

LAr R&D Progress Updates

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2/25/25



Lab Safety and Space Management

▶ **EI Inspector JPM**

- I have been added to the EI inspector list
- Ready to conduct inspection on equipment

▶ **LN2 bulk order**

- LN2 level is pretty low in the 6000-gallon tank
- Lost communication to my contact in Airgas until last week
- Finally get into contact with the new contact
- Ordering a refill for ~5000 gallon

▶ **Bldg 510 power outage**

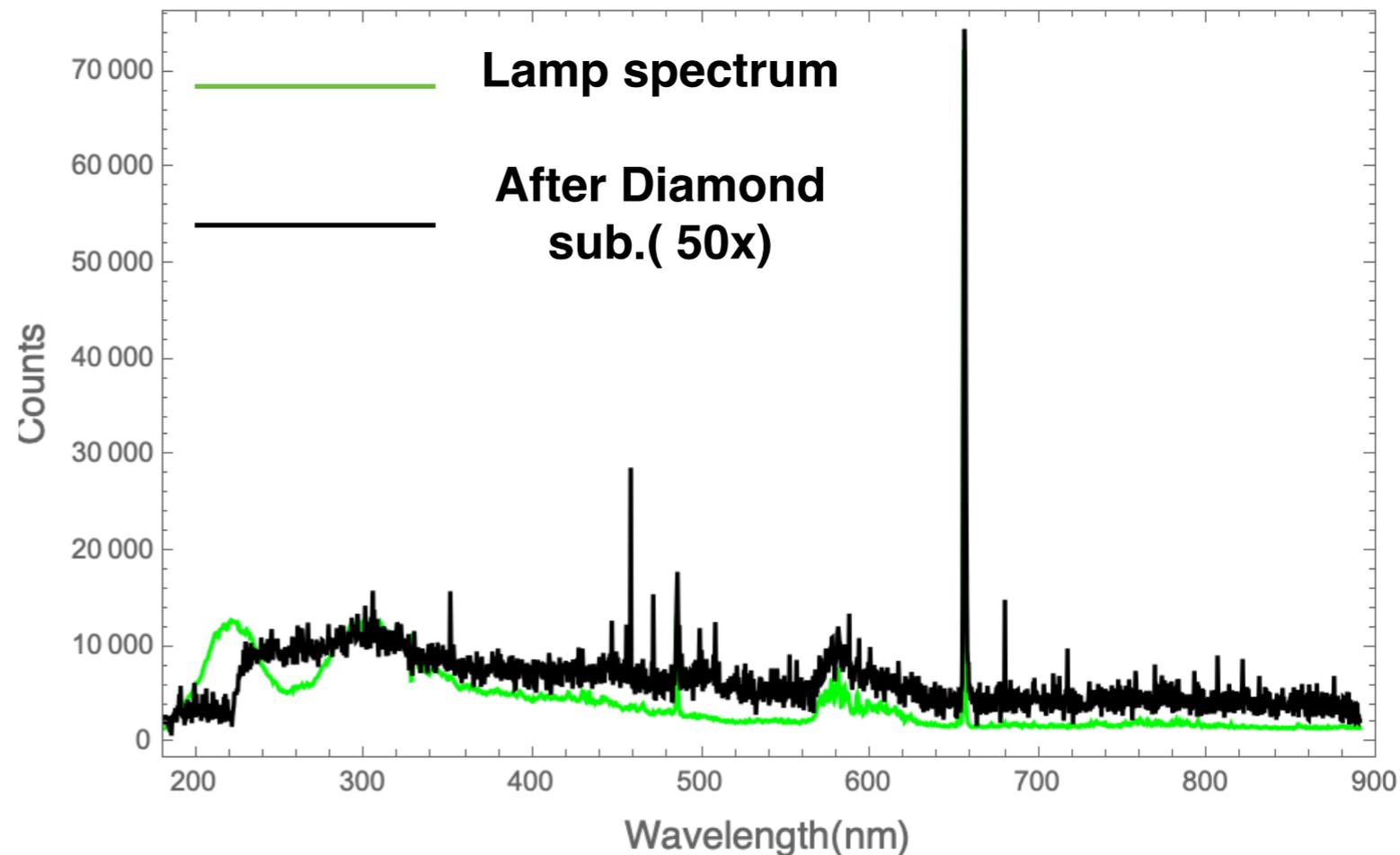
- Achim just mentioned to me there are long term power outage expected this year for power outage in Bldg 510
- A few short outages planned, a major one that may last for 5 days
- We are expecting 1 month notice ahead of the outage



Diamond Substrate Emission Measurement Preliminary

▶ **Diamond emission measurement(From last week)**

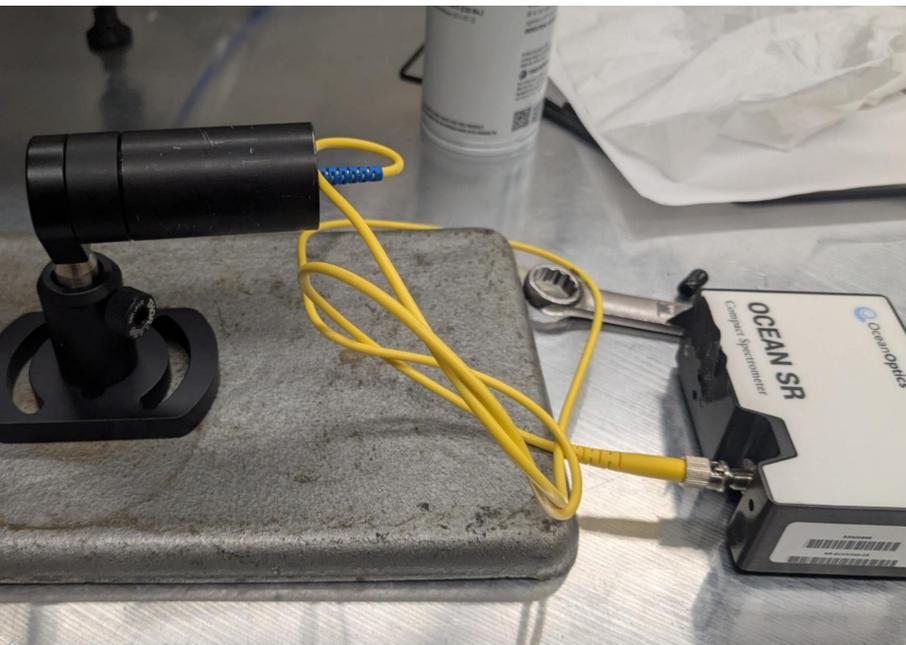
- Adjust the spectrometer positioning at the maximum amplitude
- Set up the diamond substrate in front of the wavelength detector
- First tried to illuminate the diamond substrate with full spectrum and observed slight different spectrum with low amplitude
- Tried selection wavelength, but **can't observe any signal yet**



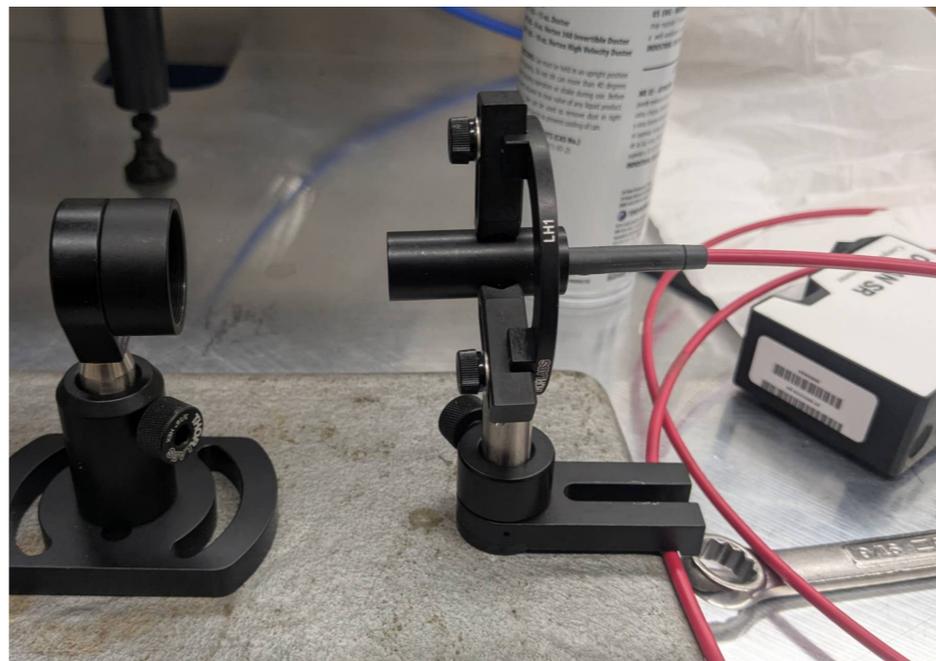
Diamond Substrate Emission Measurement Preliminary

► Increase the light input to the spectrometer

- Instead of free coupling, need to feed the light to spectrometer with fibers
- Received some collimators from Aleksey
- They have some issues in terms of connectivity and wavelength range and etc.
 - No improvement on the signal observed yet
- The substrate is 1" inch, ideally to have a 1" UV collimator with UV fiber
- Thomas has a 1" UV collimator but can't find it yet, a 1/4" UV collimator received
- Bob just provided a UV fiber to work with the UV collimator
 - Will make more attempts with the diamond substrate spectrum measurement



ST connector, not SMA



Fiber is not UV



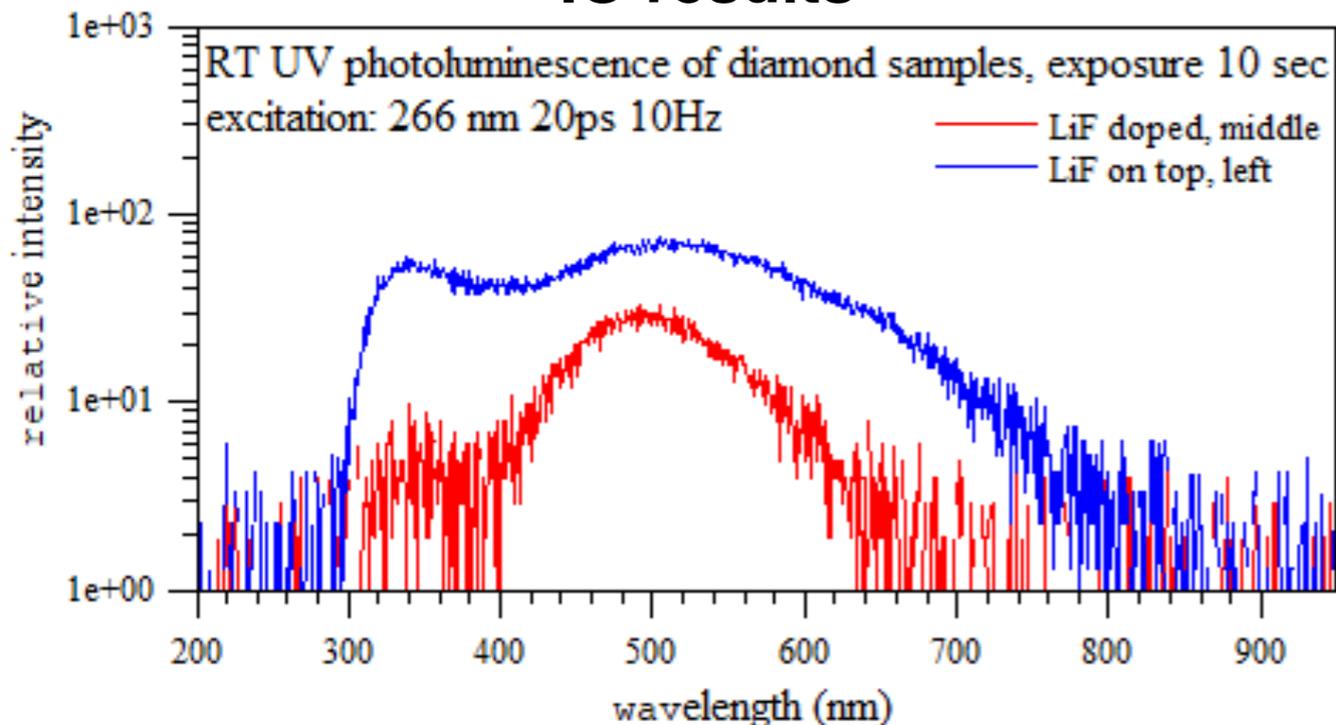
UV collimator

Diamond Substrate Emission Measurement Preliminary

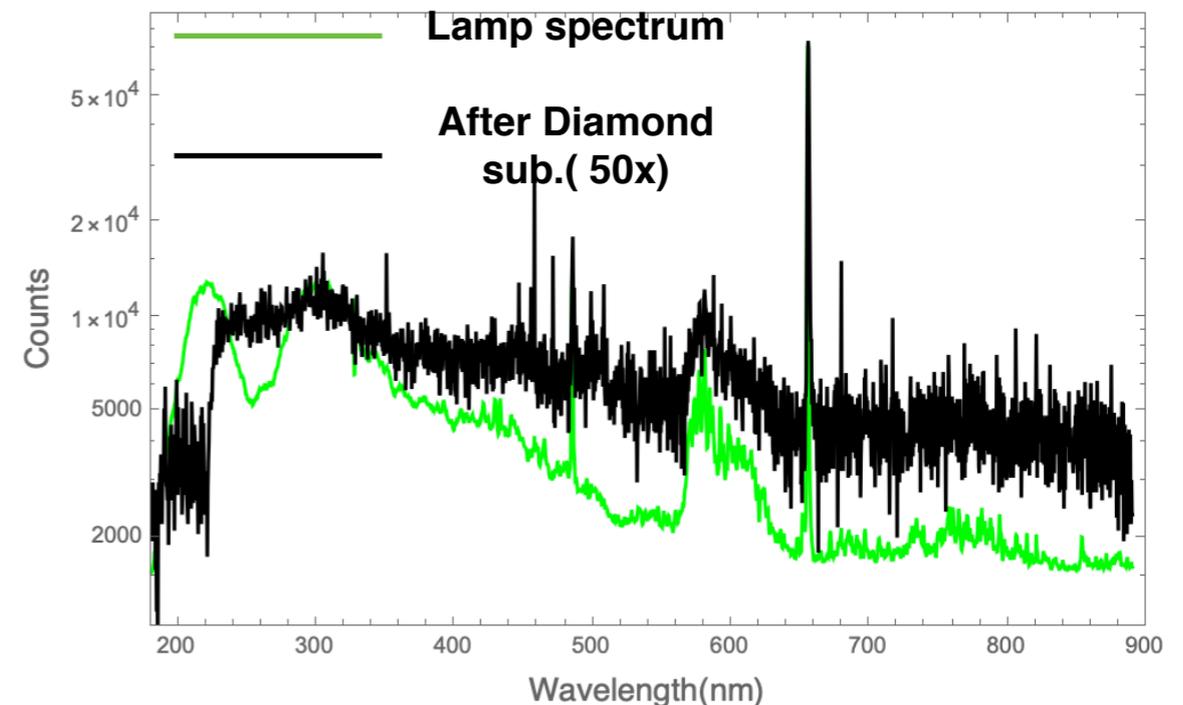
► Results comparison

- Thomas provides some results measured with the diamond samples from Aleksey last year
- With 266nm laser excitation, the emission has a band from 300-800nm
- The feature was not observed in my results yet, need to increase the light intensity into the spectrometer

IO results



My results



Plan for the spectrometer FY25

▶ **Goals**

- Utilization of the current optical chamber to conduct measurement in Vacuum and GAr phase with the spectrometer
- Design of the cryogenic test chamber

▶ **Current Status**

- Spectrometer is basically working some remaining issues
- Filters are expected soon from our collaborator
- We have an existing test chamber from the original spectrometer
- Calibrated PMTs with electronics in place

▶ **Missing pieces**

- Mechanical drawing of the test chamber
- Design of the mechanics inside the test chamber
- Adapter tube between the collimator and the test chamber
- Modification to the test chamber

Plan for the spectrometer FY25

► Goals

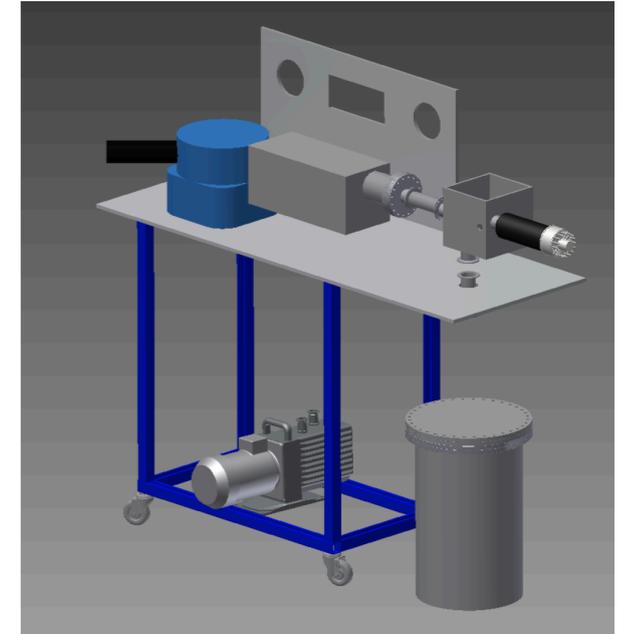
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► Missing pieces

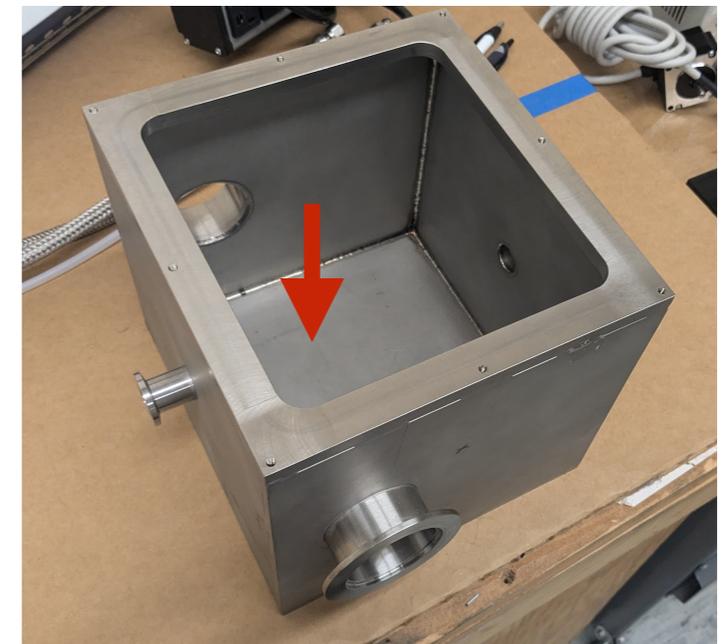
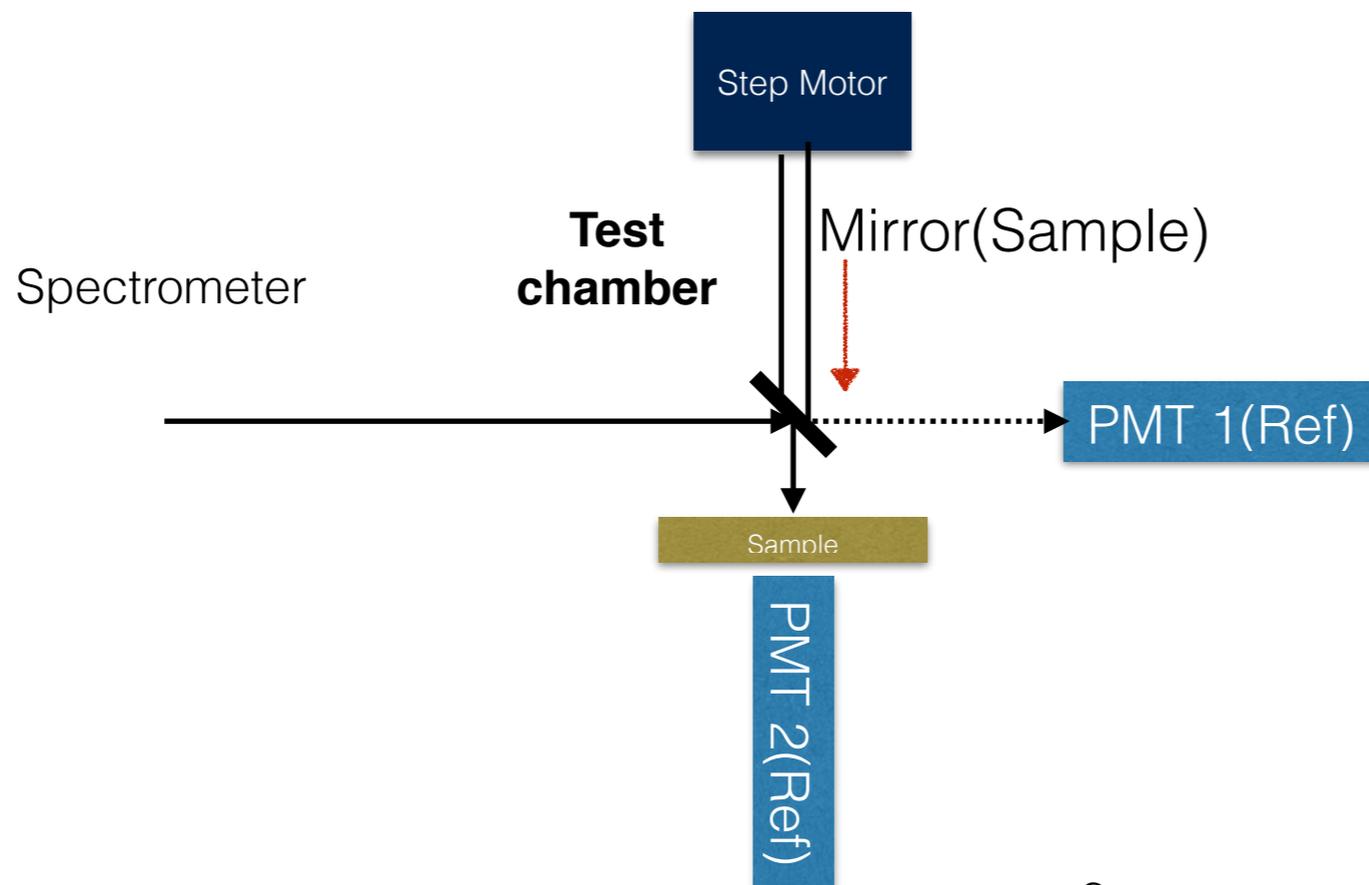
- Mechanical drawing of the test chamber
- Design of the mechanics inside the test chamber
- Mechanical parts for the test chamber
- Adapter tube between the collimator and the test chamber
- Modification to the test chamber



Plan for the spectrometer FY25

► Measurement scheme

- Setup 2x ref PMTs with the test chamber
- PMTs running on non-gain mode with low bias voltage
- Establish the baseline measurement without the sample
- Putting the sample in front of one ref PMT



Plan for the spectrometer FY25

▶ **Time line estimation starting from March 1st**

- **Mechanical Design 03/01-04/15**
 - Precise measurement to the test chamber dimensions
 - Development of CAD model for the test chamber
 - Mechanical drawing for the additional portal
 - Design of apparatus inside the test chamber
 - Produce the drawings for the review of our engineers
- **Machining on the test chamber and parts 04/15-05/15**
 - Need to go through the PO process or Work Order
- **Design of the Cryogenic Test chamber 04/15-05/15**
 - In parallel with the machining
- **Assembly of the apparatus and troubleshooting 05/15-06/15**
- **Measurement in Vac. And GAr 06/15-07/15**
- **With contingency for potential delays and safety review, it should be achievable by the end of this FY**
- **Will refine the timeline after further discussion with colleagues**

Discussion with Jianming about Purifier

- ▶ I had a discussion with Jianming about the good purity performance achieved in their system
 - The trick is to increase the scrubber materials
 - They simply loaded the purifier with 8x more copper getter in the total of 7.3 kg, while we only have about 800 kg of copper
 - It is actually connected a 3 inch tube on top of a cylinder of our size
 - The activation took about a week with 6x bottle of H₂+Ar mixture with non-continuous operation
 - We could adapt this experience with increase on our purifier size
 - Had a discussion with Zepeng who is at U. Hawaii now with potential collaboration



Cu Vessel 2

Copper
(6524 g)

Cu Vessel 1

Copper
(816 g)

Molecule
Sieve
(336 g)

Molecular Sieve Vessel

