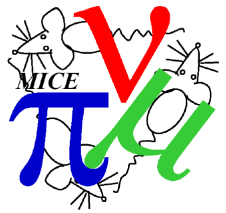
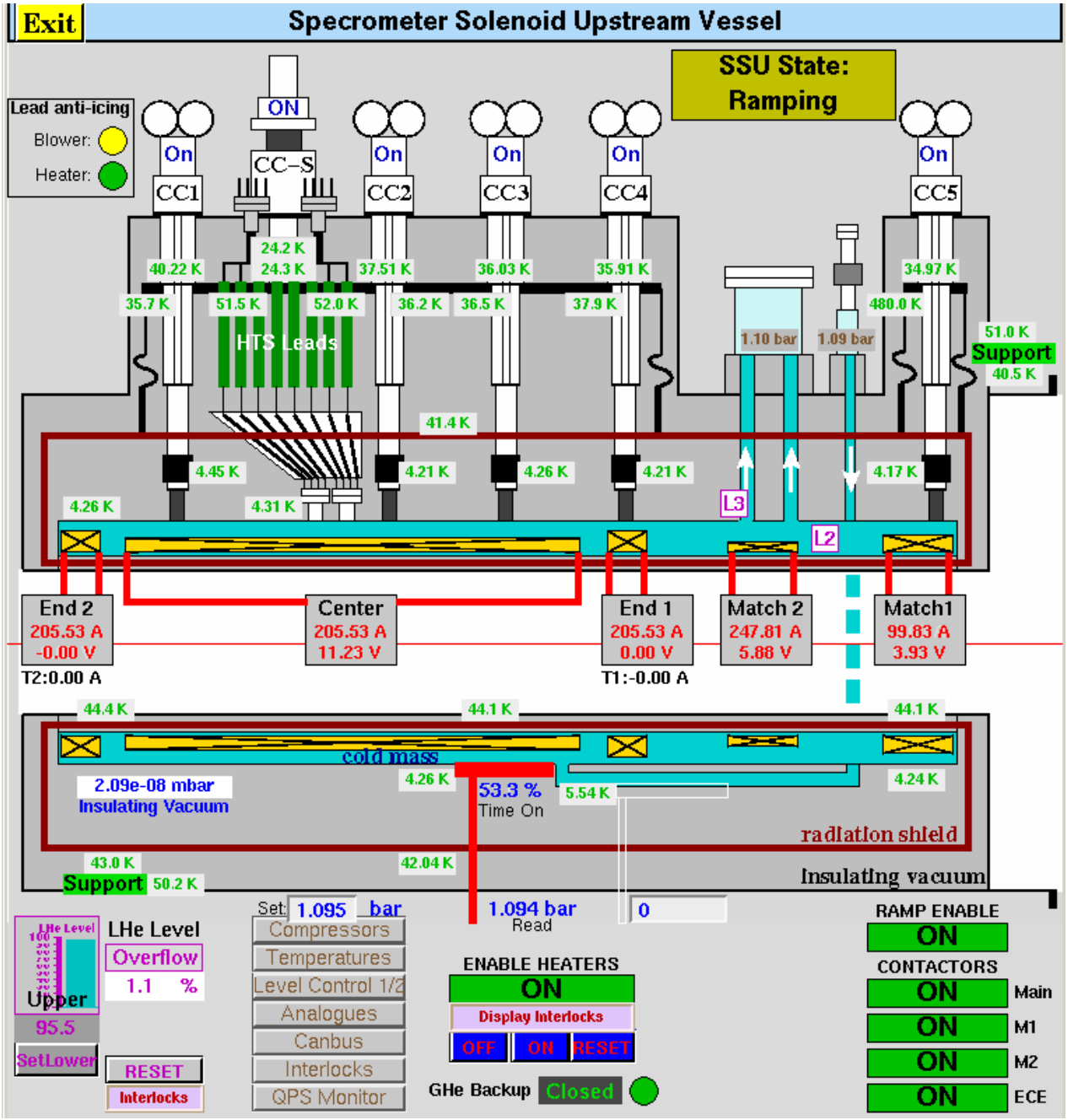
State of the superconducting magnets, October 2016

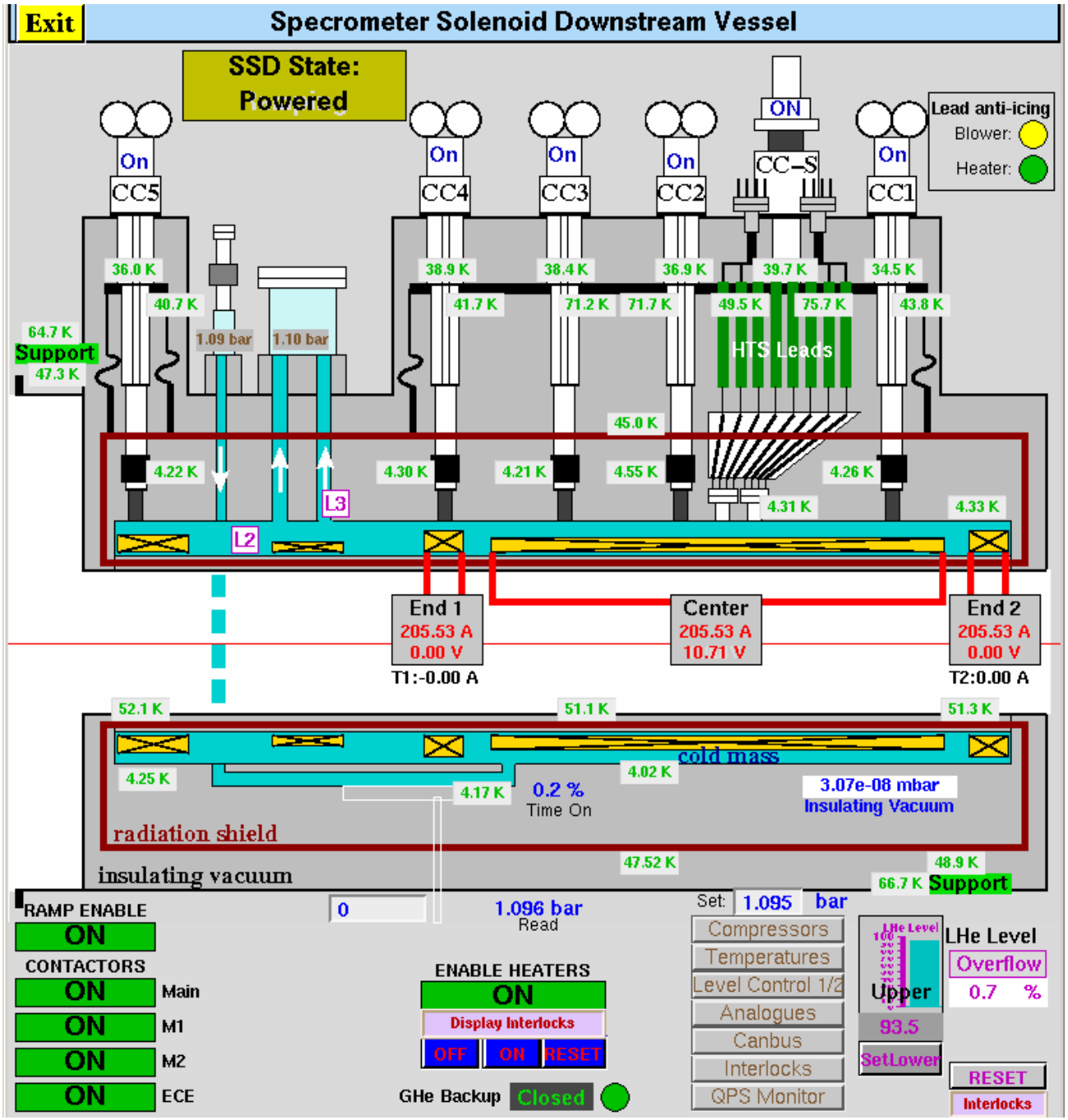
J Boehm





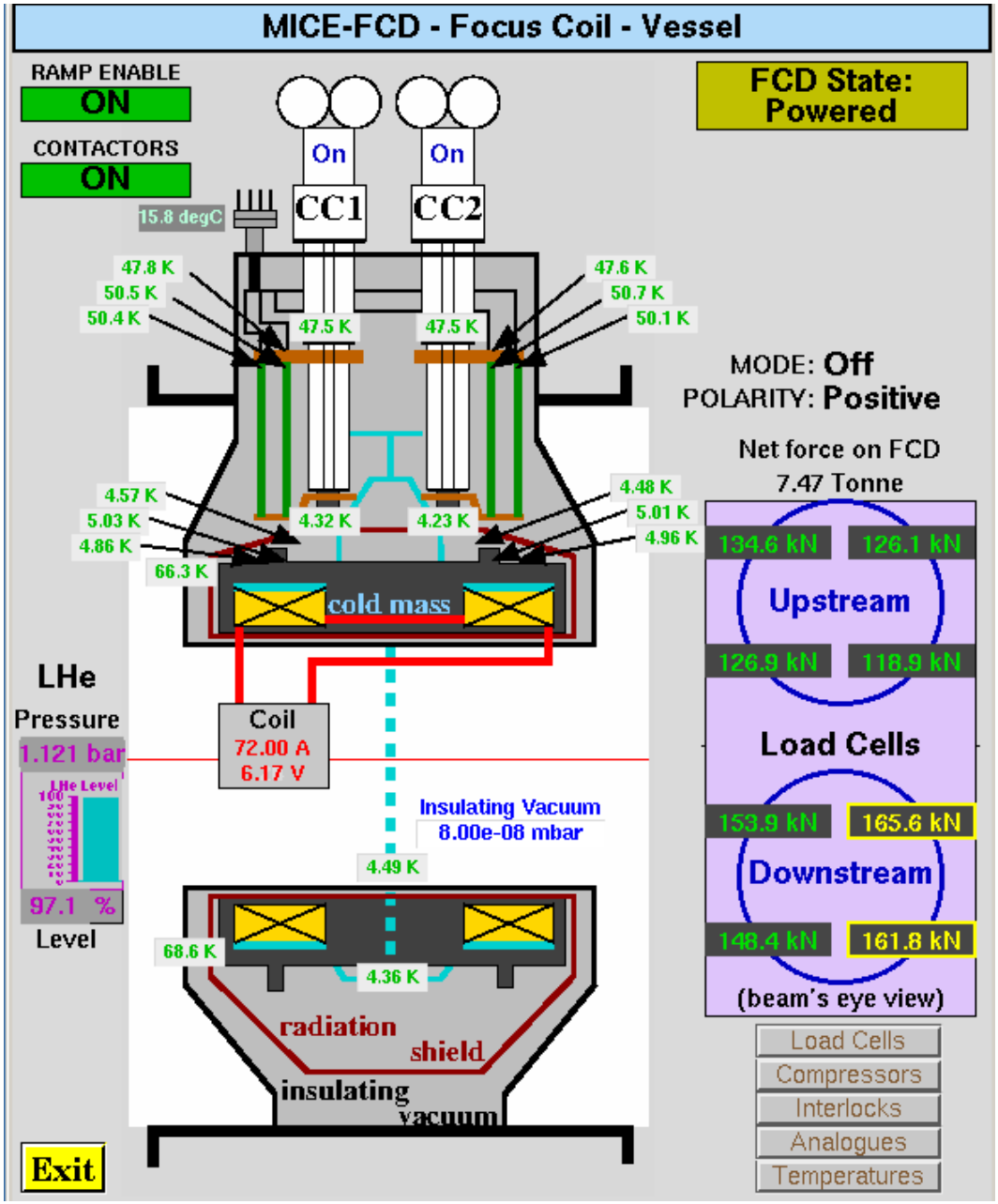
SSU

- Very good cryogenic overhead
- Trim coils (PSU) lost control during recent soak test



SSD

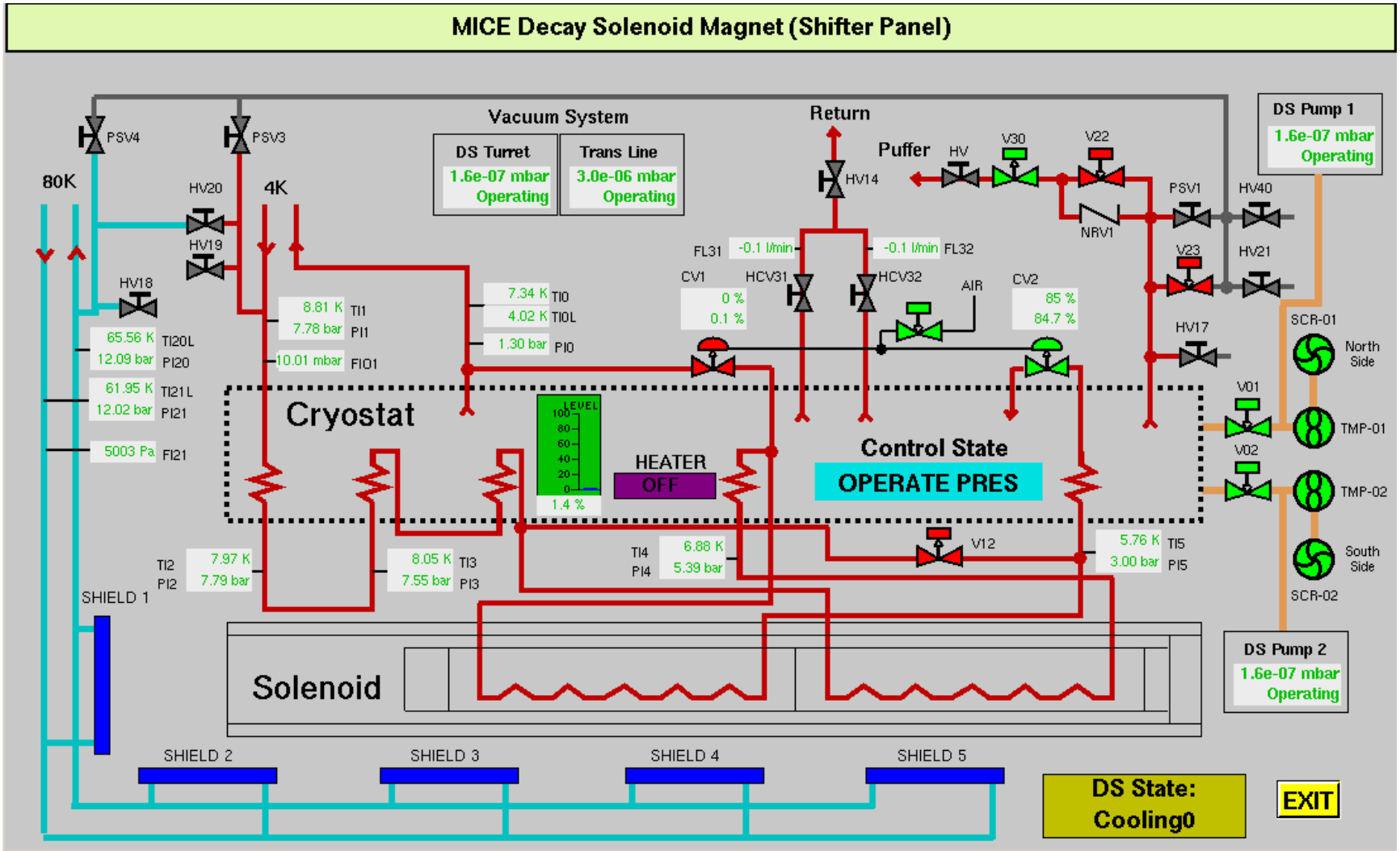
- Cryogenic performance borderline
- keeps pressure at 3T, only just
- Needs fine tuning with water and ambient temperature



FC (D)

- only location to show interaction force (now displayed)
- cryogenically stable at 1125mbar with small headroom
- cooling water issues
- hydrogen system tested off-line on FCU in R9

Decay Solenoid



Seals on bearing of compressor exchanged, no more leak, now condensing

48h soak test for three magnets, SSD, FC, SSU

Start Thursday 22nd Sept, 22:00, ramped to 3T setting 6.1.4

Setting	E2	CC	E1	M2	M1	FC	M2	E1	CC	E2
6.1.1	183.00	206.04	184.02	172.11	99.78	40.61	0.00	208.56	207.11	181.04
6.1.2	183.02	206.00	184.29	166.35	101.91	49.10	0.00	208.23	207.05	181.10
6.1.3	183.14	205.91	183.07	173.04	101.58	59.74	0.00	207.82	206.98	181.19
6.1.4	183.82	205.53	173.66	247.81	99.83	72.00	0.00	205.6	205.6	205.6

SSU (T1 @ -31.87A, T2 @ -21.71A)

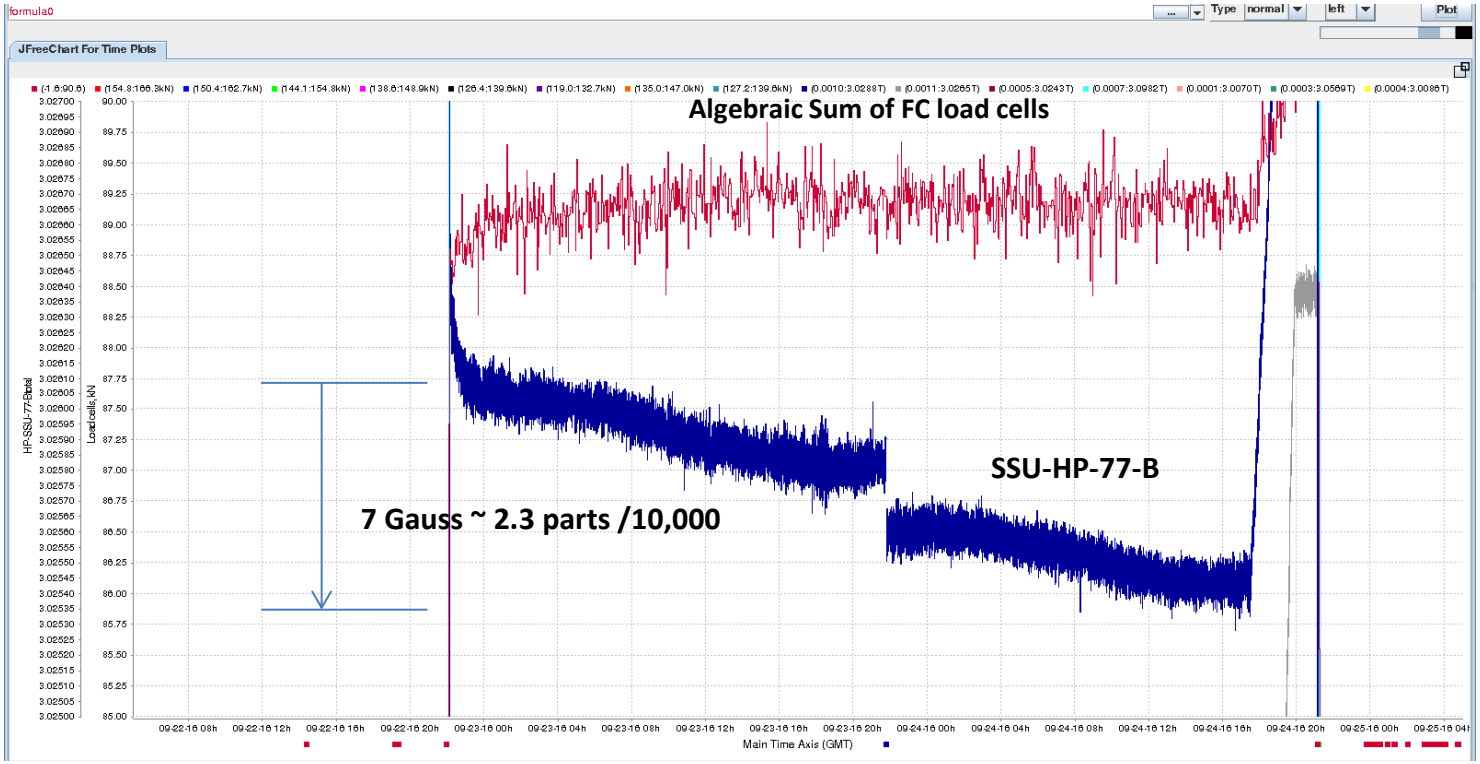
FC (solenoid)

SSD (no trim coils)

Observations:

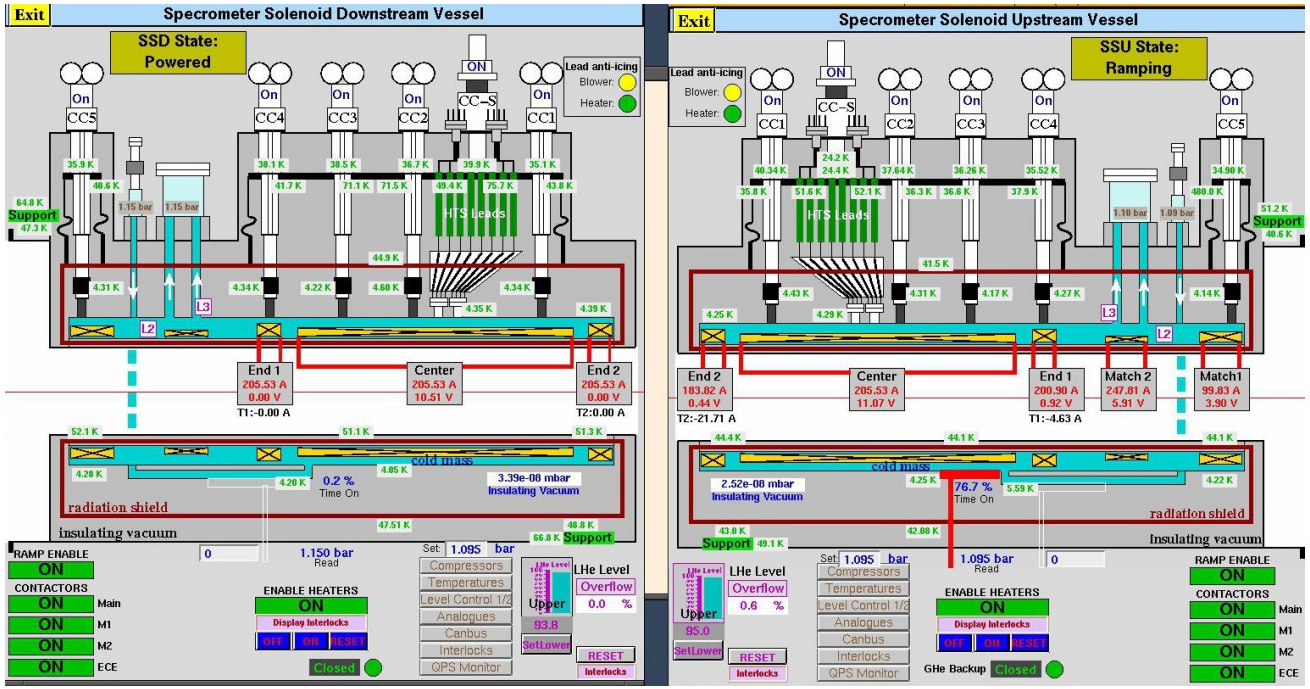
- Force between SSU and FC ~ 9t
- This force was slowly increasing, but only by 0.7%
- Cryogenic performance of SSU very healthy, condensing and keeping pressure
- Cryogenic performance of FC very healthy, condensing and keeping pressure
- Cryogenic performance of SSD was borderline, the pressure increased very slowly and the heater percentage was zero. PS: CC2 and CC5 have been increased in pressure today, Tuesday, from 310 to 340psi.

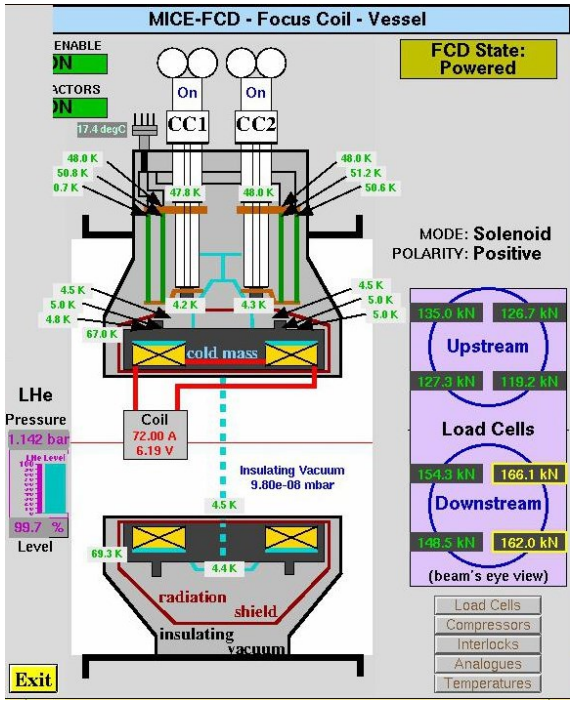
Instabilities, mechanical and magnetic



Force appears to increase by ~ 0.6 / 89 = 0.7%
Consistent with *decrease* in SSU – FC coil distance of ~0.6 mm
But rather slow (a few hours) – may be other mundane explanations (John Cobb)
Jumps in magnetic field values (on all Hall probes)

State of magnets Saturday evening(end of soak test), before ramp-down





Cryogenics: good, but slow increase of P in SSD, forces stable

- Reason for ramp-down: T1 in SSU had decreased from -31.87A to -4.63A, with associated increase in force and field from E1
- Cause for this current change un-known
- Would it have stopped at zero or would it have risen to positive values?
- Can we operate without the trim PSU's?

Immediate steps to plan for

- **Fix water issue: turning on the conventional magnets increases the temperature for the cooling water to the compressors**
- **Improve cooling performance of the cold heads in SSD (contamination of vacuum space, contamination of re-condensors in helium space, contamination of exchange gas in cold-head / compressor circuit)**
- **Arrest the relative movement between OVCs and PRY**
- **Remove uncertainty about control software being able to change state without warning and without operator signal**