LAr R&D Progress Updates

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3/4/25

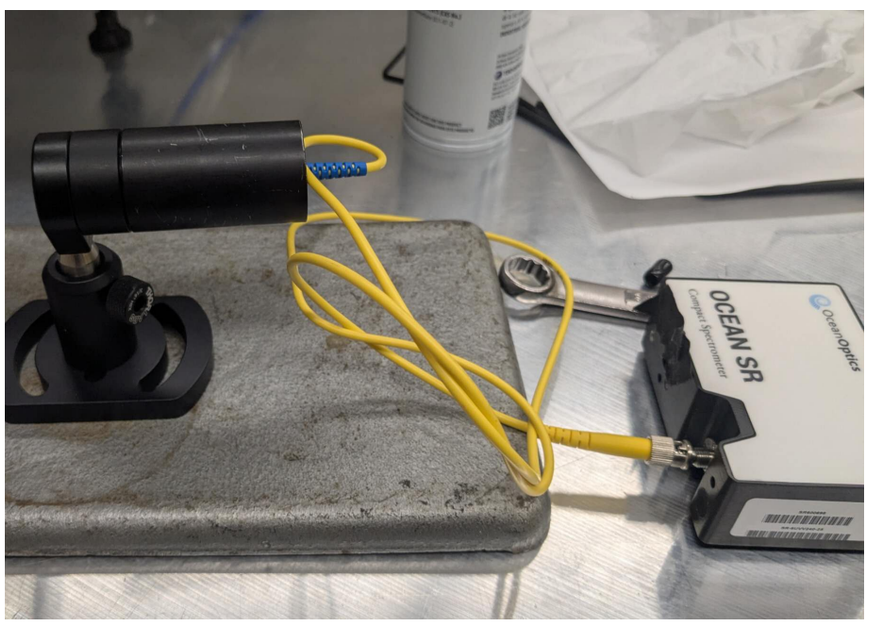
BROOKHAVEN
NATIONAL LABORATORY

Lab Safety and Space Management

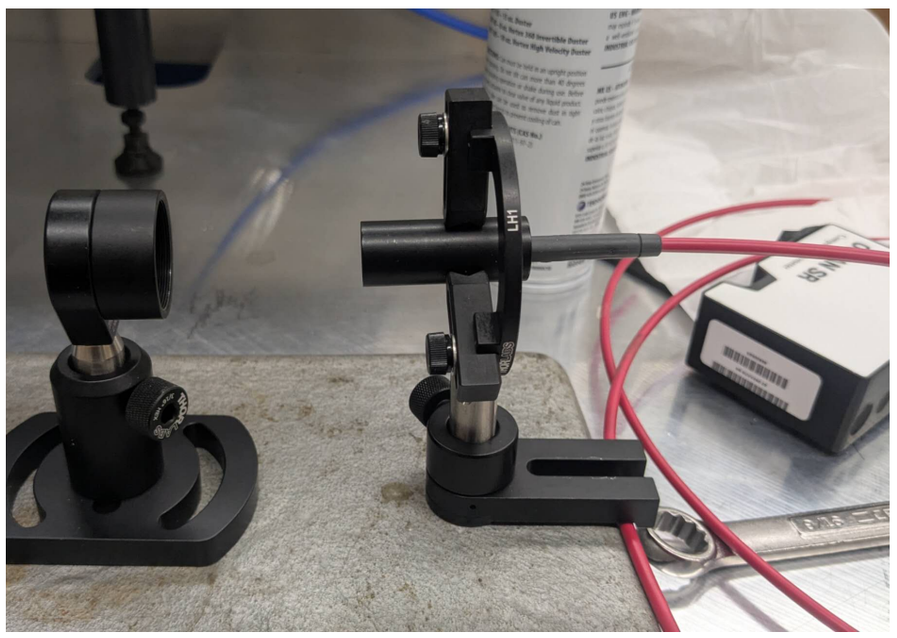
- **LN2 bulk order**
  - 5000 gallon LN2 delivered last Friday
  - Early delivery before 7am from CT
- **Bldg 510 power outage**
  - Impact for multiple building
  - I have requested for 1-month notification in advance
  - Short 1 day shutdown is planned during the summer
  - 5 day long term shutdown still expected later this year
- **HighBay AC work**
  - Still in progress with power panel on LOTO
  - Robotic testing stand is not running at this moment
  - Air handler replacement expected tomorrow.
  - A brand new unit will be installed

Diamond Substrate Emission Measurement Preliminary

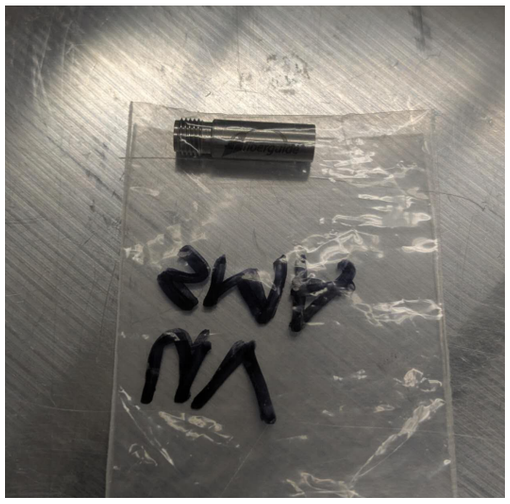
- **Increase the light input to the spectrometer**
  - Instead of free coupling, need to feed the light to spectrometer with fibers
  - Received some collimators from Aleksey
  - They have some issues in terms of connectivity and wavelength range and etc.
    - No improvement on the signal observed yet
  - 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



1 inch collimator



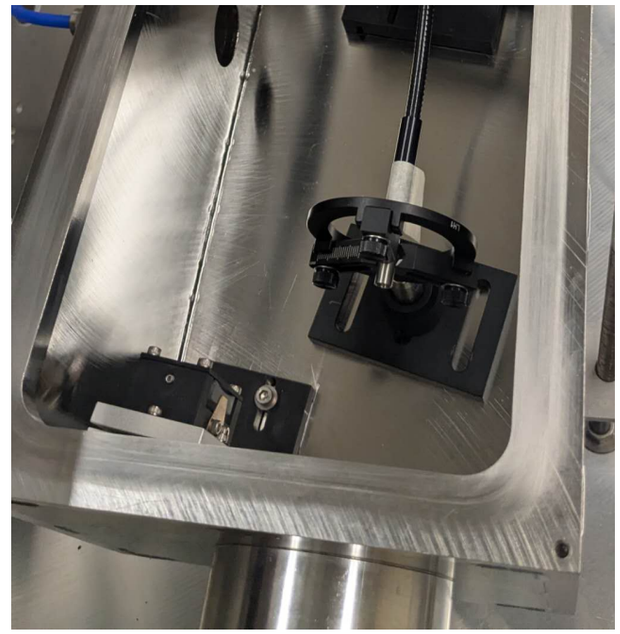
1/4 collimator

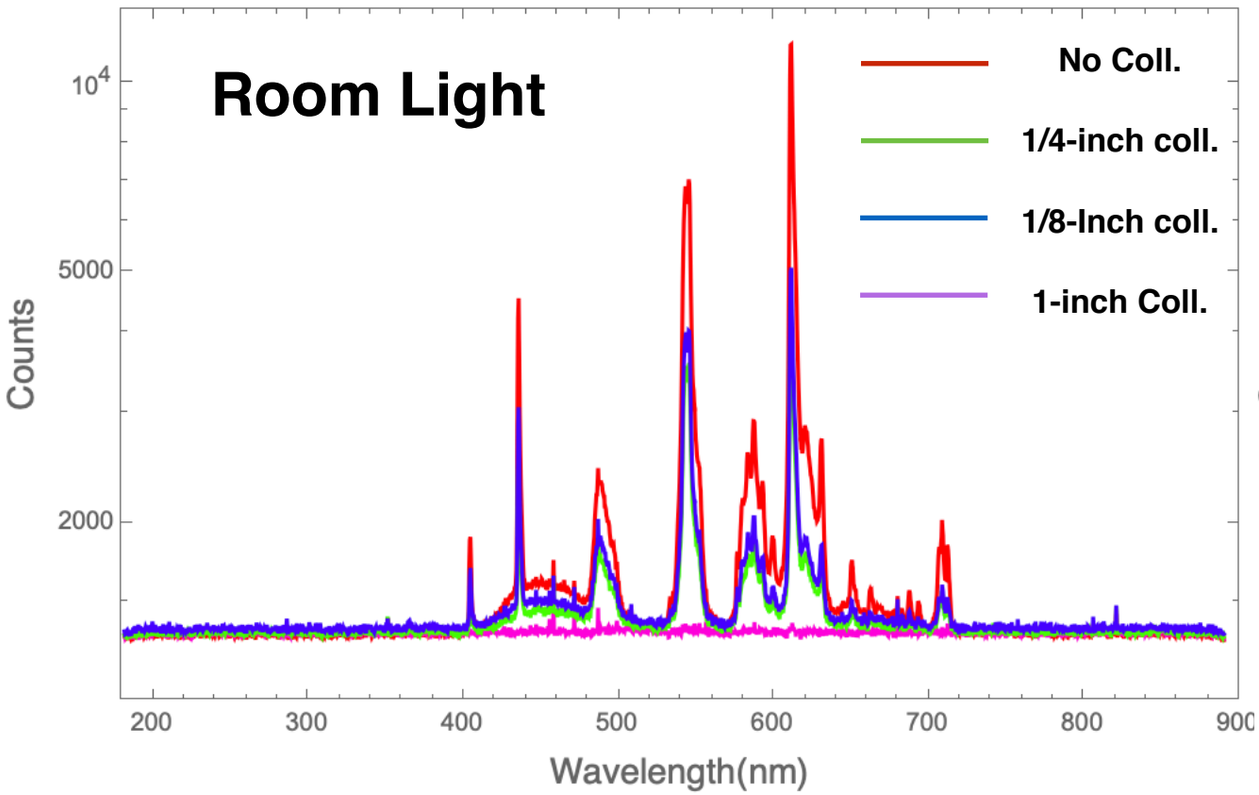


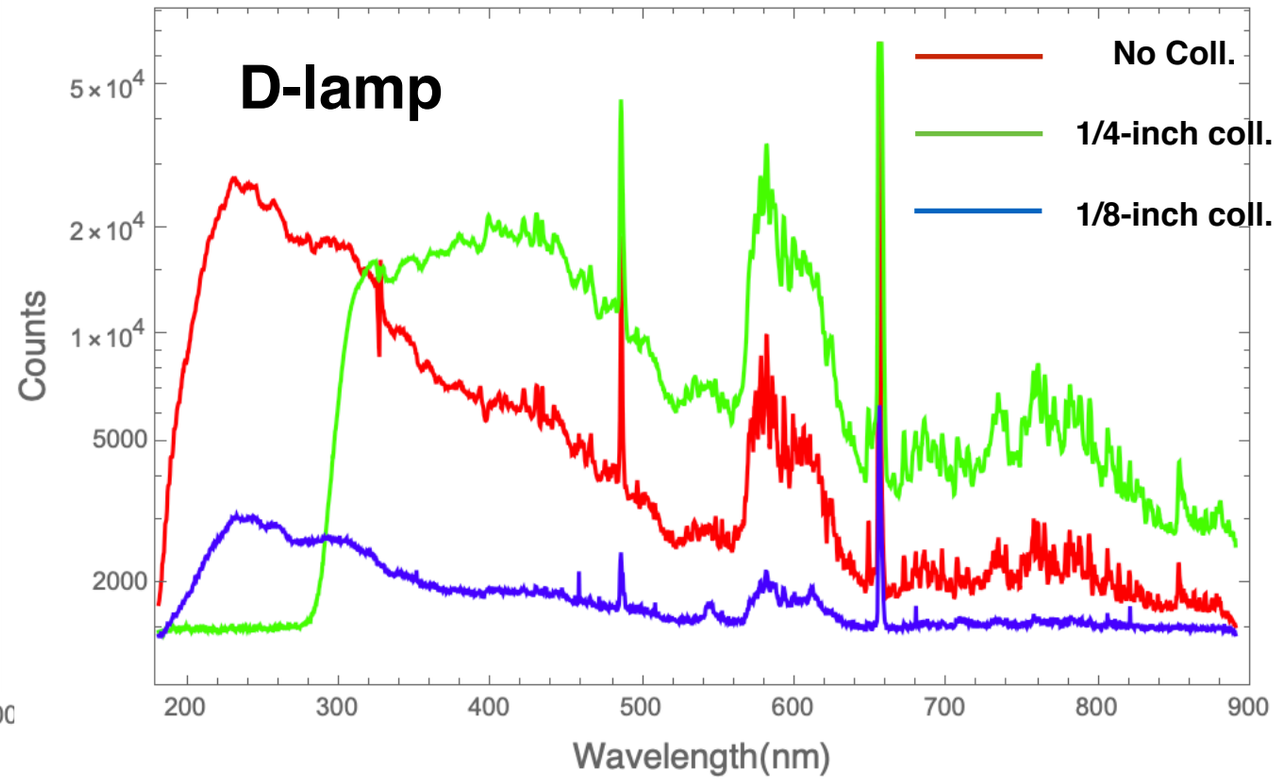
1/8 UV collimator

Diamond Substrate Emission Measurement Preliminary

- **Wavelength range testing**
  - Spectrum measured for room light and Deuterium Lamp
  - 1 inch collimator ruled out: No signal into the spectrometer due to non SMA connector
  - 1/4 Collimator has a cut-off at 300nm
  - 1/8 UV collimator has the lowest cutoff with the UV fiber
  - 1/8 UV collimator chosen for the single wavelength measurement

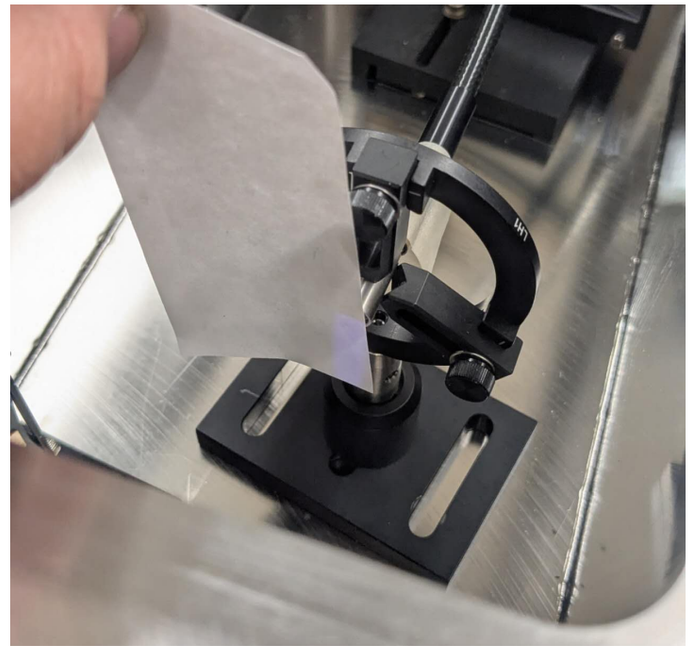


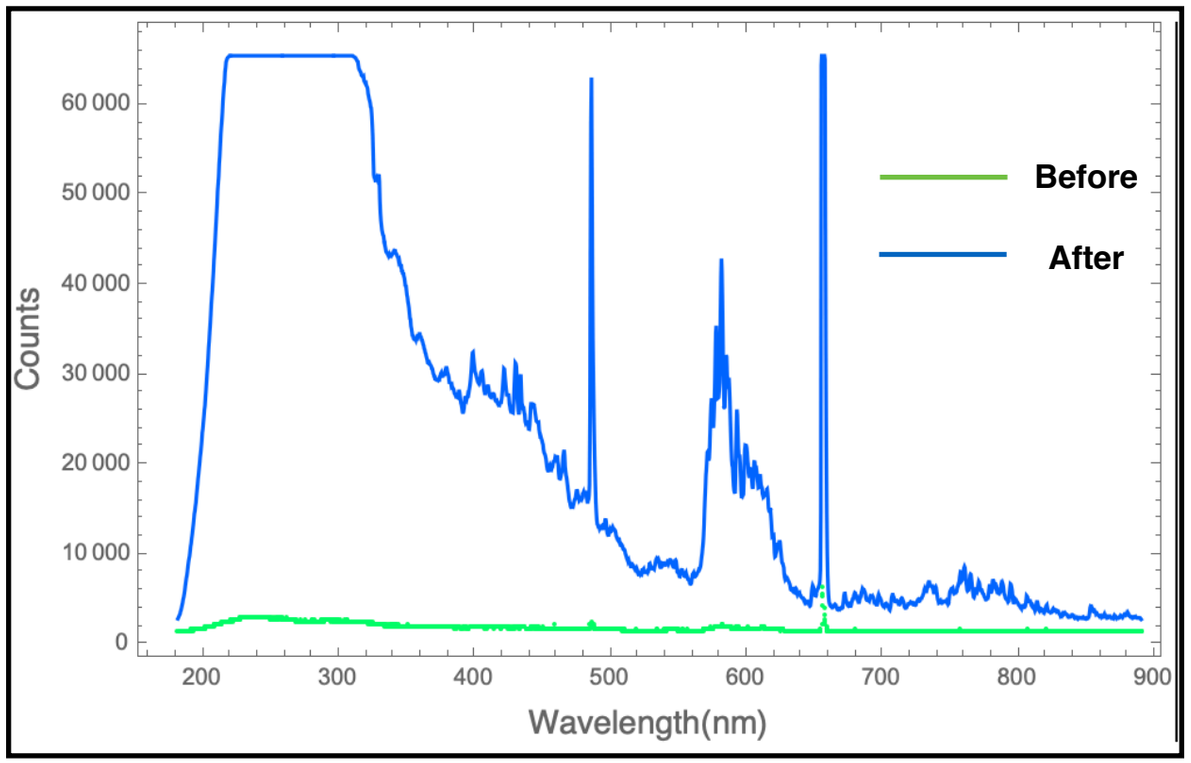




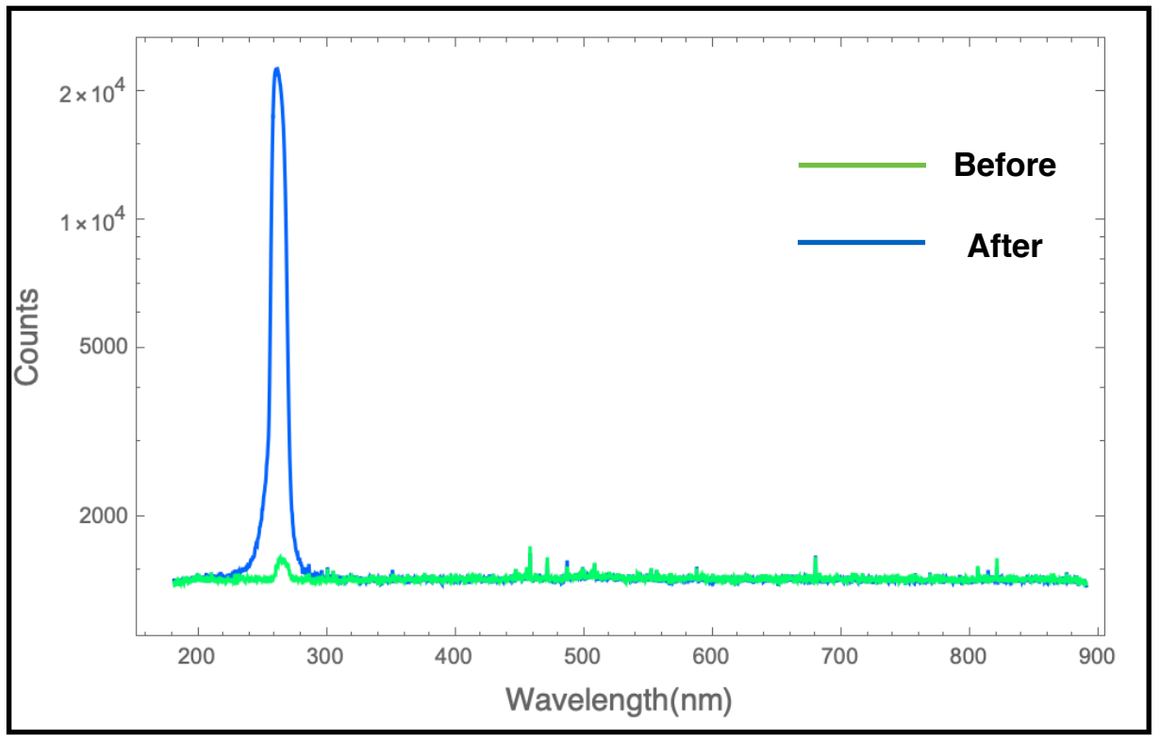
Diamond Substrate Emission Measurement Preliminary

- **Fine tuning for the maximum light collection**
  - It is noticed the signal after 1/8 collimator is still not very high
  - The collimator size matched with the light slit width at the top
  - Adjust the collimator height to the middle of the light spot
  - The improvement is very clear with the spectrometer saturated at full spectrum
  - When selecting 266 nm, the peak height increased by about 100x





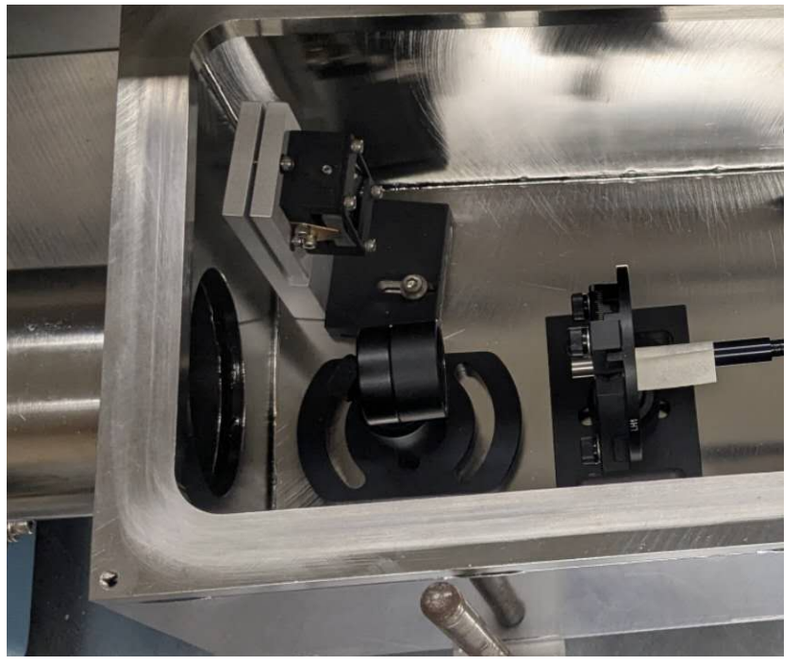
Full Spectrum

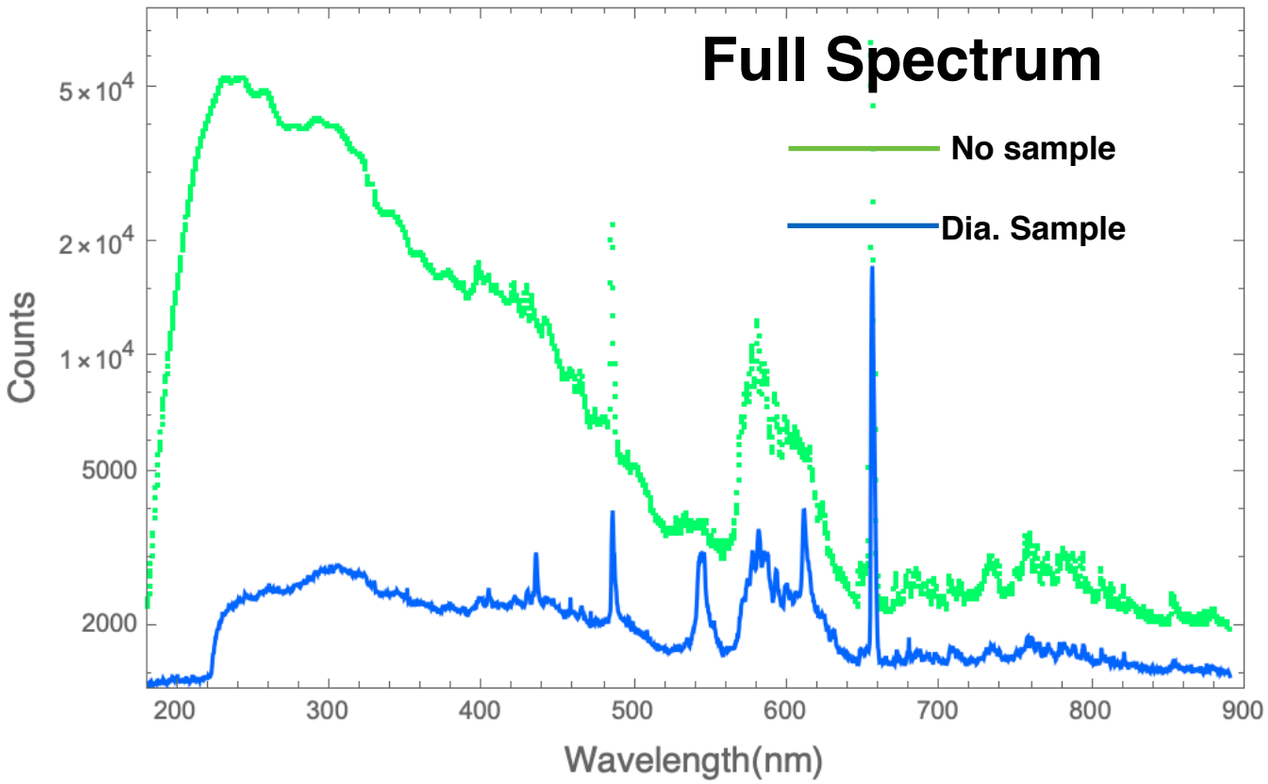


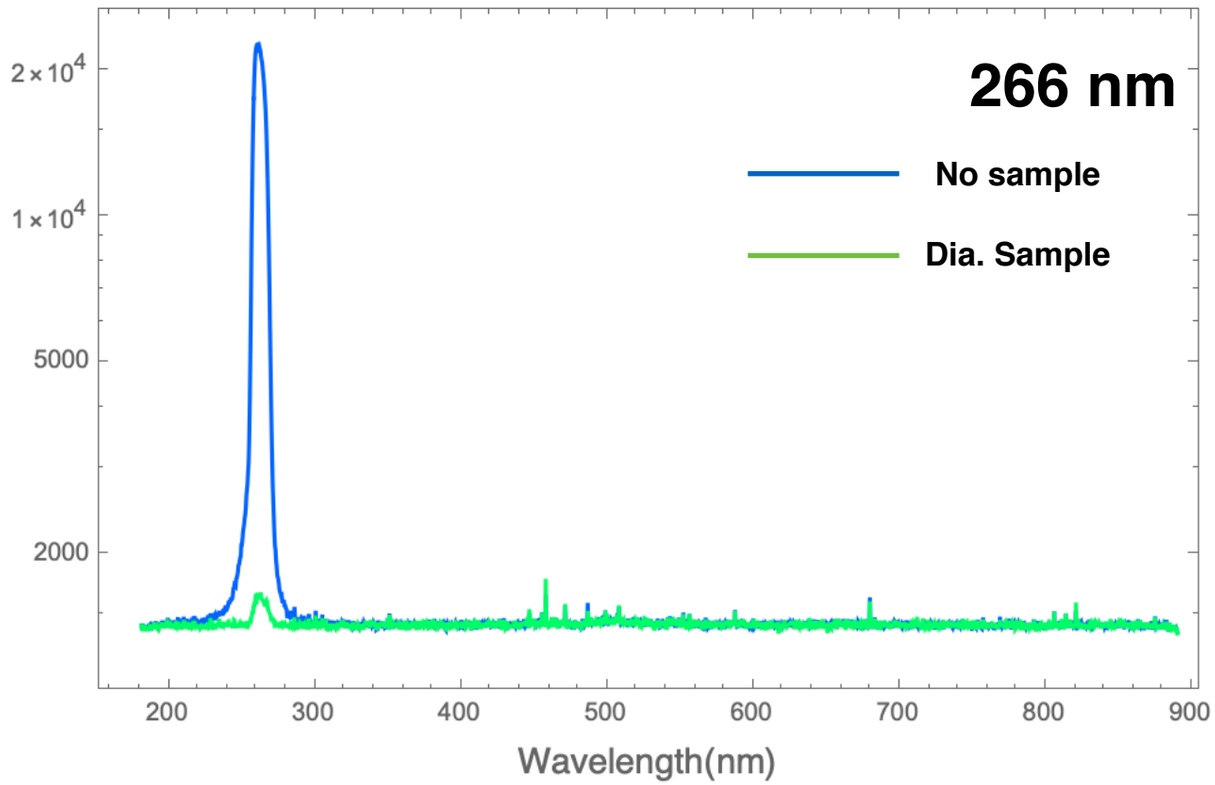
266 nm selection

Diamond Substrate Emission Measurement Preliminary

- **Diamond Substrate Emission Spectrum Measurement**
  - Insert the diamond in front of the collimator
  - Significantly signal amplitude improvement

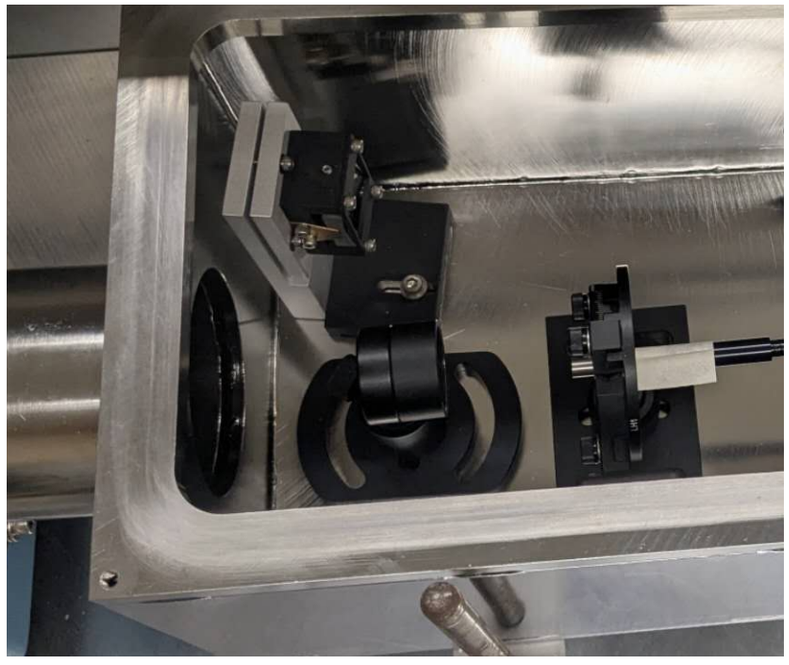


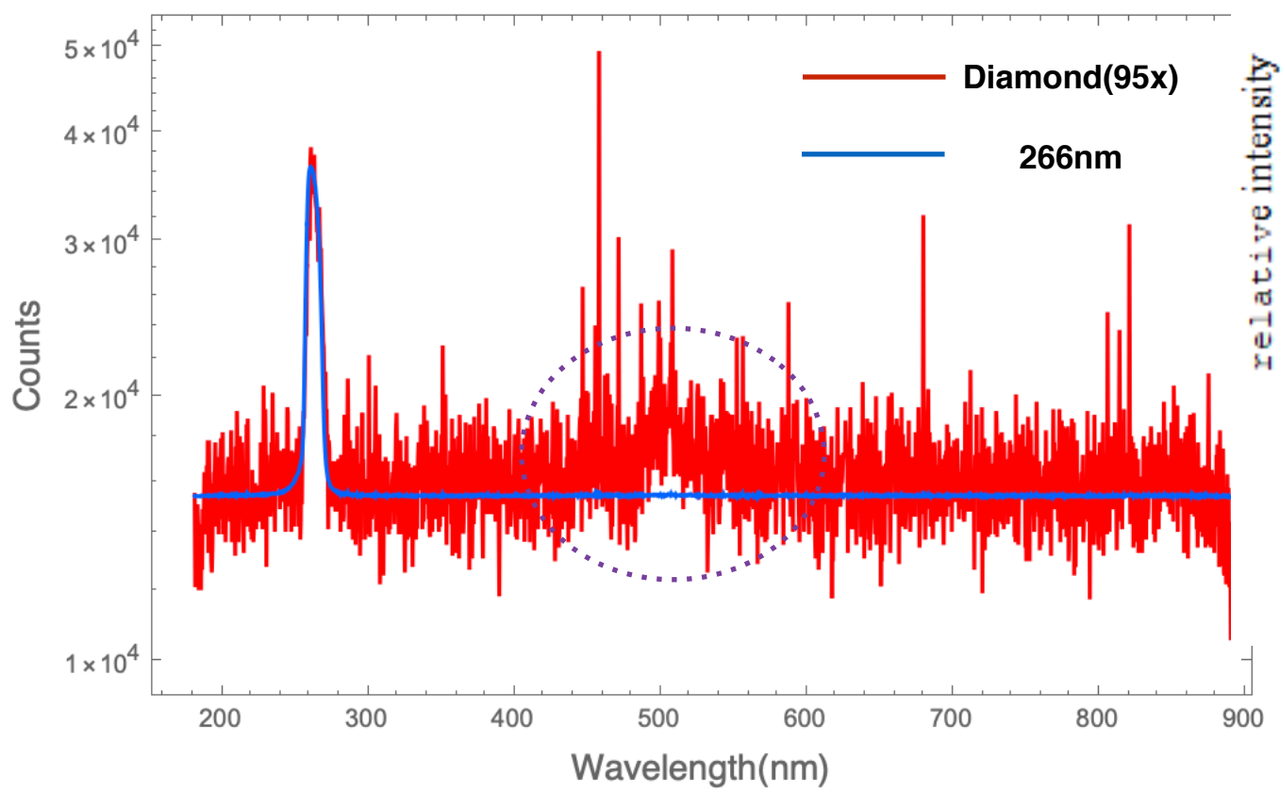


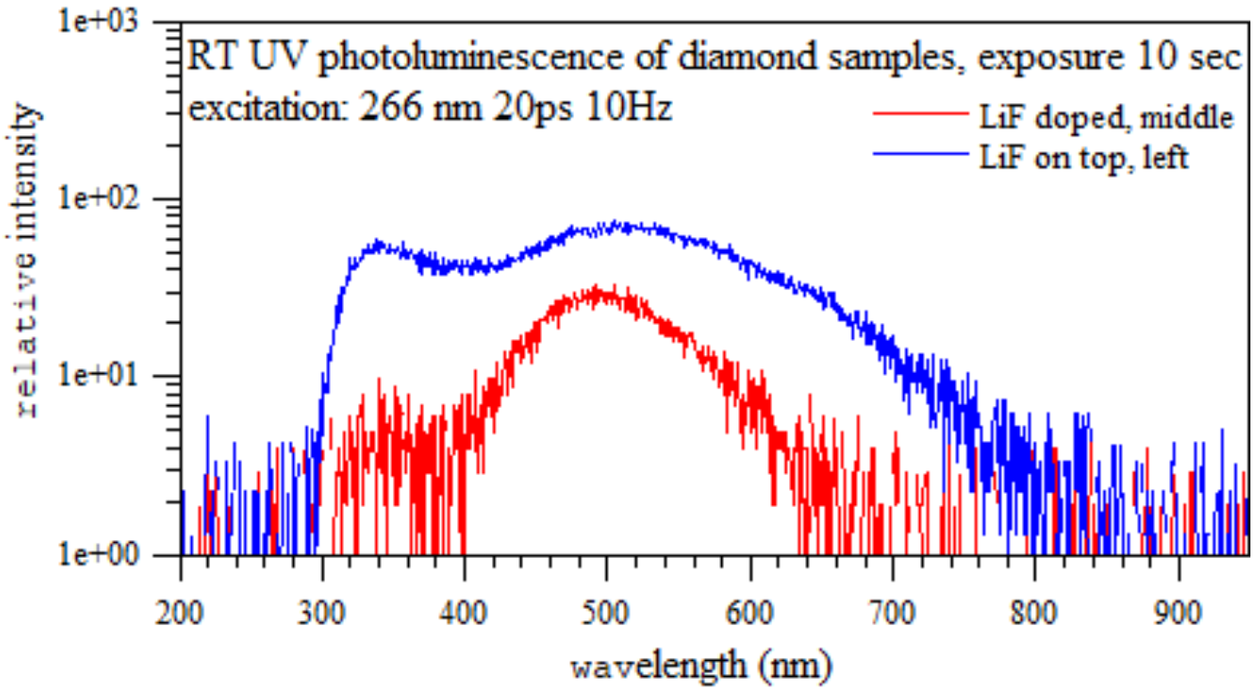


Diamond Substrate Emission Measurement Preliminary

- **Diamond Substrate Emission Spectrum Measurement**
  - Very weak emission spectrum observed around 500 nm
  - We are also collecting the 266nm wavelength
  - Future improvement on collection would help
  - Will try with the 1/4 collimator with 300nm cutoff
  - Meeting with Thomas at 3pm to discussion the measurement improvement







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Spectrometer exit slit repair

- **Exit slit removed from the setup**
  - Both pieces moving after disassembly
  - Do see signature of aged grease by the high resistance on the shutter
  - Bill is disassembly entire slit to remove the old grease and re-lub the parts