LAr R&D Progress Updates

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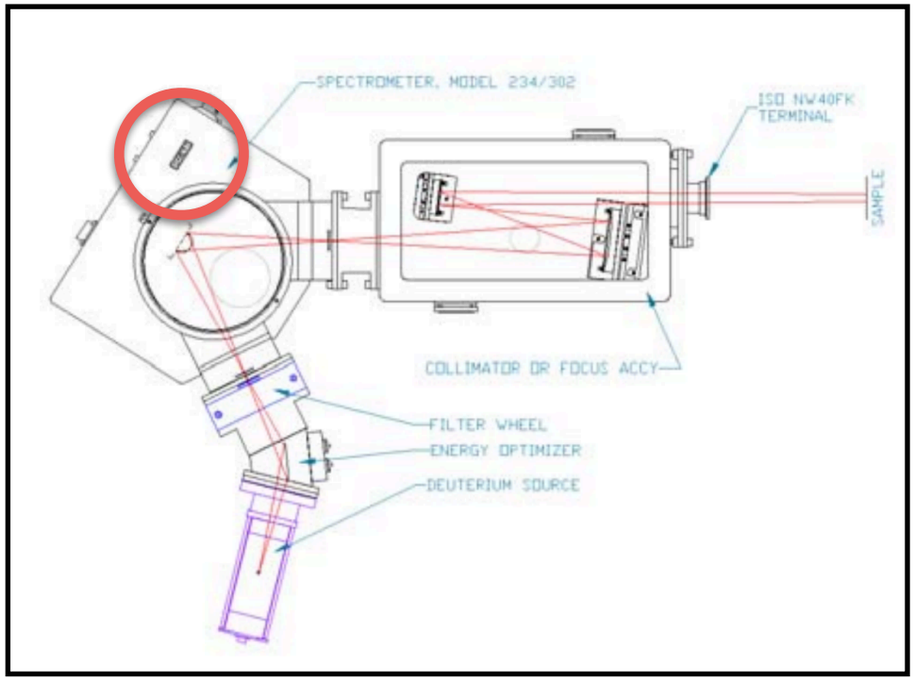
NATIONAL LABORATORY

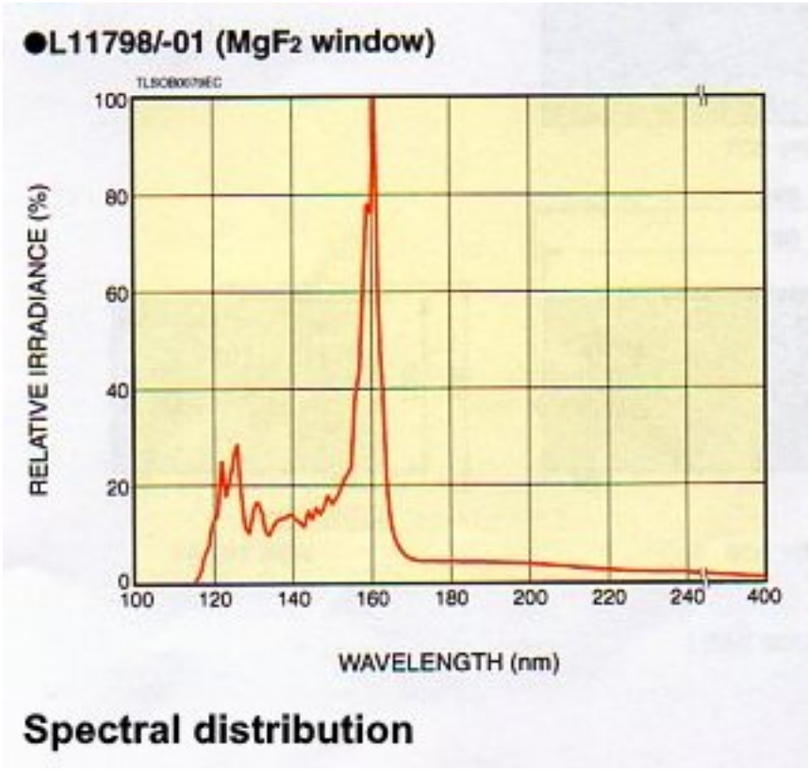
Lab Safety and Space Management

- **Slipper Conditions on the ground**
  - Please be careful at the incremented weather
- **EEI Inspector JPM**
  - All training completed as briefed last time
  - Not in the system yet, will follow up with Joel
  - Guang has a splitter for EEI inspection

Spectrometer Alignment Confirmation Test

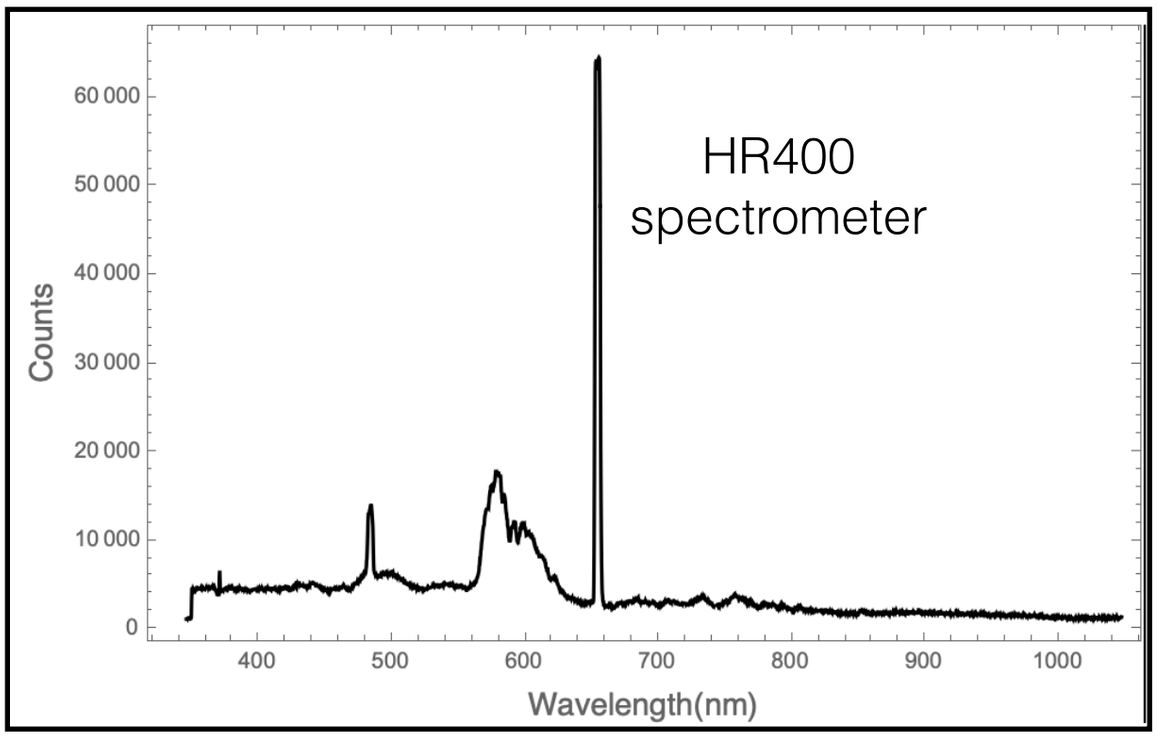
- **Introduction**
  - The spectrometer has an optical grating on a rotational base
  - By the controller, the wavelength can be selected with a numerical indicator on the spectrometer
  - The spectrometer was factory-aligned decades ago, we need to validate the wavelength selection
  - The Deuterium lamp we have has VUV emission spectrum starting from 120nm, data sheet stops at 400 nm
  - We have conducted wavelength measurement with 2 spectrometers

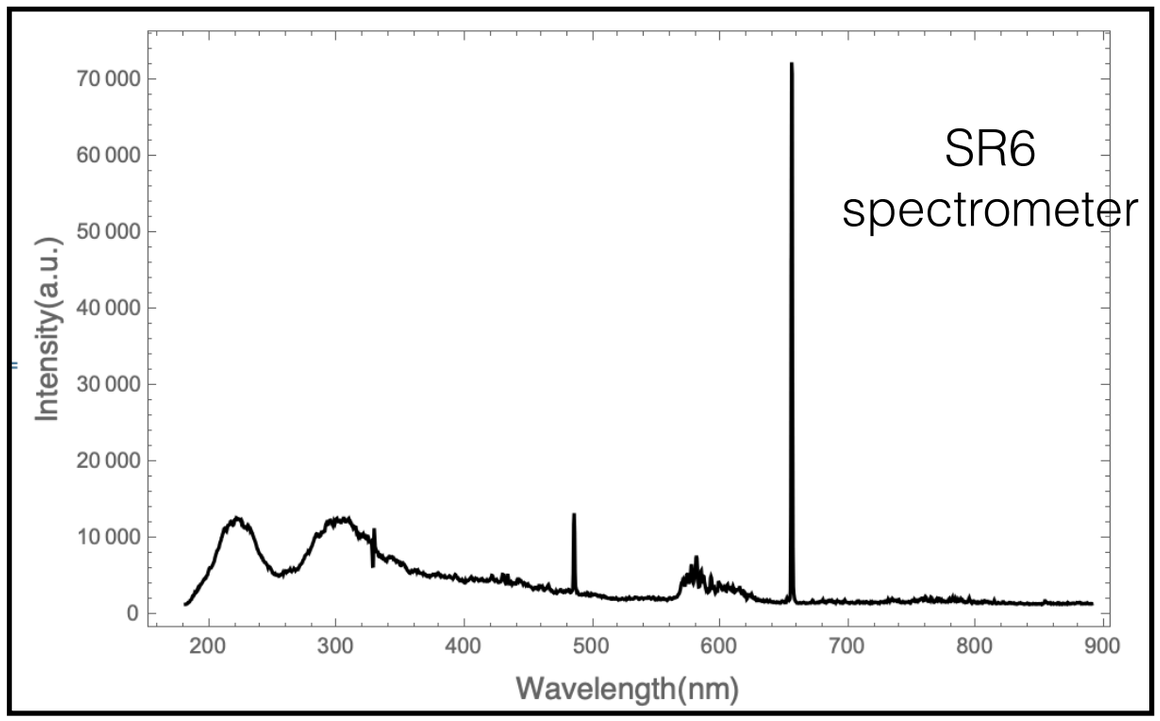




Spectrometer Alignment Confirmation Test

- **Spectrometers**
  - Replace HR 400 with SR6 spectrometer with better UV range
  - Still installed at the exit of the spectrometer after the second slit
  - Direct coupling in GAr (The optical component with continuous GAr flow)
  - Use very low-intensity output from the Deuterium lamp first for full spectrum without wavelength selection

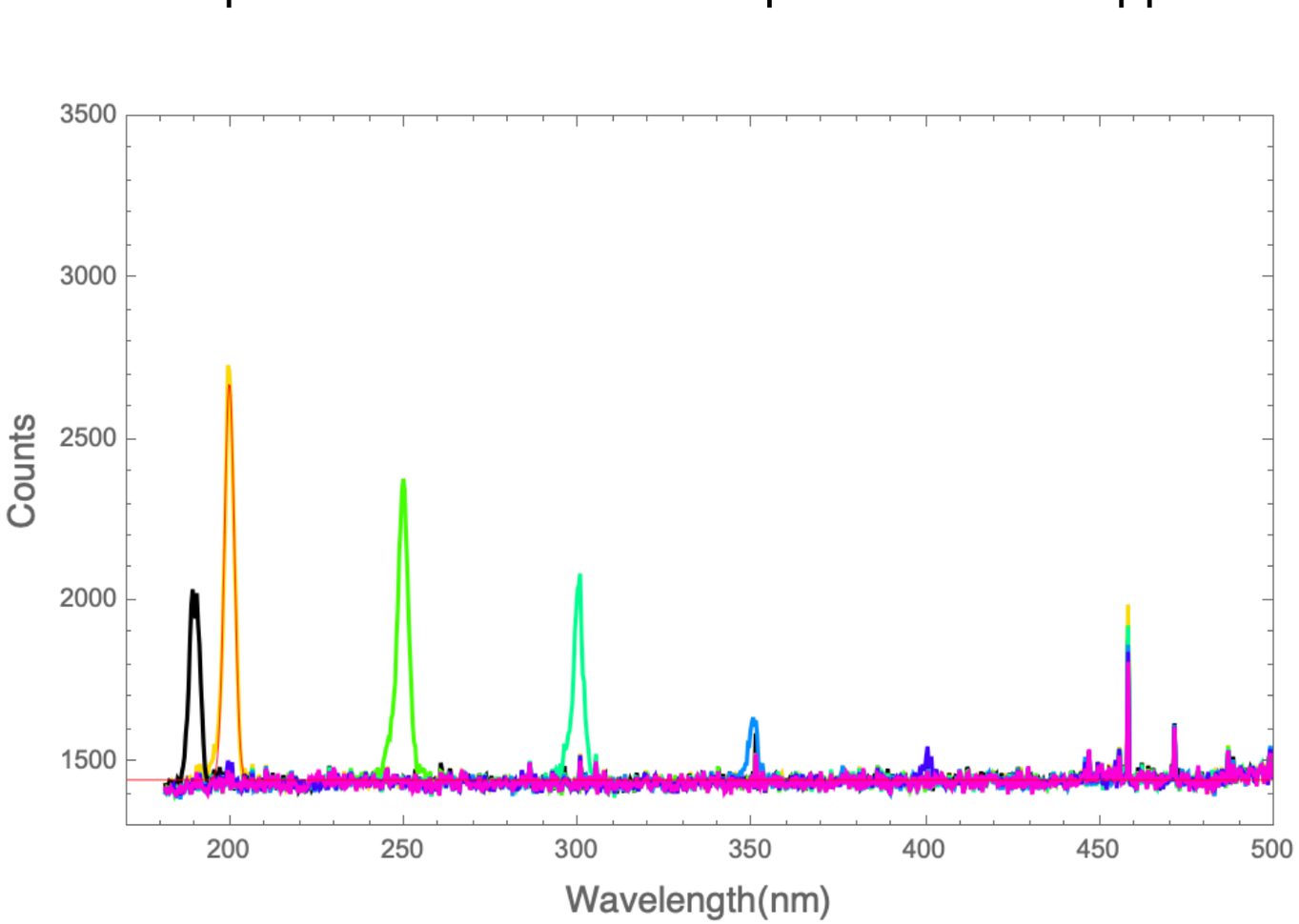


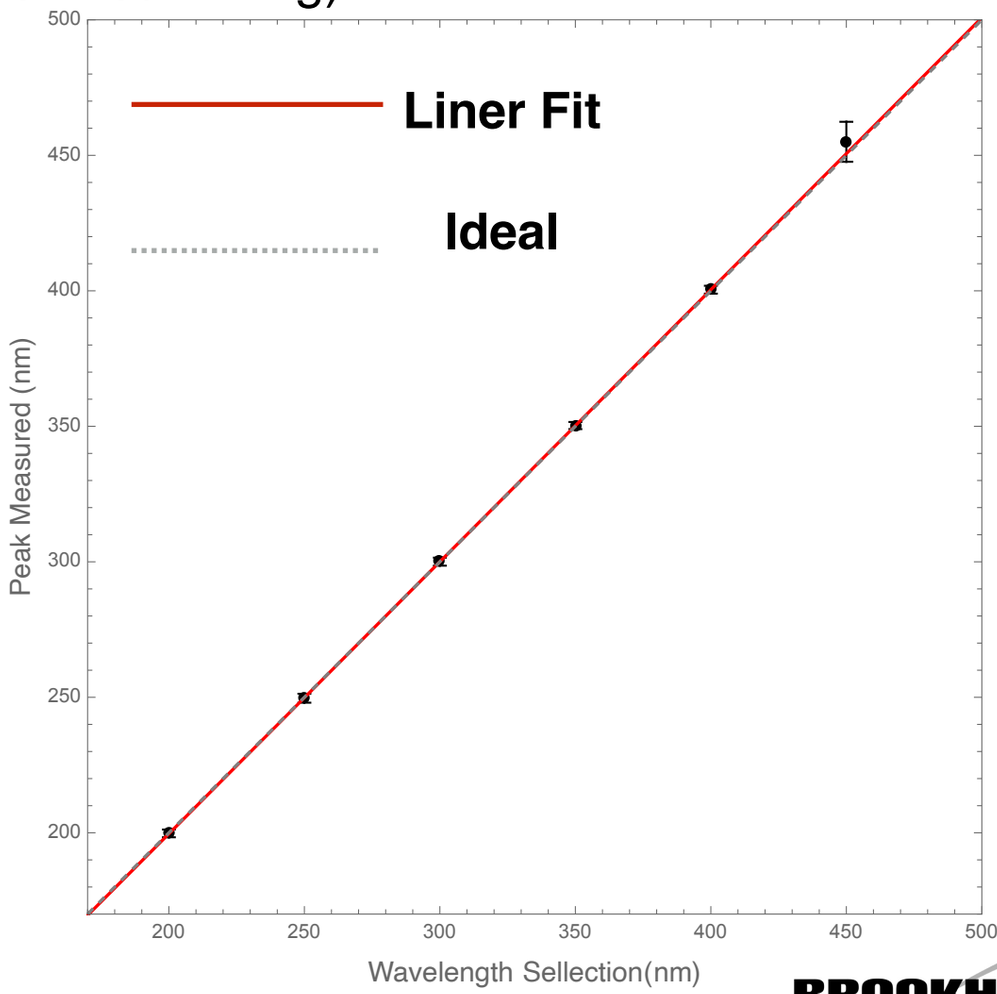


Full spectrum from D2 lamp

Spectrometer Alignment Confirmation Test

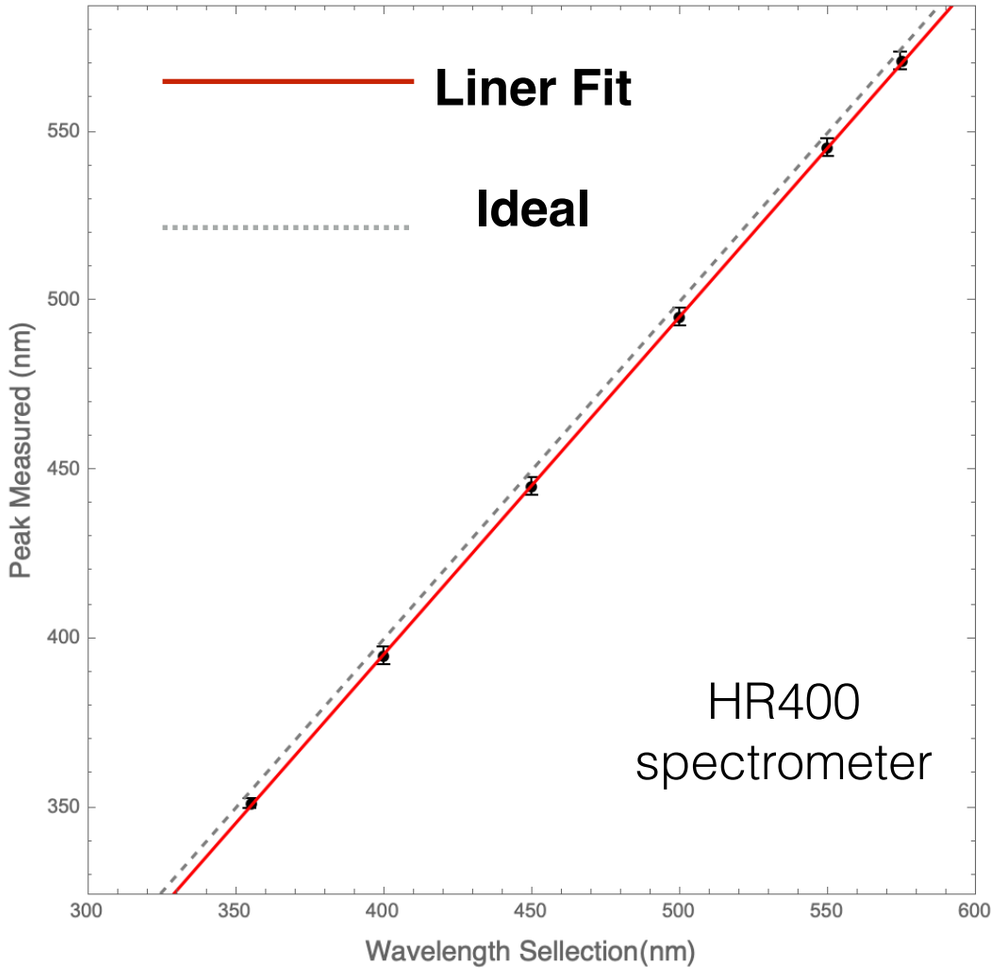
- **Wavelength Selection Calibration**
  - Conducted wavelength selection from 190nm up to 450 nm wavelength range
  - Spectra scanned for wavelength selection at 190nm, 200, 250, 300,350, 400, 450 nm
  - Low limit of 190 nm due to wavelength detector range
  - Upper limit 450 nm can see visible peak seems to be determined by the wavelength detector response range
  - A perfect linearity between wavelength setting and measured wavelength observed(first point at 190nm and last point at 450 dropped in the linear fitting)

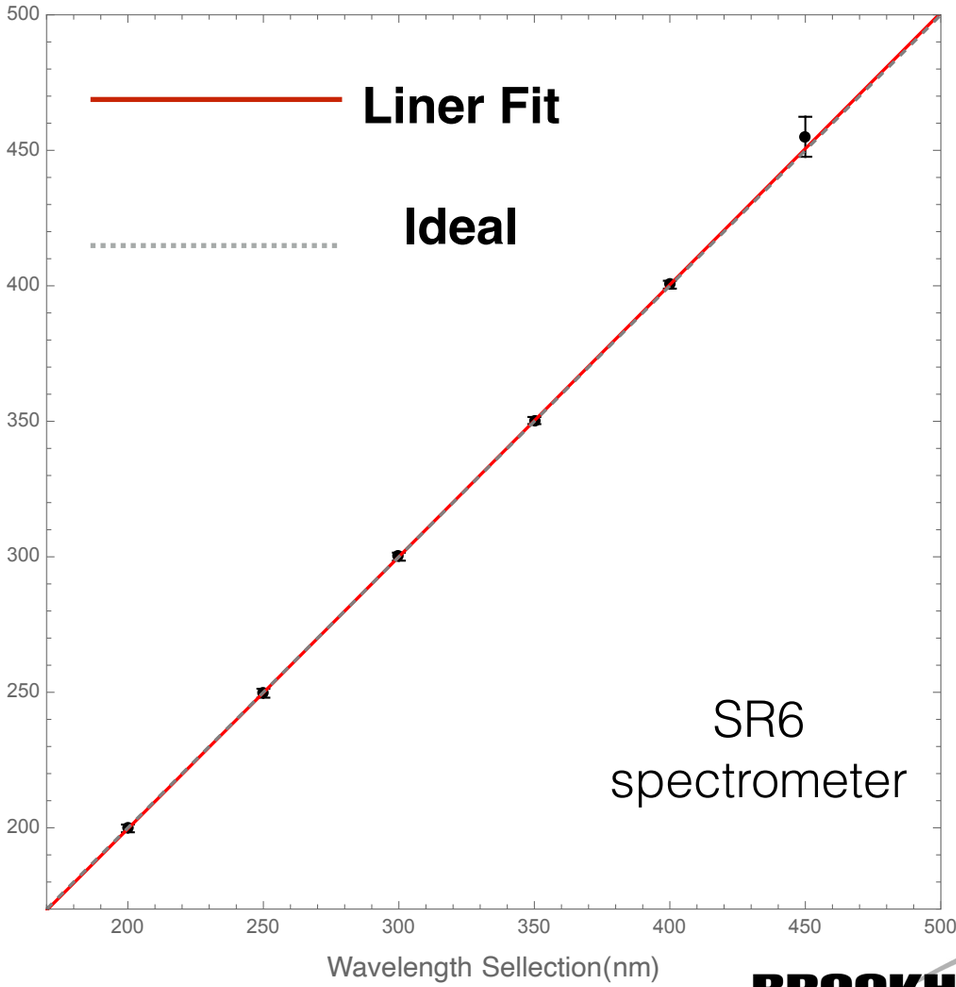




Spectrometer Alignment Confirmation Test

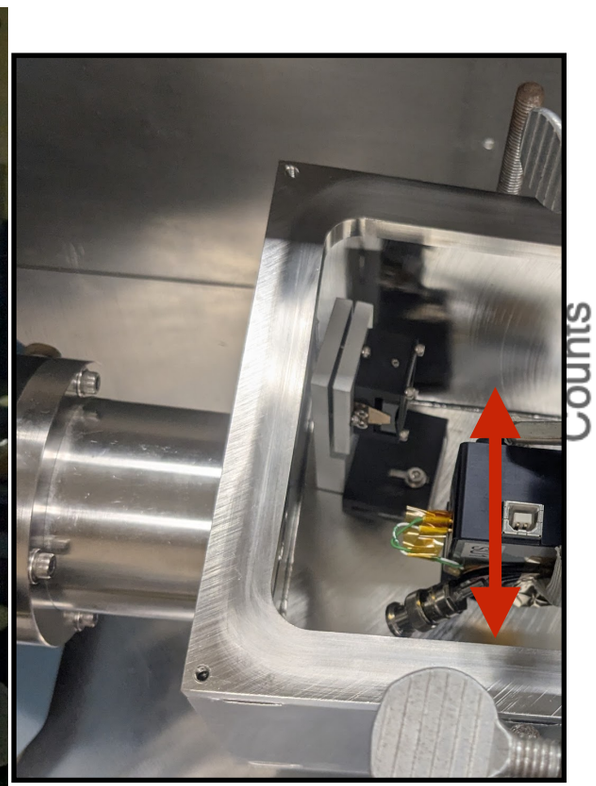
- **Comparison between two wavelength detector HR400 and SR6**
  - Different wavelength range
    - HR400 345nm-1050nm
    - SR6 180nm-900nm

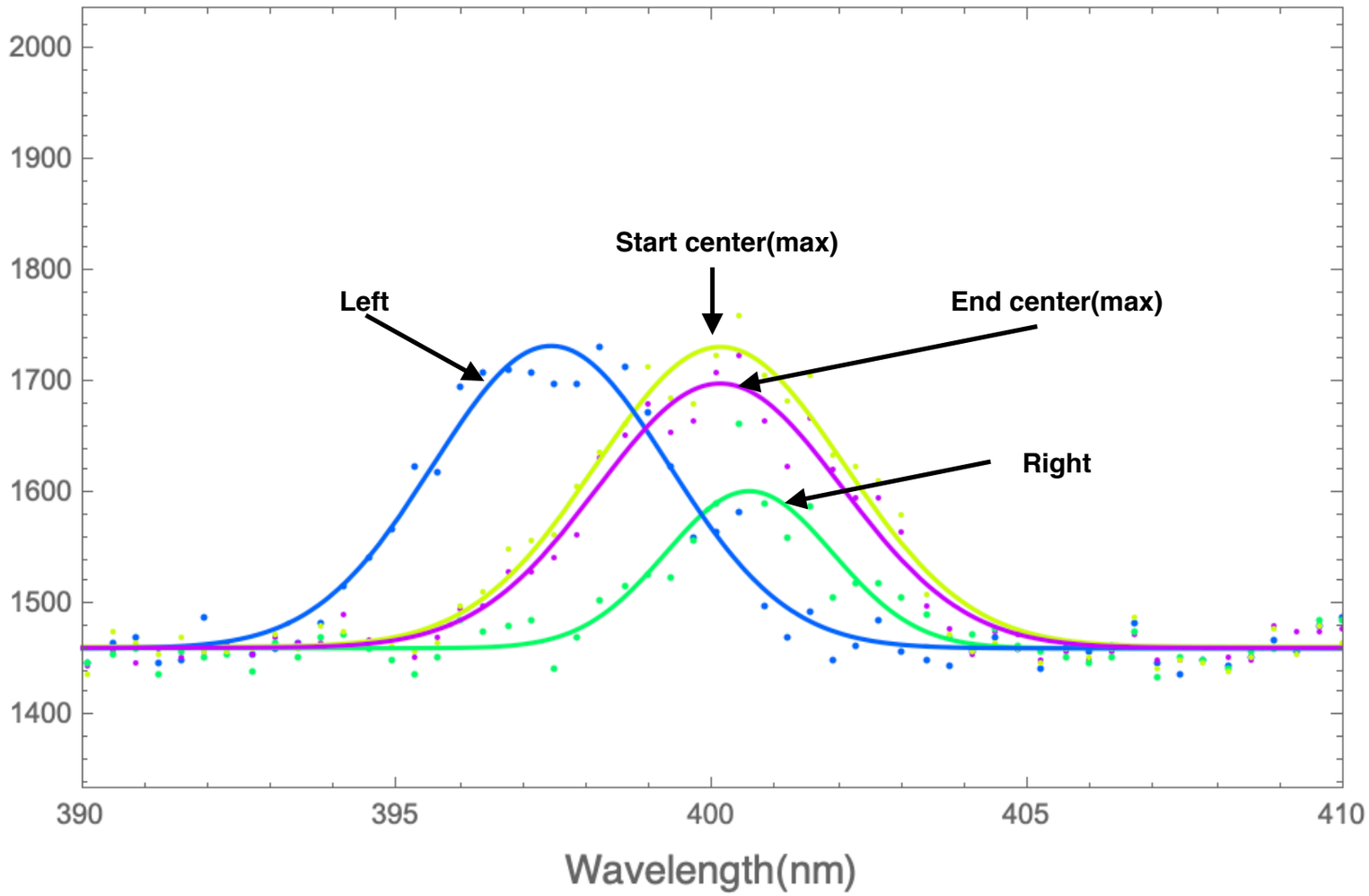




Spectrometer Alignment Confirmation Test

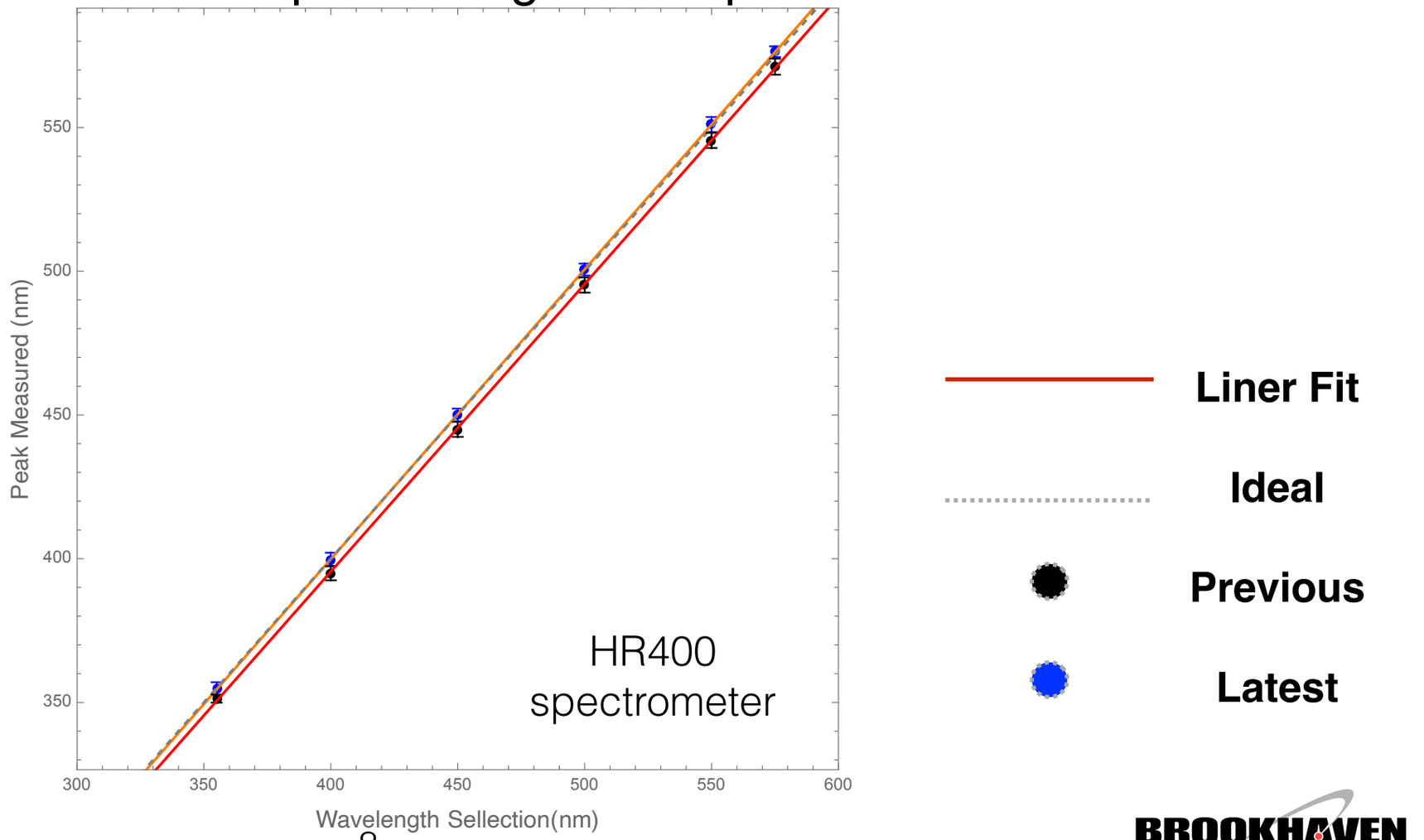
- **Peaking dependance on the wavelength detector positioning study**
  - The light spot after the slit has a width
  - During measurement, we found the peak position dependance on the positioning of spectrometer intake with cause position
  - Selection the wavelength at 400nm on spectrometer
  - It is was found the maximum of amplitude associated with selected wavelength





Spectrometer Alignment Confirmation Test

- **Repeat wavelength scanning with HR400**
  - After found the peak position dependance on the spectrometer positioning, repeat the scanning with HR400
  - Set the spectrometer at 400nm and adjusting wavelength detector position to the maximum signal amplitude
  - Repeat the wavelength scanning
  - Great Linearity achieved with repositioning of the spectrometer



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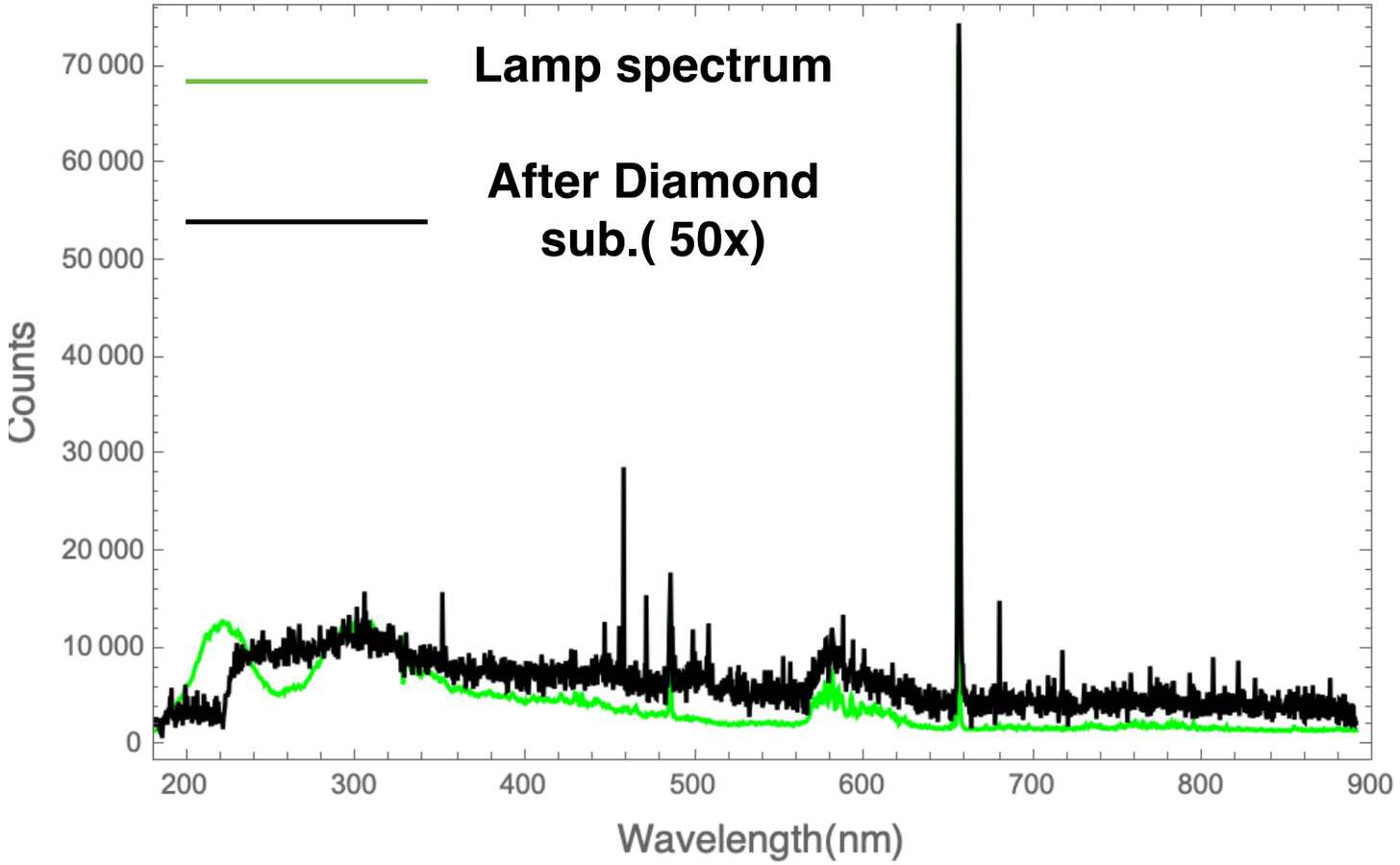
Diamond Substrate Emission Measurement Preliminar

- **Diamond emission measurement**
  - 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



Spectrometer Refurbishment

- **To do list**
  - Fix the exit slit by Bill, expected next week when he returns, some lubrication needed according to McPherson
  - Implement a translation stage to profile the beam and validate the functioning of exit slit inside the collimator box
  - Installing the new mirrors
  - Repeat beam alignment and validation scanning with all next components
  - Light spot size measurement to determine the adapter for the optical chamber