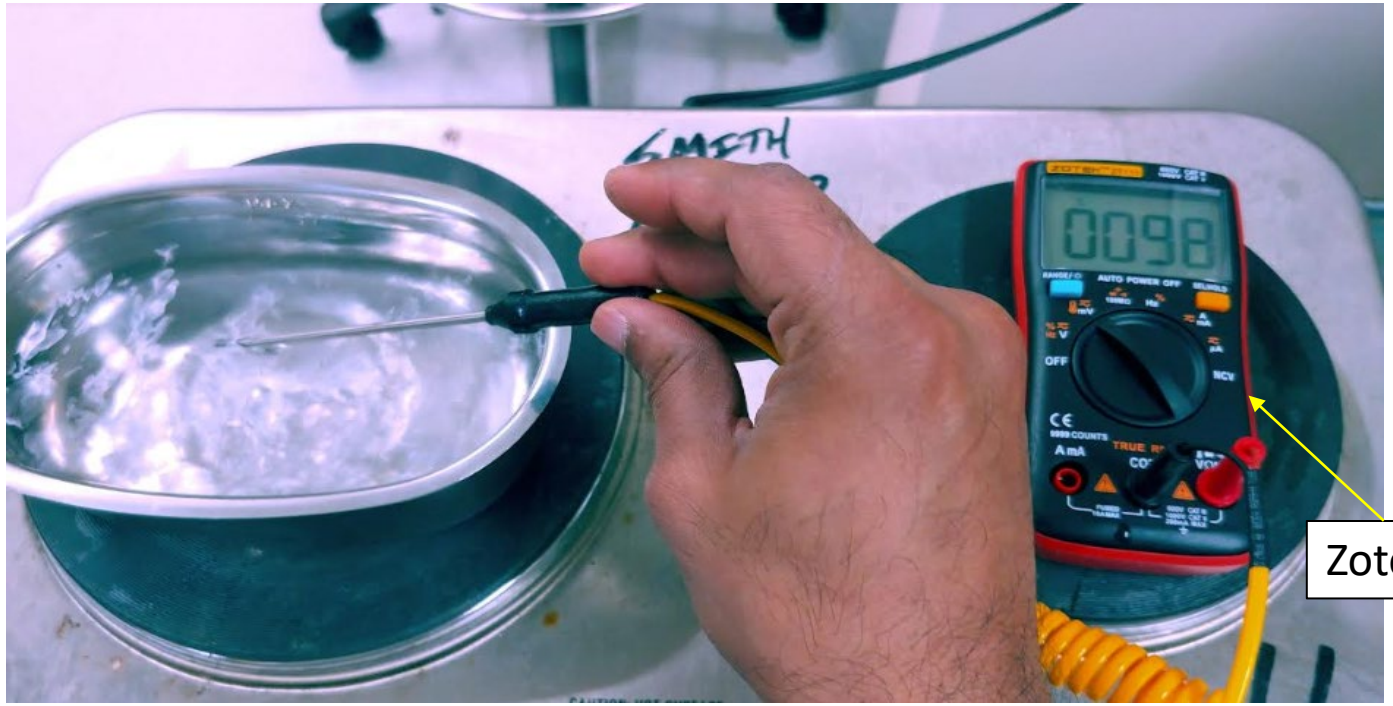
Spectral measurements of candidate laser pointers to be used to measure grating spacing
Student challenge 2020

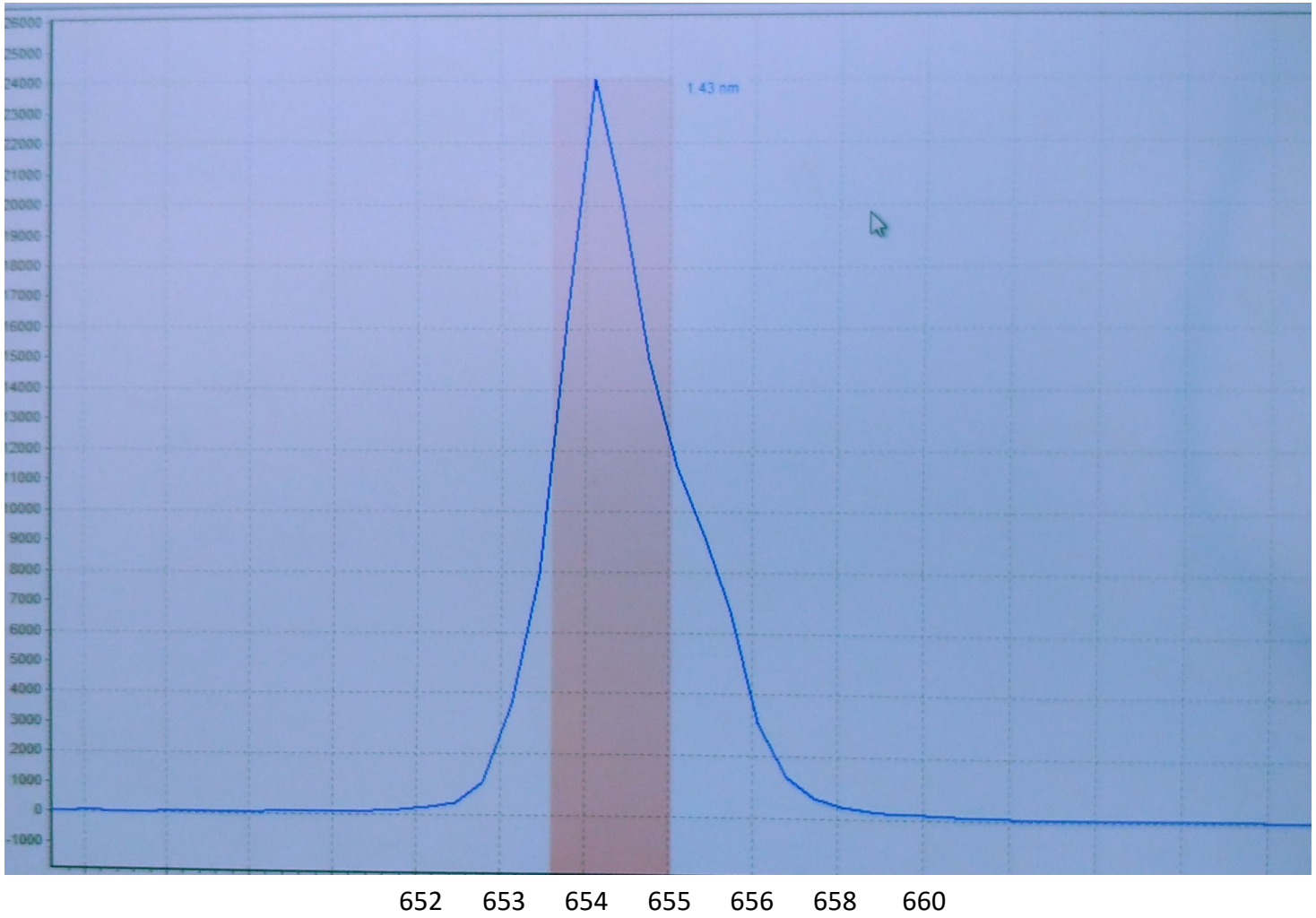


Calibration of thermocouple using boiling water showing 98 °C

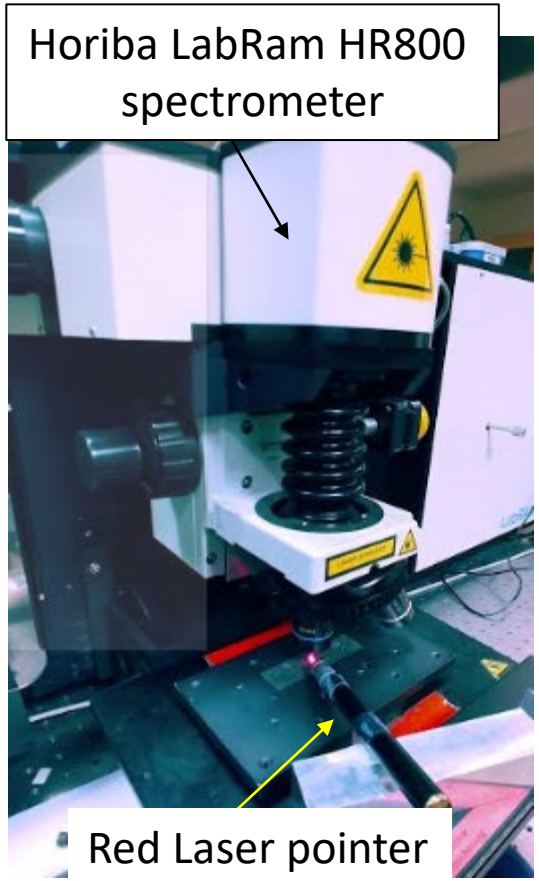
Red

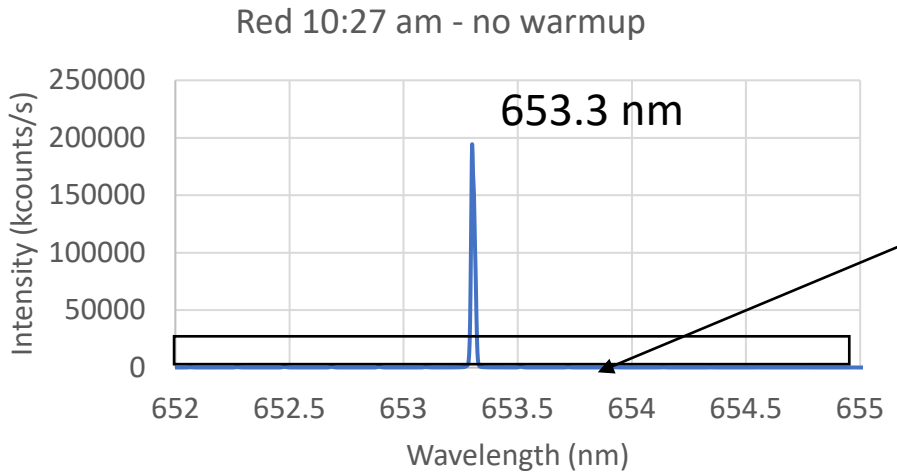
A quick measurement made on a “low” resolution spectrometer, Avantes Avaspec (2048L?) shows the central wavelength is somewhere in between 654 to 655 nm. (The laser was not warmed up)

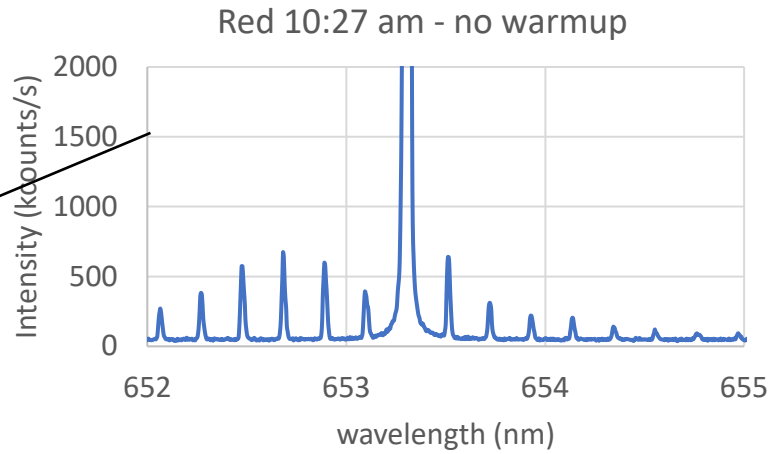
I did not even store the data because all I wanted to know was the range of spectrum before I measure the laser with “high” resolution spectrometer Horiba Labram HR8000

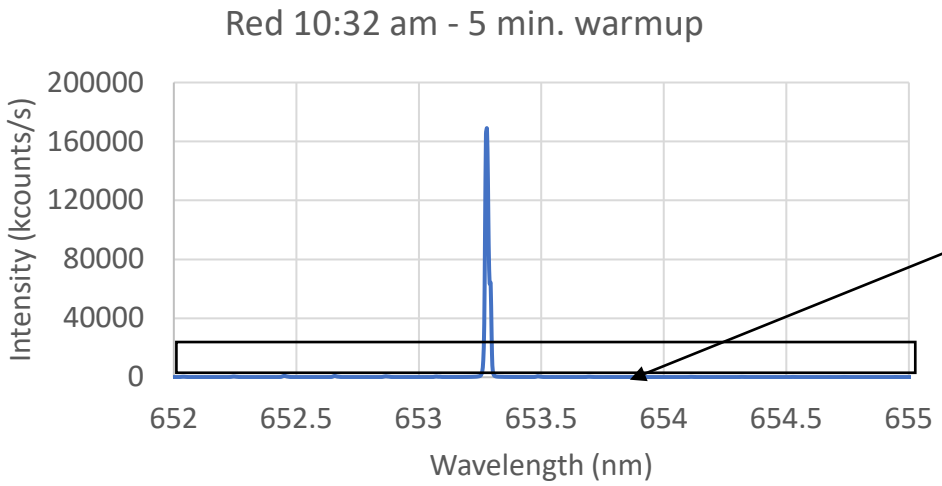


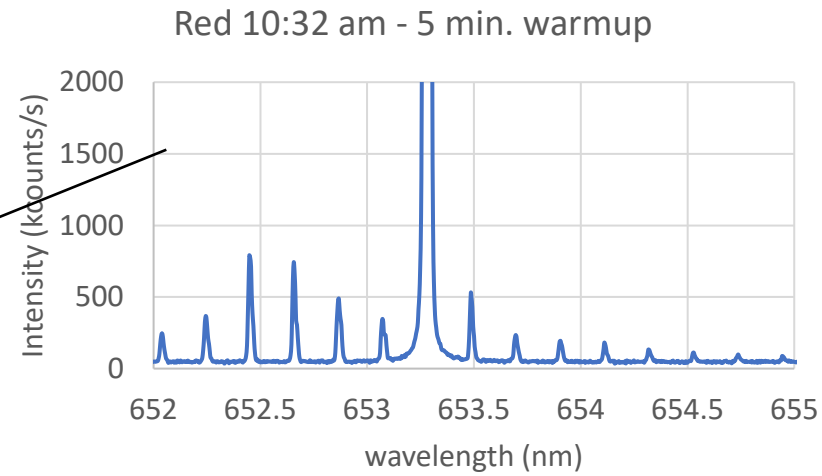
Lab temperature: 21 °C

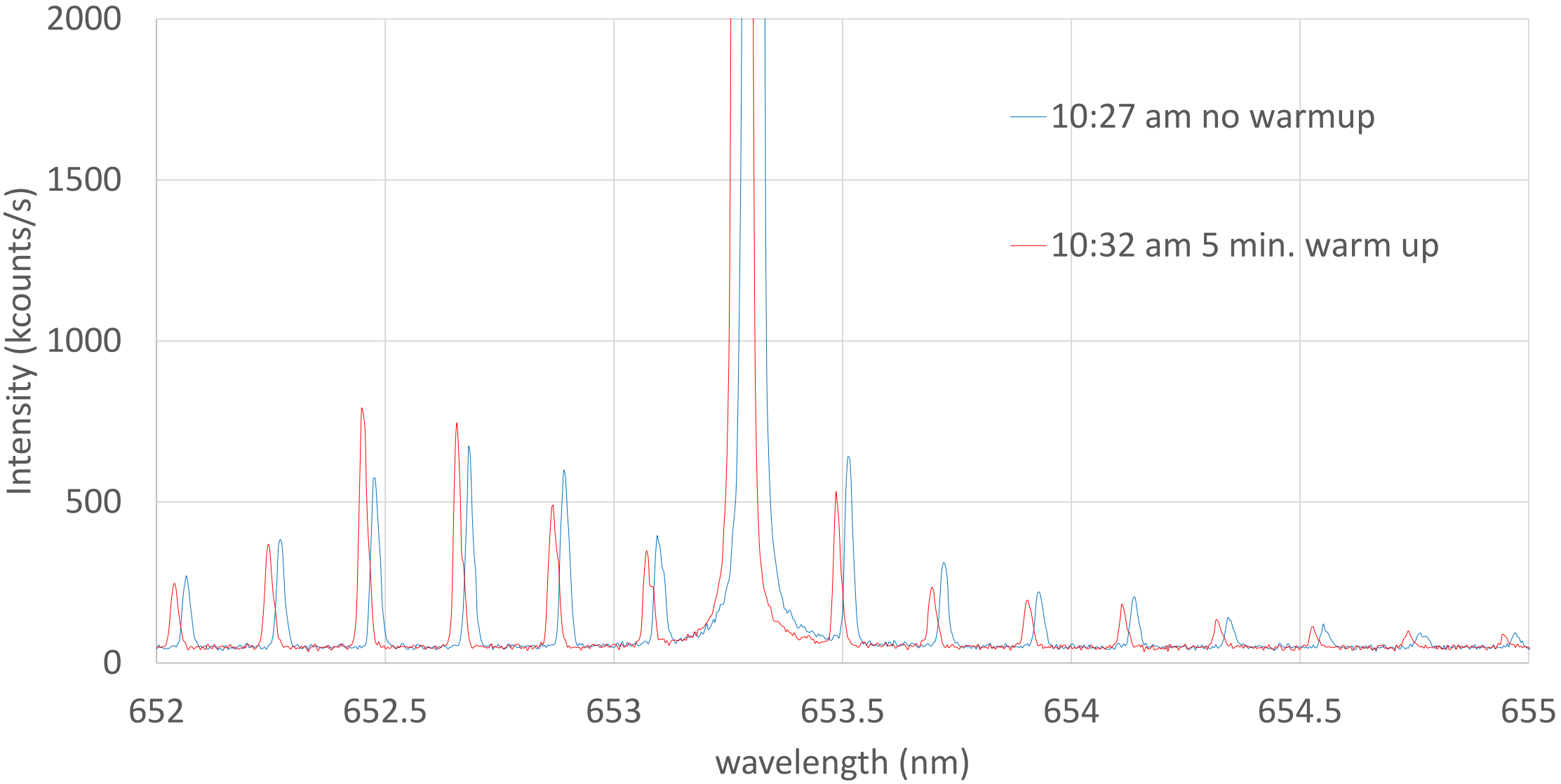






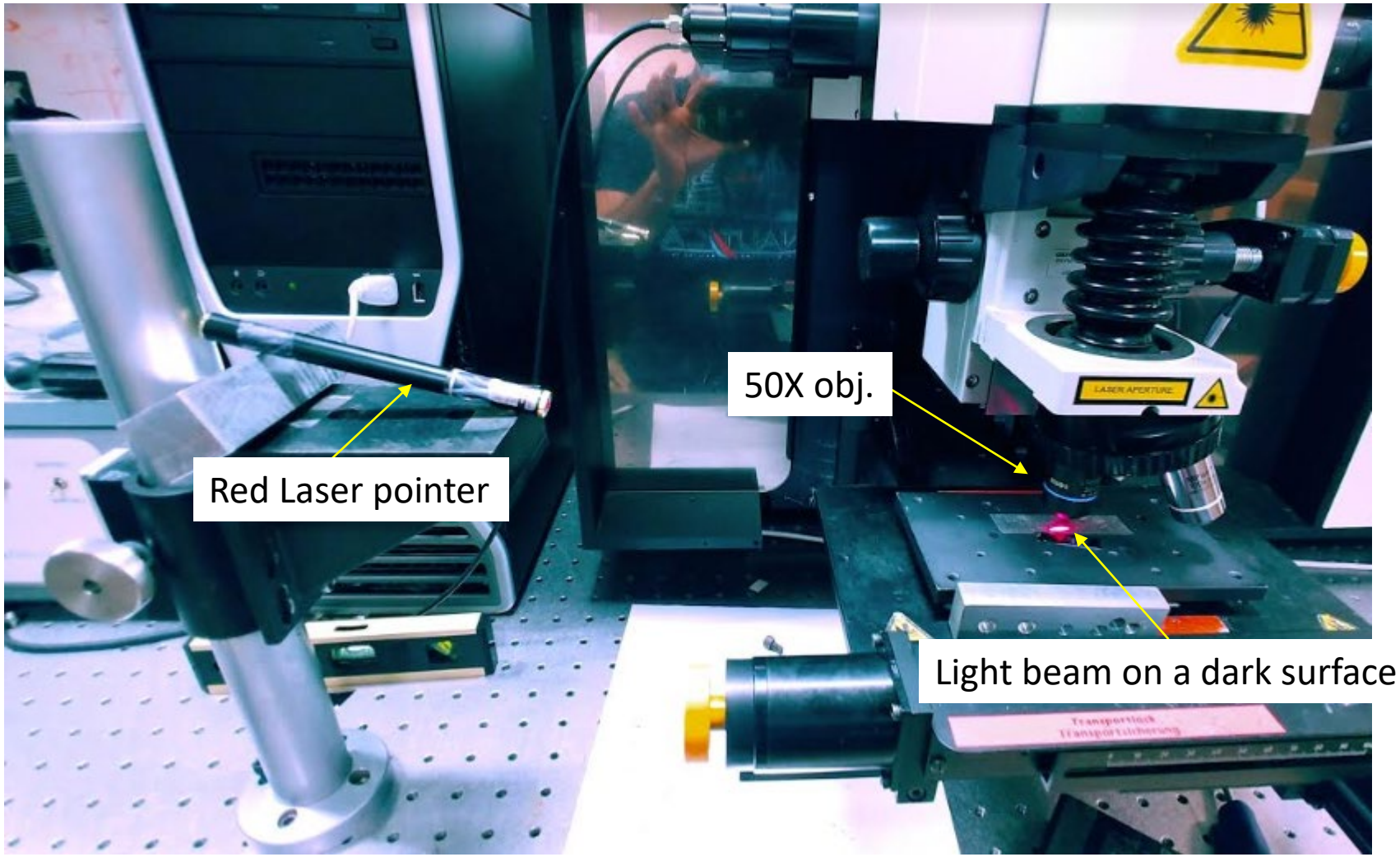




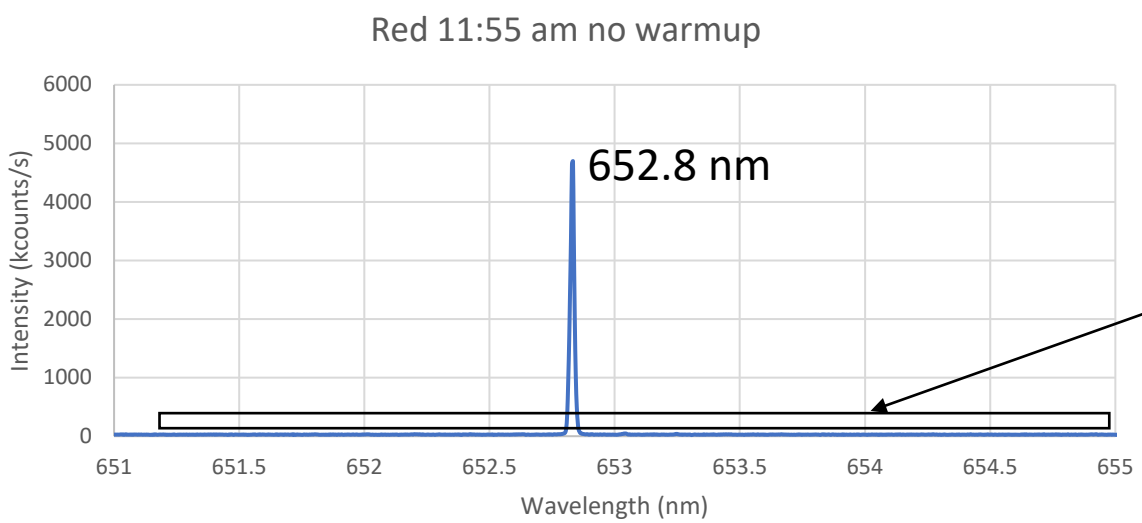

2000
1500
1000
500
0
Intensity (kcounts/s)
652
652.5
653
653.5
654
654.5
655
wavelength (nm)
10:27 am no warmup
10:32 am 5 min. warm up

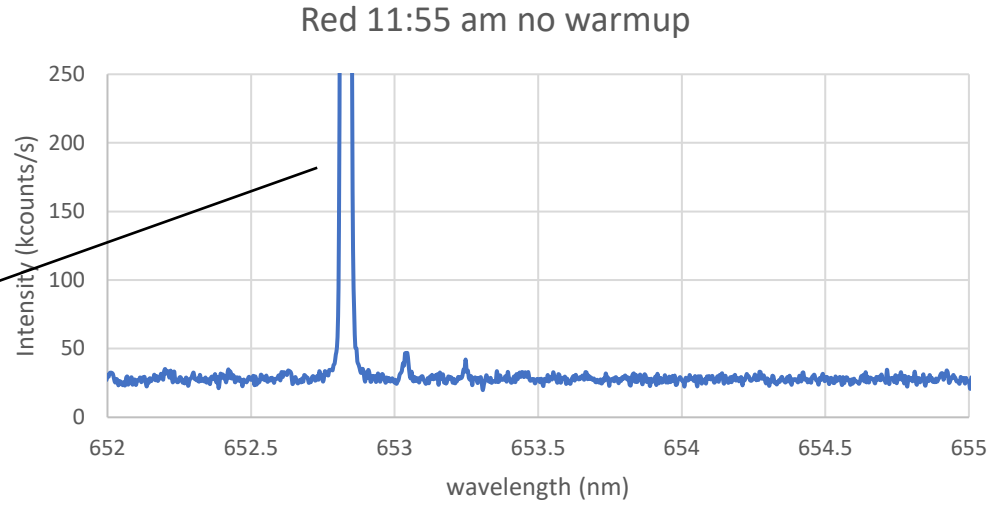
Second set of measurements

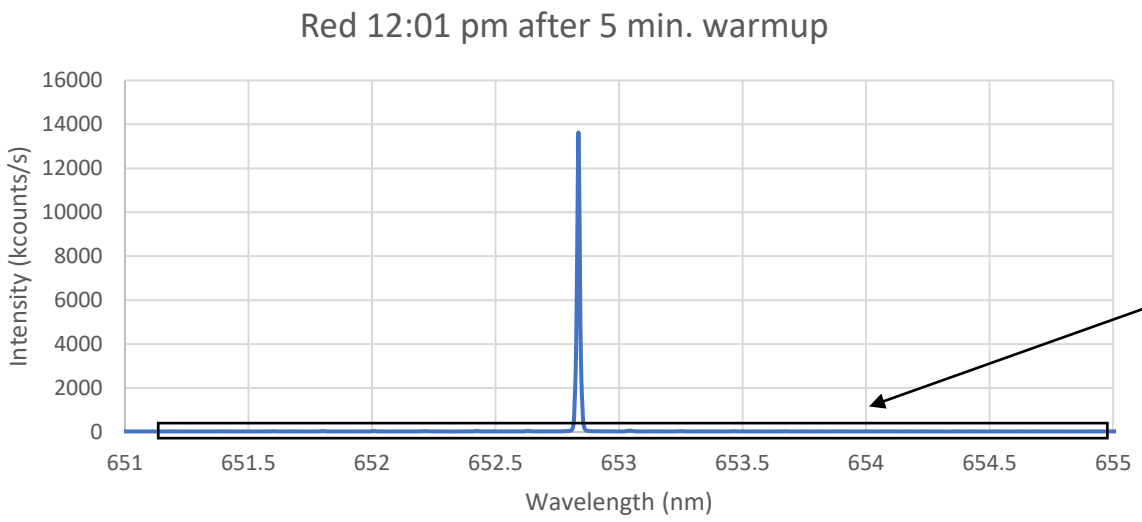
During the second set of measurements, I moved the laser pointer away from the objective lens and placed it on a height adjuster

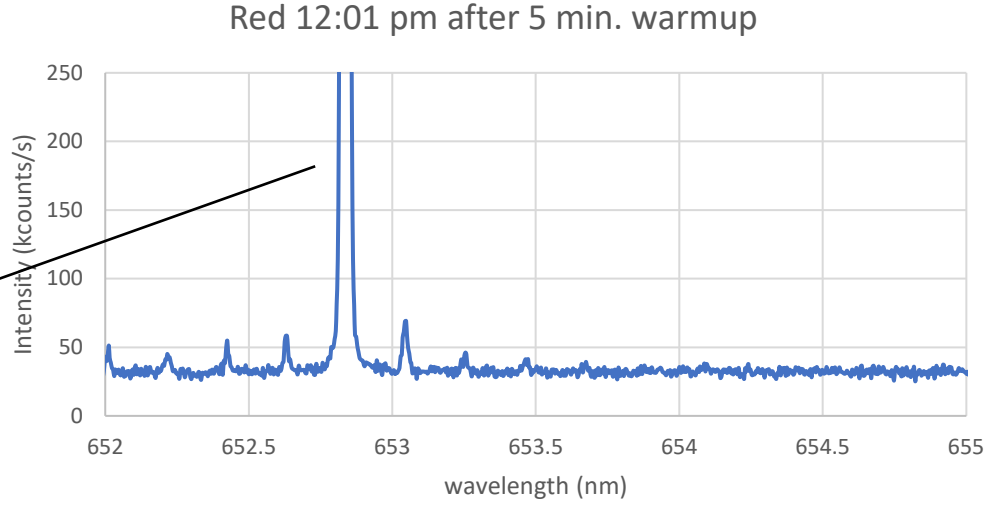


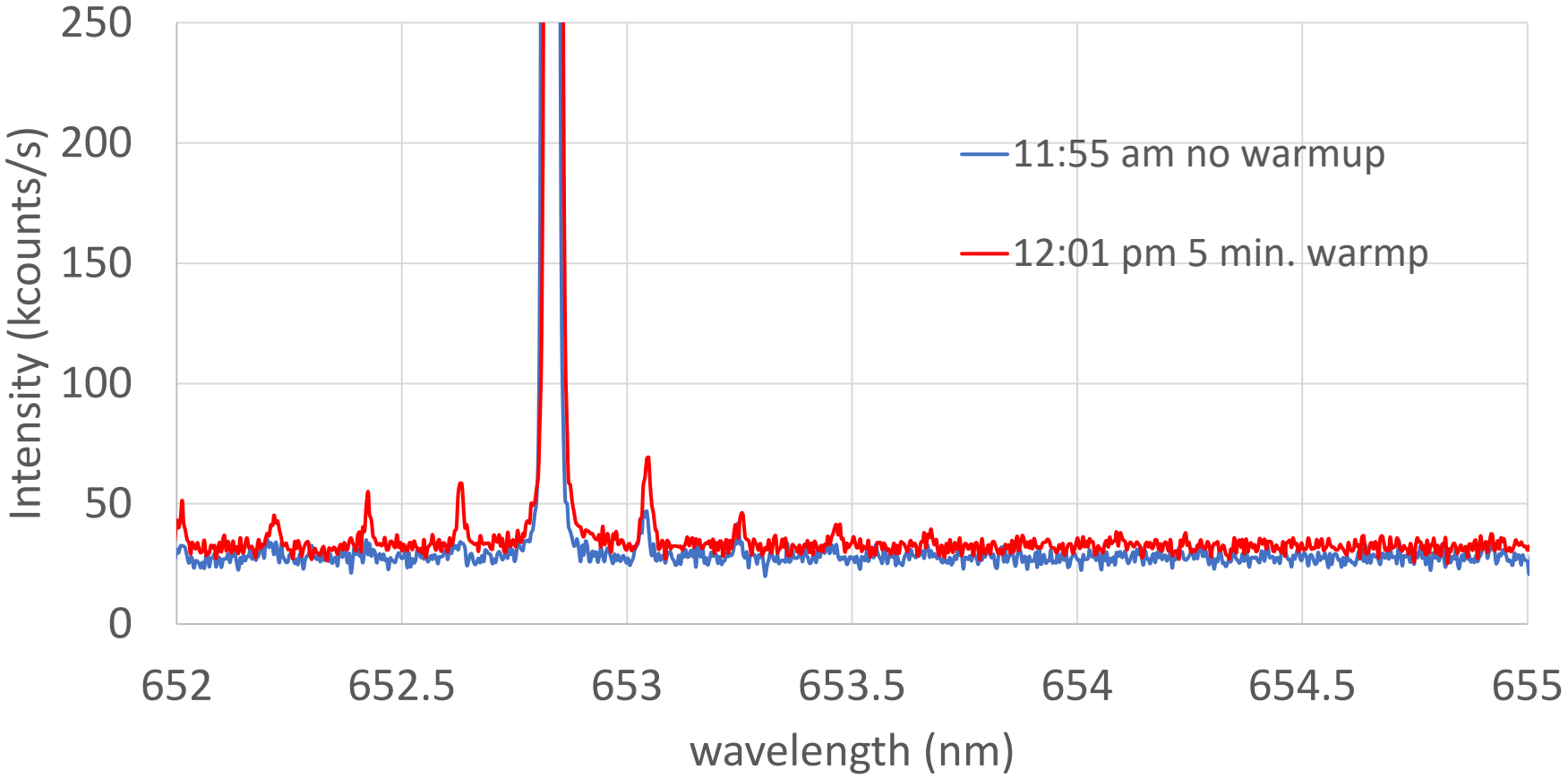
Lab temperature: 21 °C

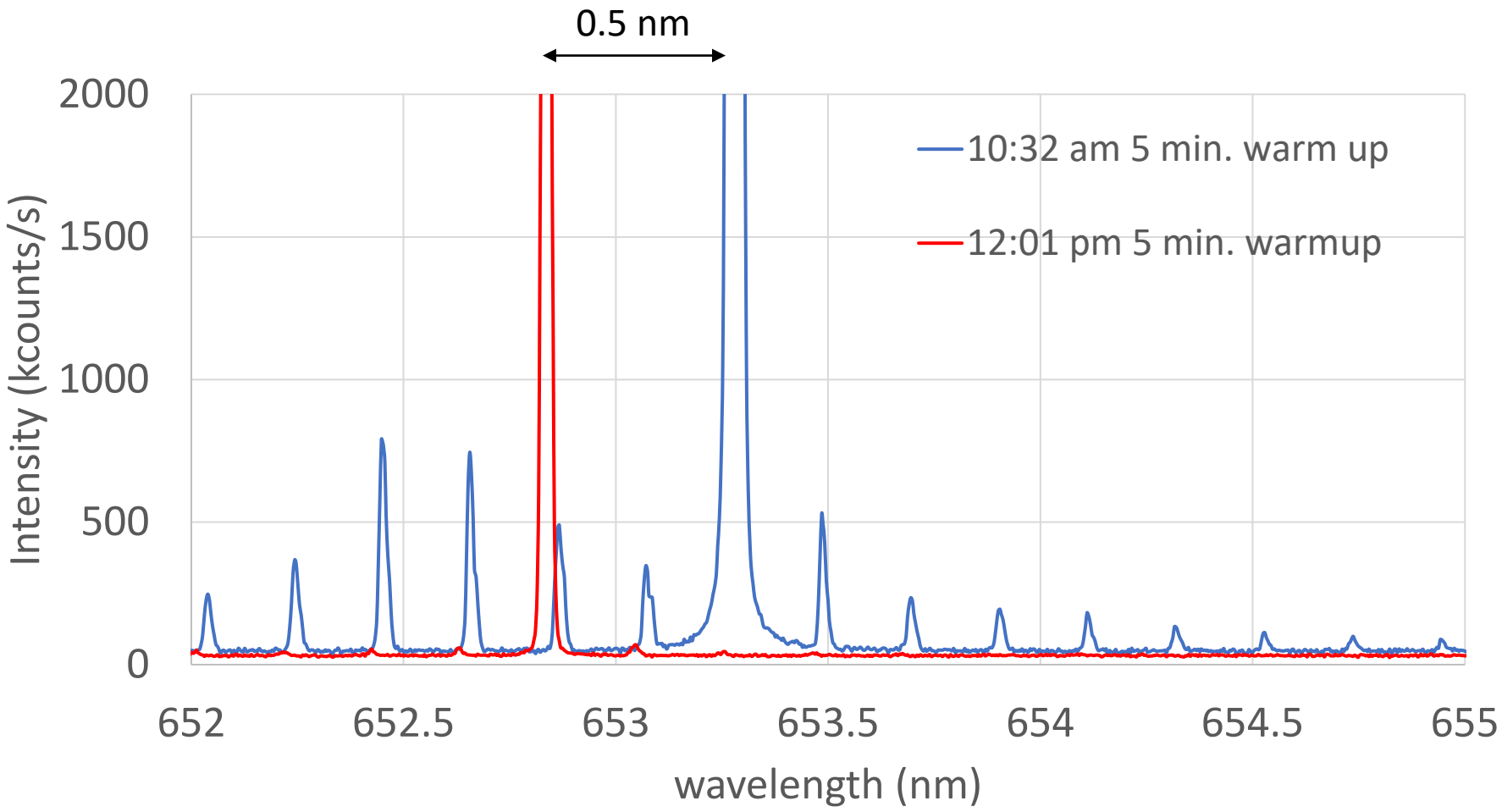






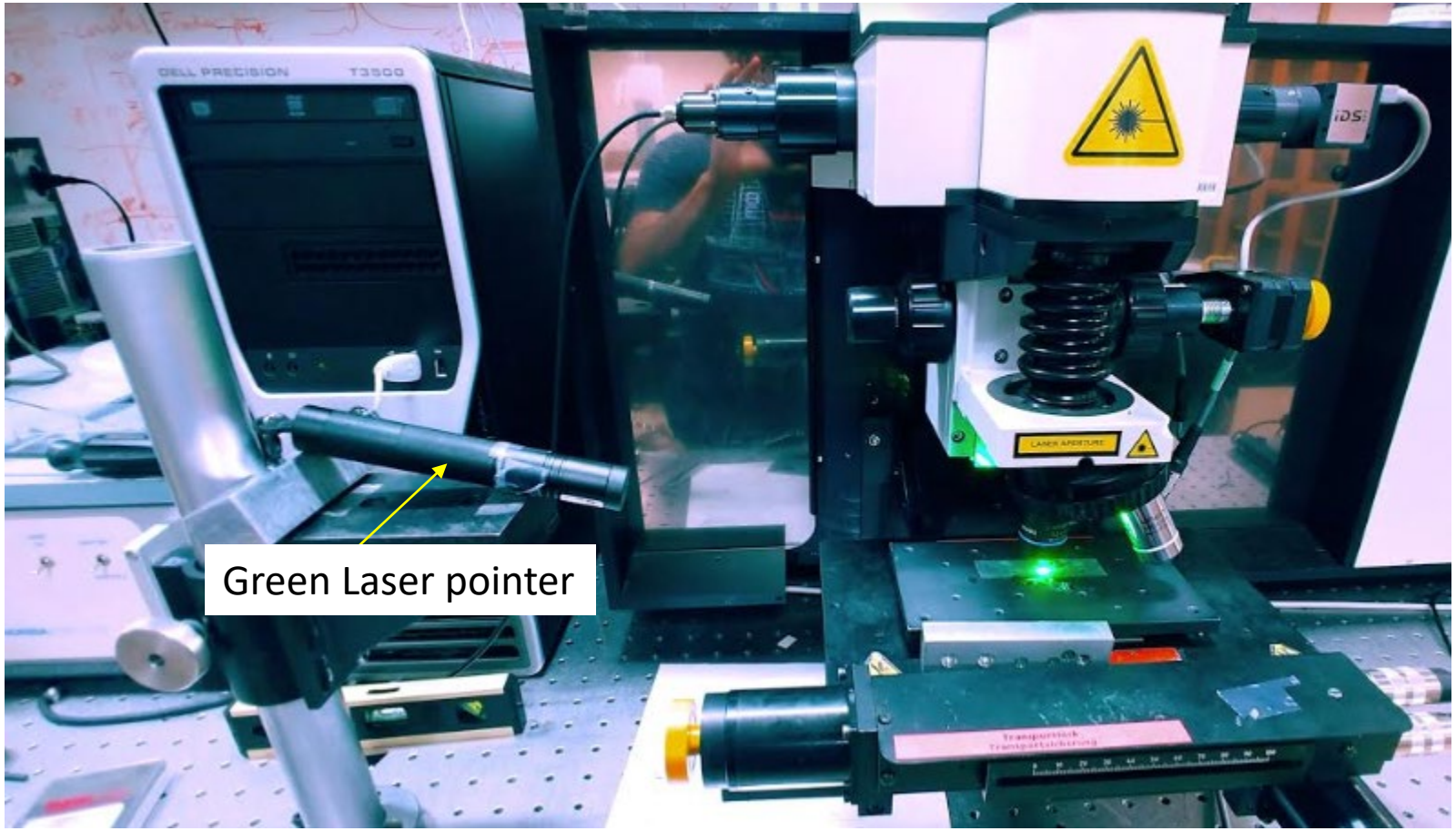



250
200
150
100
50
0
Intensity (kcounts/s)
652
652.5
653
653.5
654
654.5
655
wavelength (nm)
11:55 am no warmup
12:01 pm 5 min. warmp

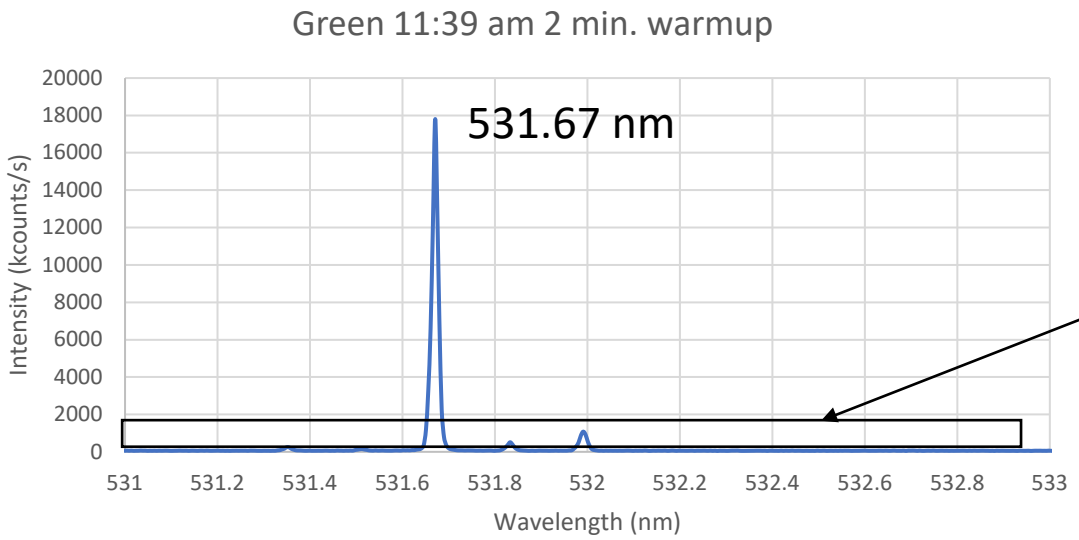

0.5 nm
2000
1500
1000
500
0
Intensity (kcounts/s)
652
652.5
653
653.5
654
654.5
655
wavelength (nm)
10:32 am 5 min. warm up
12:01 pm 5 min. warmup

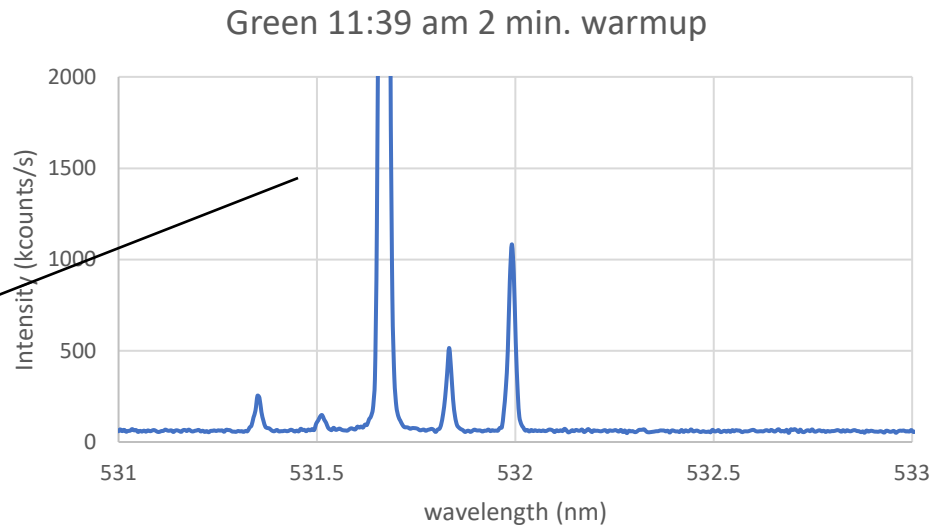
Green

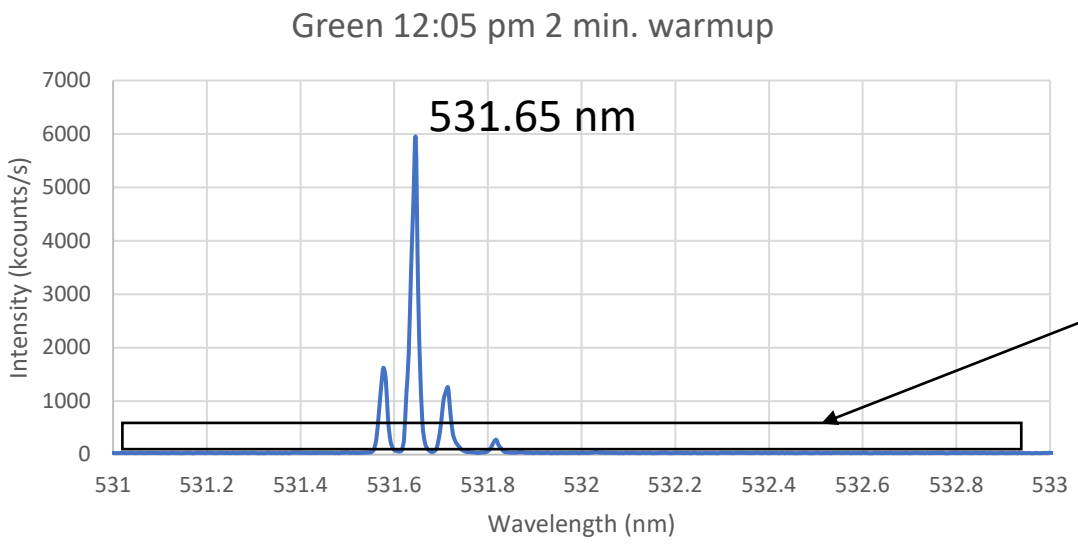
45 mins. Of charging the battery of green laser only can keep it on for less than 5 minutes,
Therefore I could only warm it up for a couple of minutes before making the measurement

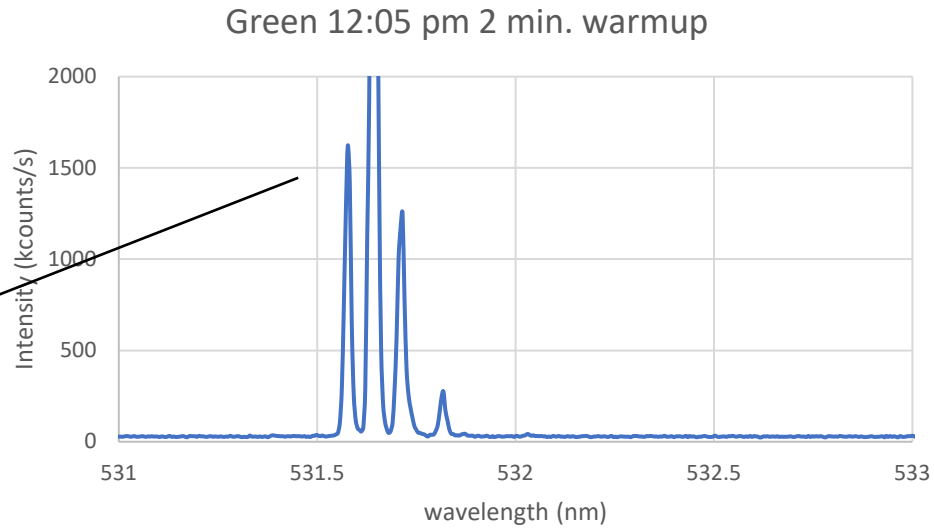


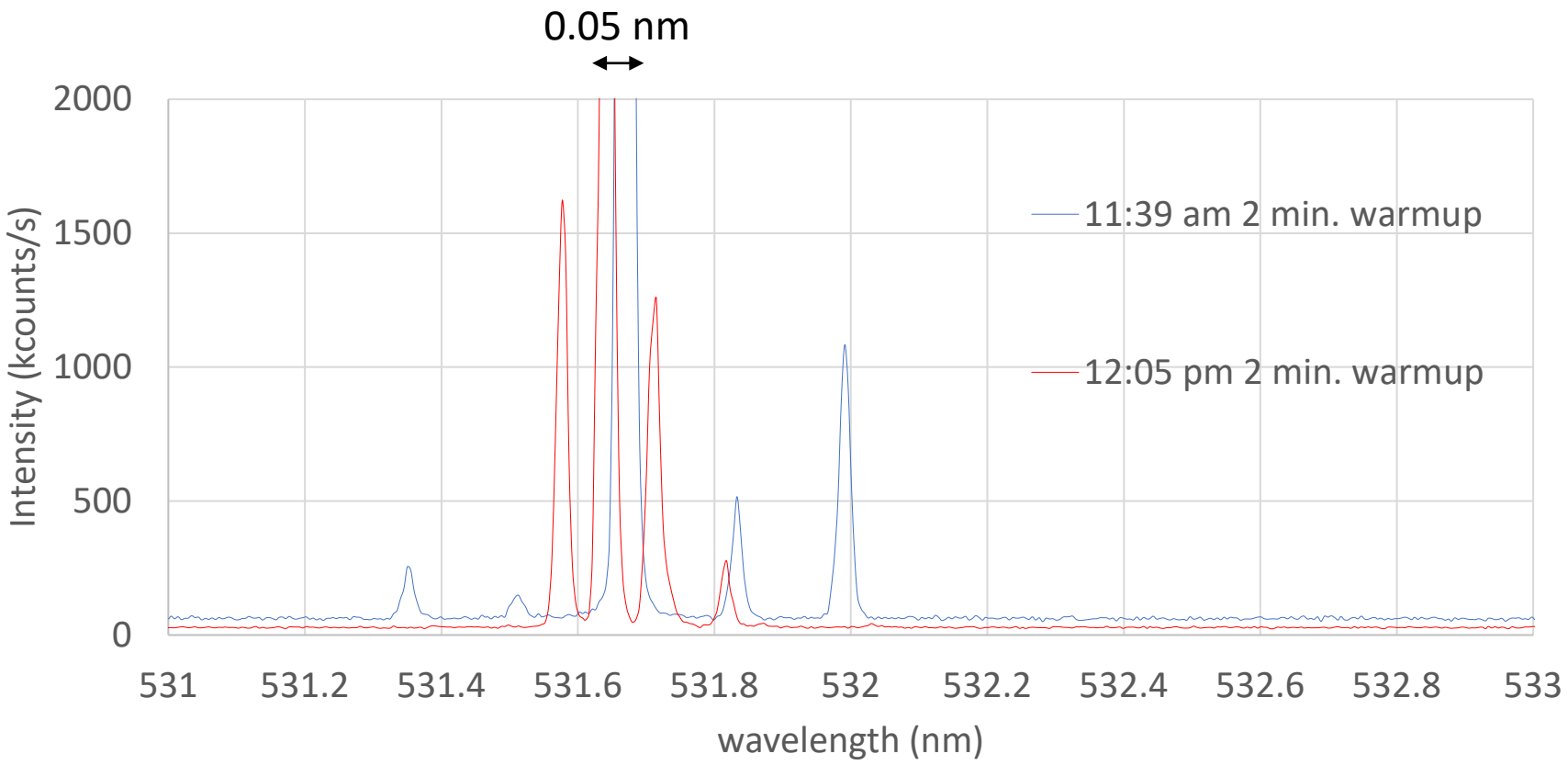
Lab temperature: 21 °C










0.05 nm
2000
1500
1000
500
0
Intensity (kcounts/s)
11:39 am 2 min. warmup
12:05 pm 2 min. warmup
531
531.2
531.4
531.6
531.8
532
532.2
532.4
532.6
532.8
533
wavelength (nm)

Summary

- Red laser’s central wavelength (~653 nm) changes by 0.5 nm in the two measurements made like an hour apart in Horiba LabRam spectrometer.
  Not sure about the effect of distance from which the laser is shined to the surface under the objective lens.

- Green laser’s central wavelength (~531.6 nm) changes by 0.05 nm in the two measurements made like 30 mins. apart.