 30s and let settle for 7 min Would likely have gone lower as it seemed to be steadily decreasing but degassing did not speed up the process so I moved on
	1836	Check pressure	Chamber ion gauge	3.4e-8	Degassed 2x 30s and let settle for 7 min Increase in pressure is likely due to increasing the temperature on the tower. Will need to let things pump for a little while to see if it comes back down.
2017.12.30	1852	Check temps			
	1930	Check pressure	Chamber ion gauge	5e-9	Bumping the cable changes the pressure reading. Not sure what to make of that
	1933	RGA scans			Picture on page "RGA spectra"
2017.12.31	NA				Didn't take data these days
2018.01.01	NA				Didn't take data these days
2018.01.02	0927	RGA scans			Picture on page "RGA spectra"
	0933	Check temps			Link to thermocouple readings
	0939	Check pressure	Chamber ion gauge	6.0e-9	Degassed 2x for 30s and let settle for 10 min.
	1150	Burp Ion Pump	Chamber side ion pump		Chamber side ion pump (black wire, not silver). Turned on this ion pump and the pressure jumped to ~10^-6 Torr briefly. Pump controller made some coughing or clicking noises that may have been it changing ranges. Repeated this on/off cycle two more times. By the third time it was happy at ~2*10^-7 Torr, with a slowly decreasing pressure.
	1155	Check pressure	Source ion gauge	9.4e-8	Before burping the source side ion pump
	1156	Burp ion pump	Source side large ion pump		Watching the source side ion gauge, • first burp of the source side large ion pump for about 5s. Pressure went up to 1e-5. After about 2 min ion gauge read into the mid -7's. • Burping ion pump again for about 15s pressure went up into the -6's then started to come back down. • Third burp after about 2 min for about 15s. Pressure went up into the low -6's before coming back down to 3.4e-7 after 2min • Fourth burp. Pressure went up to high -7's. Leaving ion pump on and the pressure is slowly starying to come down. Left on for about 45s.
	1202	Burp ion pump	Source side small ion pump		Watching source side ion gauge (after burping the large ion pump) • First burp - Initial attempts to turn on the ion pump were not successful. At this point we are unsure why.
	1230	Burp ion pumps			Continued burping both the lagre ion pumps on the chamber side and source side and watching the pressure on the source ion gauge. Eventually we saw that the ion pumps were not increasing the pressure substantially when they were turned on. We verified they were pumping by watching the pressure stabilize when closing of the gate valve to the turbo. Then we turned off the ion pumps and closed the valve again and saw the pressure only increase.
	1233	Ti sub cycling			Began cycling ti sub using 35A for 1 min with 3 min period. Cycled fil #2 three times and switched to fil #3 for three cycles as well. Watched pressure at the source ion gauge • Fil #2 - high 3e-7 on first cycle • Fil #3 - high: 2e-7 on first cycle Both filaments brought the pressure down to ~8e-7 after a couple cycles
	1249	Turned off all four heaters			
	1256	Check pressure	Source ion gauge	4e-8	After degassing once for 30s
	1746	RGA scans			
	1747	Check pressure	Chamber ion gauge	7.6e-10	That's not a mistake!! We're coming down folks! Pressure is going down nicely after turning off the heaters. Currently the turbo is the only thing pumping on the system. We burped the ion pumps earlier but have them off right now. -
2018.01.03	1200				Turned on ion pumps and left them on. Chamber side pump at 0.1*10^-9 0.2uA, Source side Is at 3.6*10^-9 and current of 3.6uA.
2018.01.04	1000				Tightened metal valve to 68 in lbs and turned off the tubo. Currently the chamber side is still 0.1*10^-9 Torr and 0.2uA and source side is at 2.4*10^-9 Torr at 2.4uA.

2018.02.01	1600	Filled cryo pump with LN2			Took a lifetime before filling the cryo Picture on page "2018.01.31" and saw a 12-13 second lifetime After filling the cryo pump and flashing the ti sub we took another lifetime Picture on page "2018.02.02" and extended the lifetime to about 15 s
2018.02.06	1100	Checked lifetime			Checked lifetime after letting everything equilibrate over the weekend. Also took some loading curves to see how things are doing for 88. Picture on page "2018.02.05 - Characterizing 88 trapping" Still see a ruoghly 15s lifetime Pressure on the ion pumps is still good chamber one is bottomed out at 0.2uA and 0.1e-9. The source ion pump is varying a bit but usually around 7e-9 but I've seen it go up to 2e-8