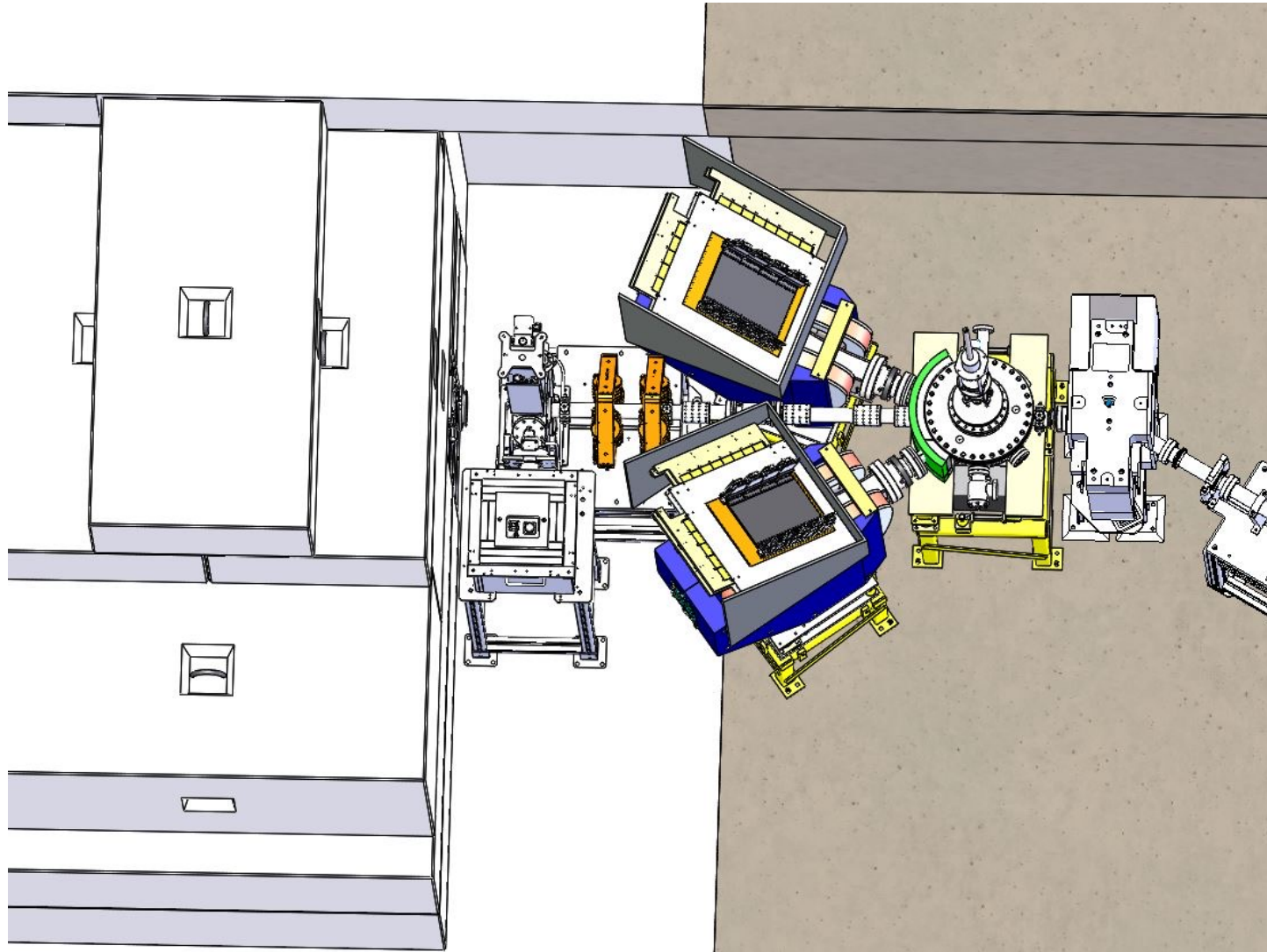

DarkLight at ARIEL

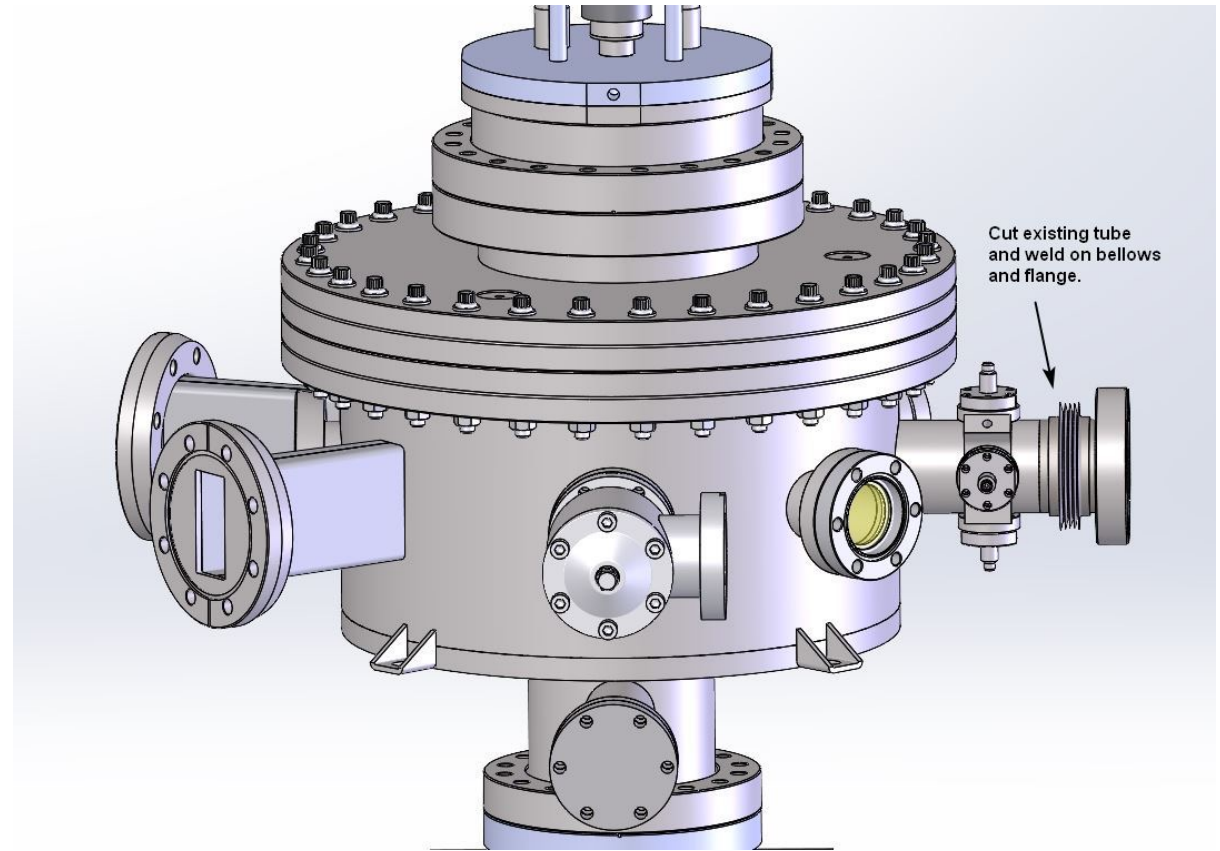
Update July 2024

Latest Experiment layout

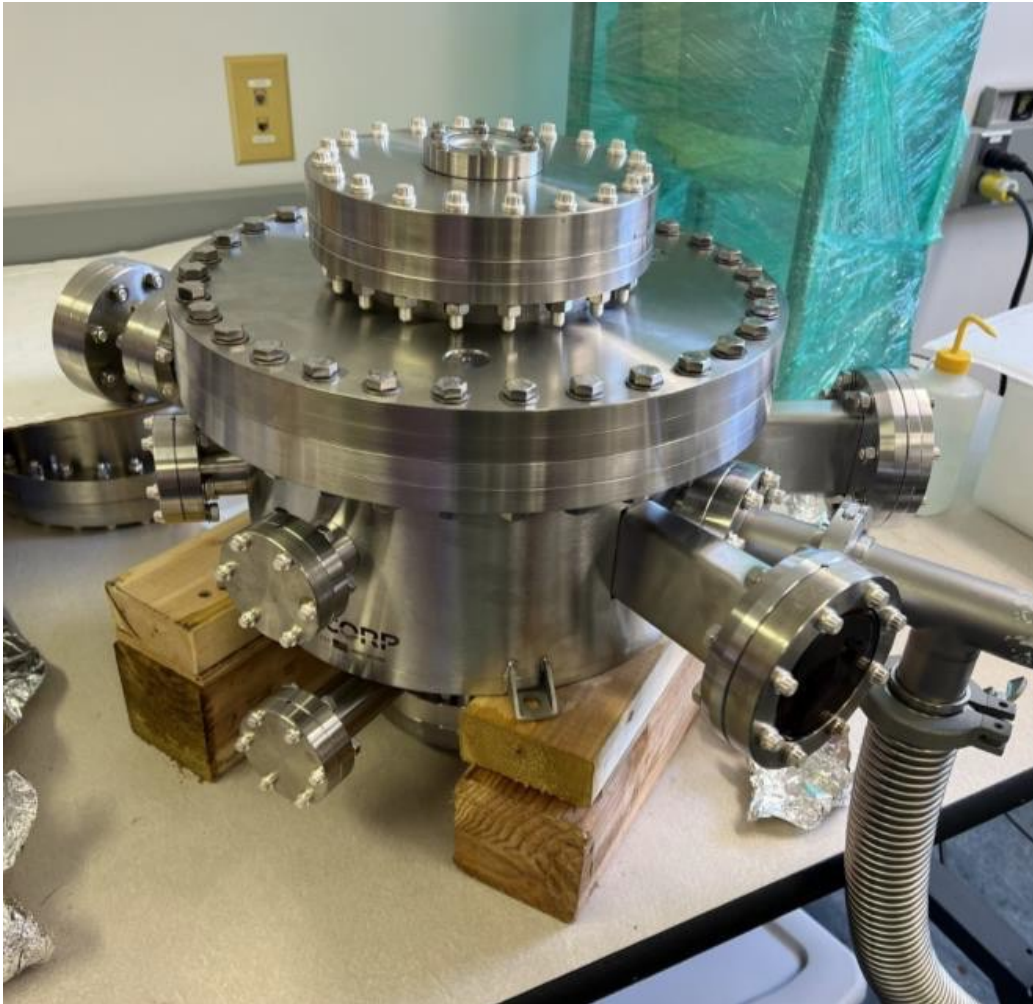


DarkLight Scattering Chamber

- Adding bellows to inlet tube to chamber.
- Bellows has been ordered and machine shop is ready to modify chamber.



Scattering Chamber



Scattering chamber delivered and leak checked.

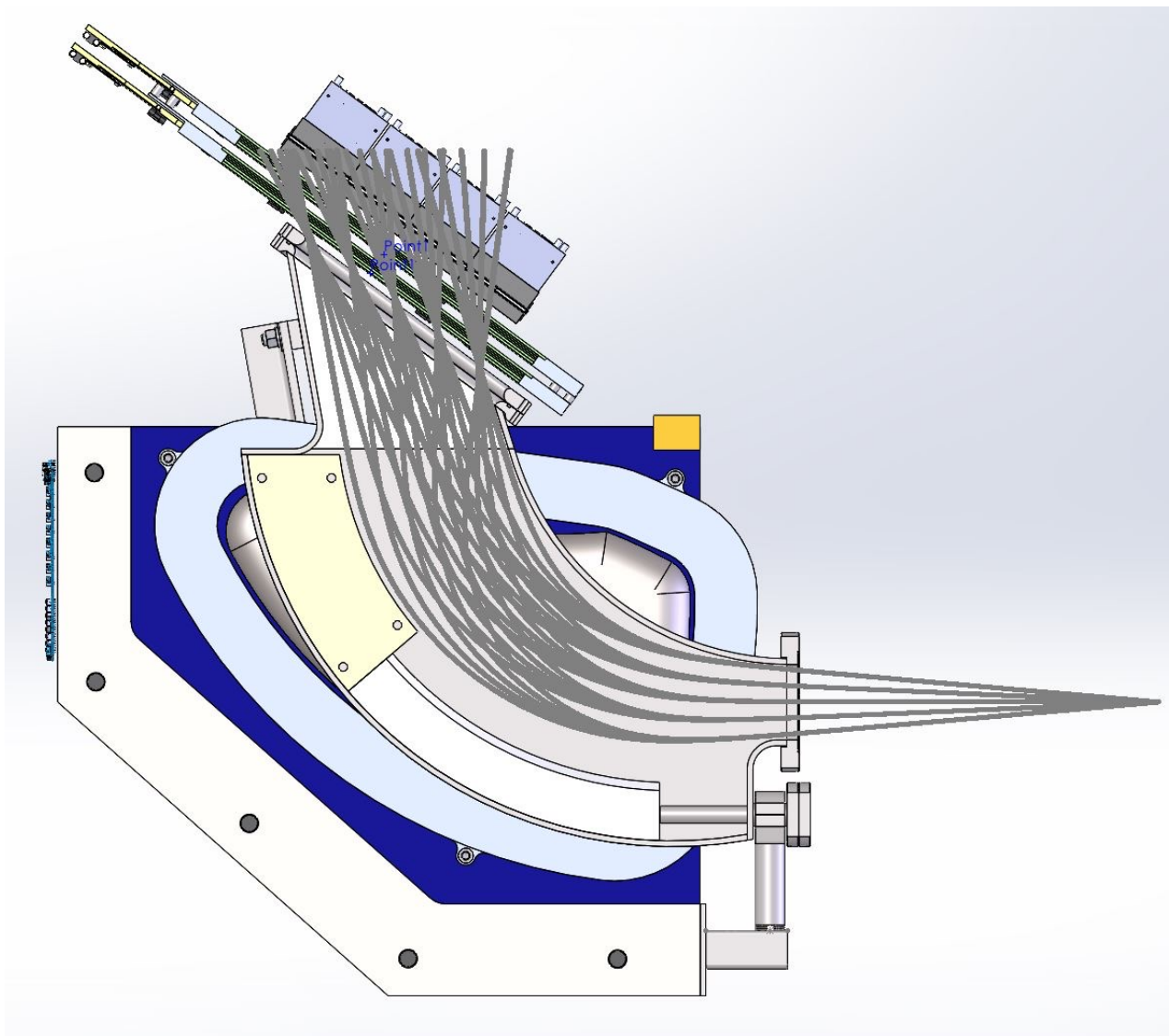
Dipole Magnets

- Dipole Magnets are finished. We are currently working on getting them shipped to Bates.



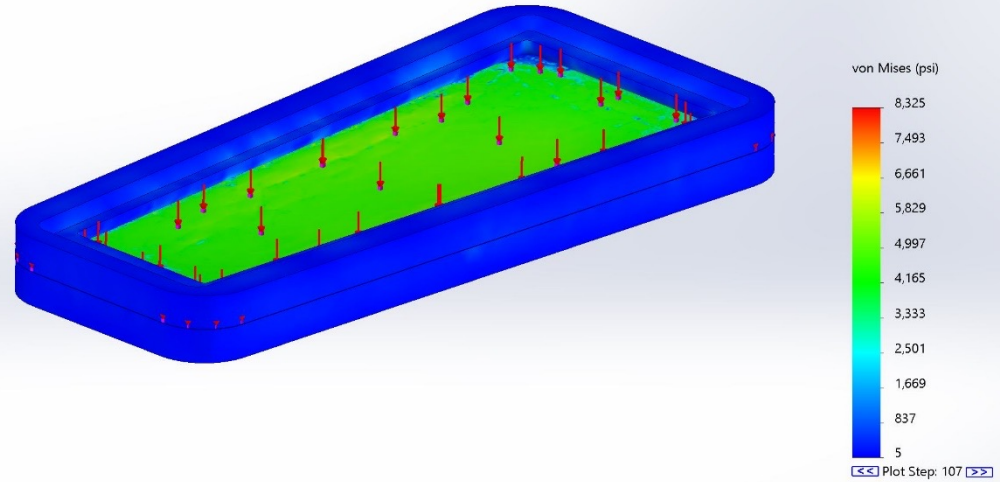
Section View of Electron arm w/ latest PEEK design

Modified
PEEK
shielding
design for
electron arm

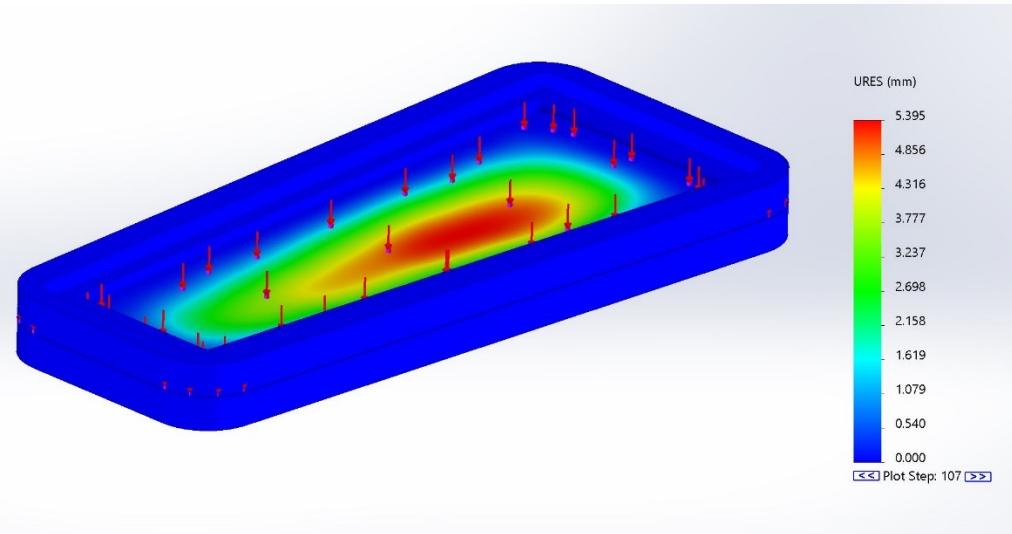


Thin window FEA analysis

Stress levels above yield (expected) but below ultimate strength of material.



The analysis shows approx. 5.4mm of displacement.



Spectrometer Window Testing

- Testing on windows was carried out by hydro-testing.
- Actual deflections were less than FEA results.
- Testing demonstrated a safety factor of 4 before failure.
- Will show video of a window test.

Time min	Pressure psi	Deflection mm	Notes
Alluminum #1			
0	10	2.56	
3	16	3.43	
6	20	3.86	
11	25	4.45	
16	30	4.94	
21	35	5.54	
26	40+	6.14	
130	40	6.15	
200	50	7.8	
	60	9.68	
	~70	12.32	failed just befor 70
Alluminum #2			
0	10	2.38	
3	16	3.37	
6	20	3.74	
11	25	4.17	
16	30	4.74	
38	30	4.76	
78	30	4.76	
113	40	5.81	
178	39	5.84	
248	39	5.86	
278	39	5.87	
	50	7.37	
288	47.5	7.43	
	60	8.99	
293	58	9	
	64	11.61	fail

Summary

- Upcoming steps for DarkLight effort includes:
 - Modifying scattering chamber inlet port for bellows addition.
 - Leak check of scattering chamber after modifications for bellows.
 - Fabricate stands for scattering chamber and dipole arms.
 - Modify magnets upon arrival.
 - Leak check dipole chamber upon its arrival.
 - Order all remaining hardware (mostly bolts, nuts, and gaskets)
 - Assemble complete system, leak check, and survey.