Mars vs. Earth

Sam Clegg

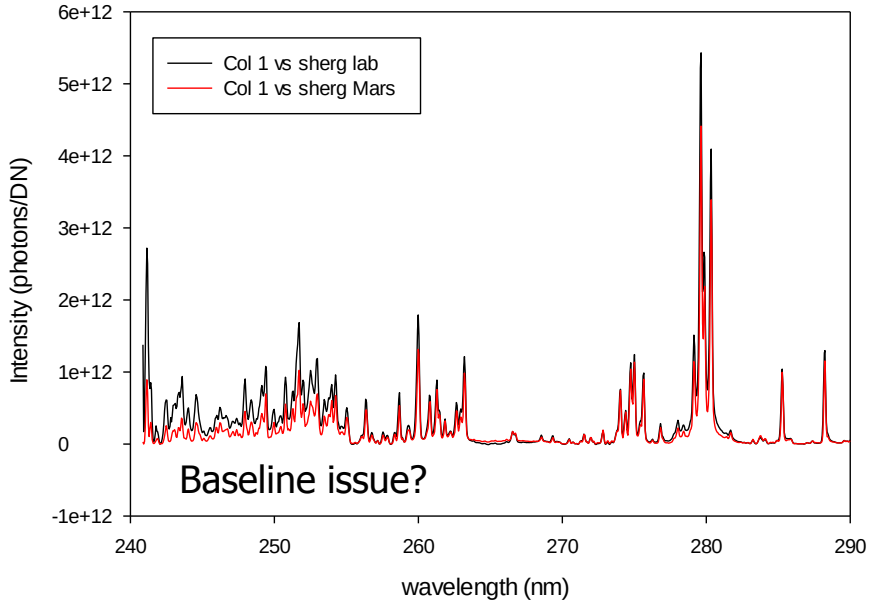
ChemCam

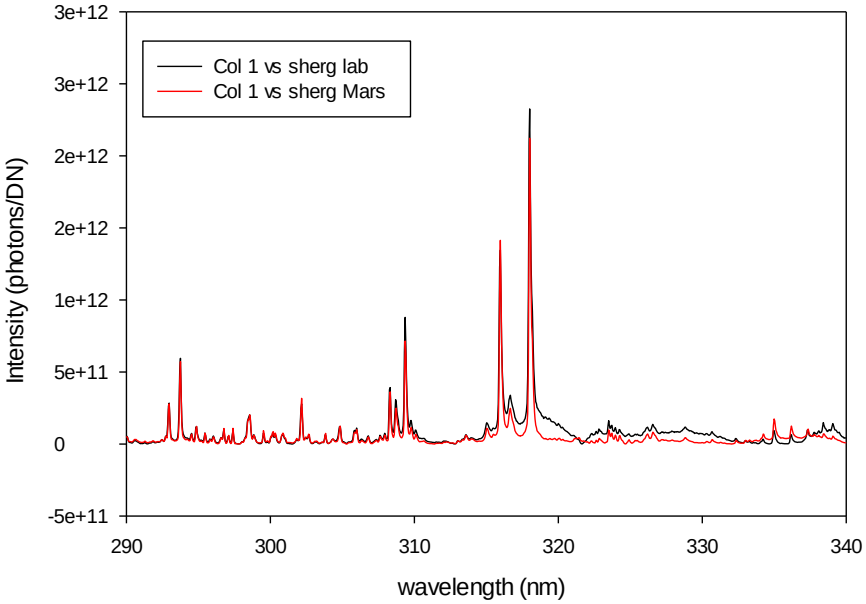
Mars Science Laboratory

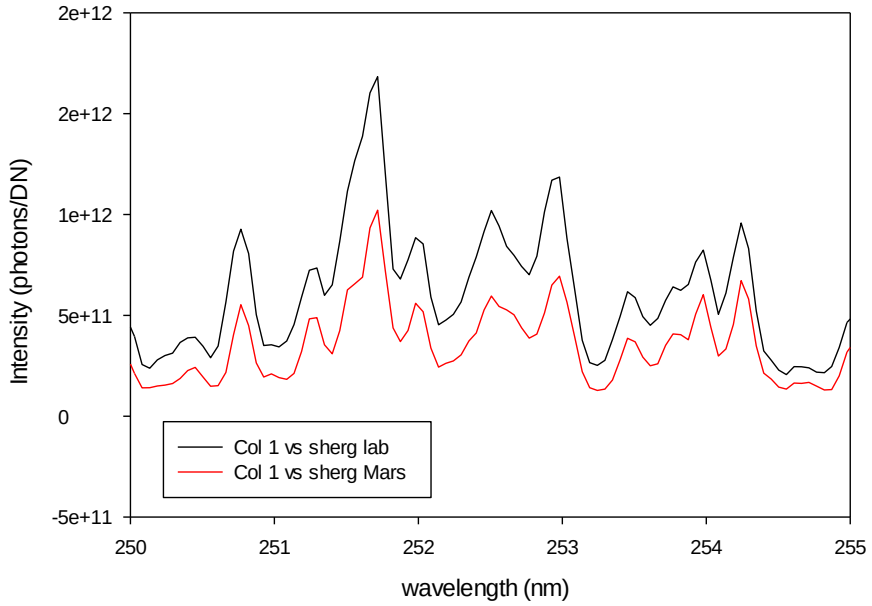
Experimental

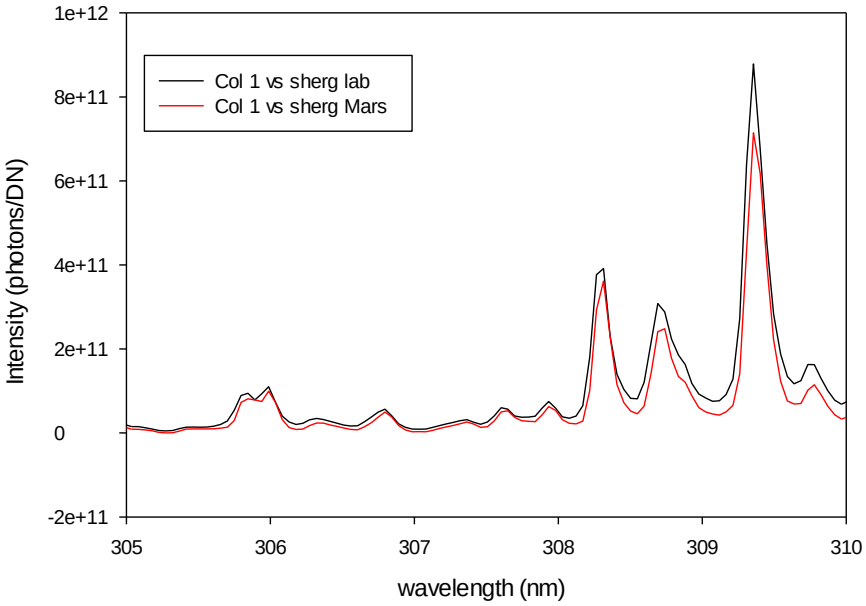
- Compare the CCCT Spectra from Mars and Lab
  - Mars Data
    - Mars data from sol 706 (most recent)
    - Autofocus, 30 laser shots, 100A/95A/95A
  - Lab Data
    - 1.6 m standoff distance
    - 50 laser shots, max energy
    - Average from 5 locations
  - Normalization
    - All UV and VIS Pixels
    - VNIR up to 840 nm – explained on slide 5

UV – no norm

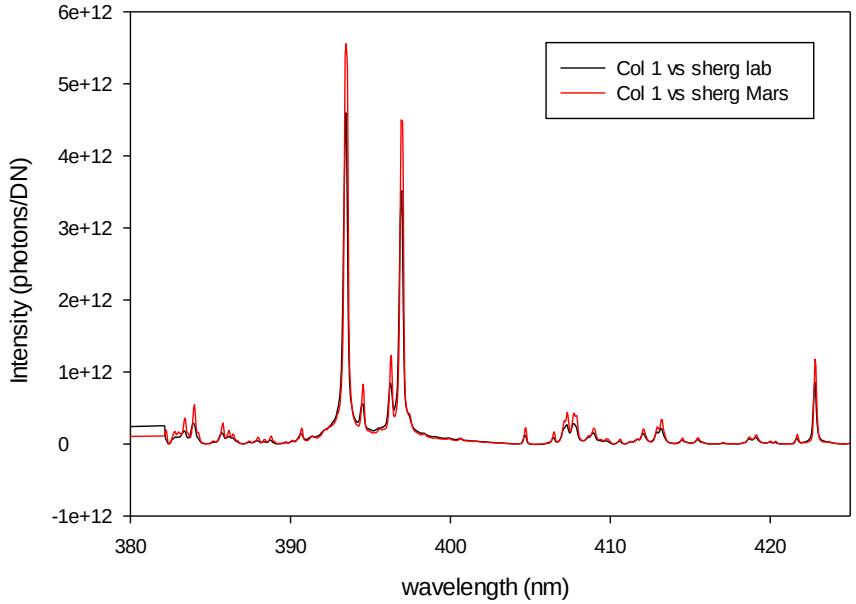

Col 1 vs sherg lab
Col 1 vs sherg Mars
Baseline issue?
Intensity (photons/DN)
wavelength (nm)

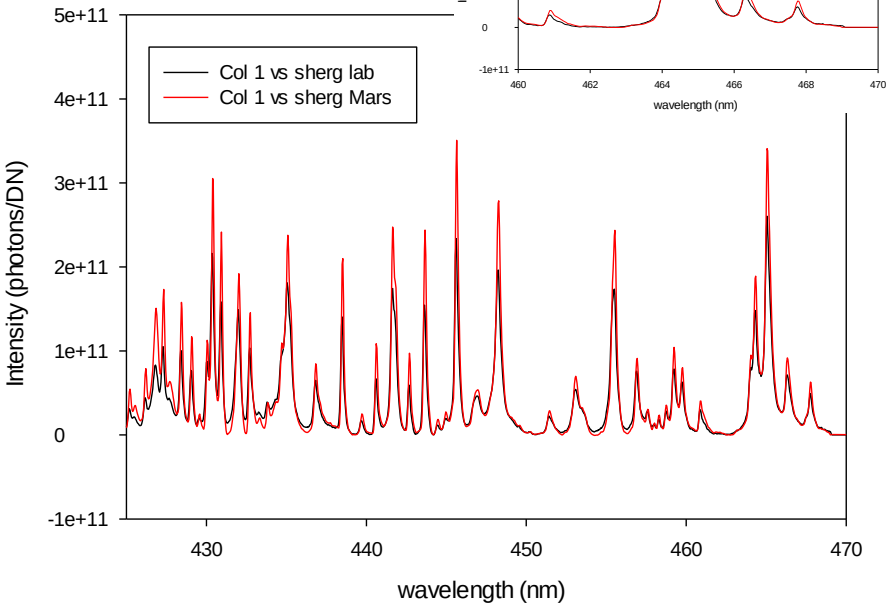

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)

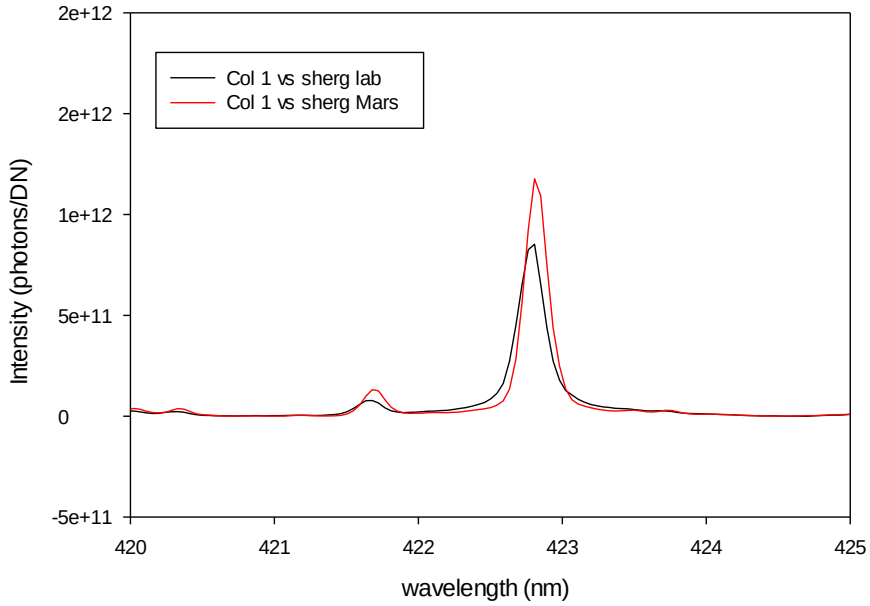

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)

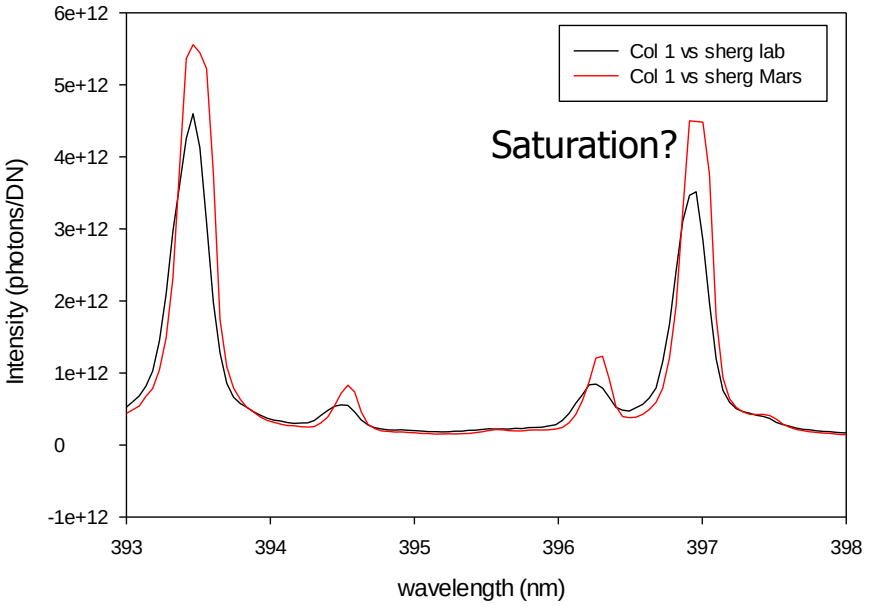

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)

VIS – no norm

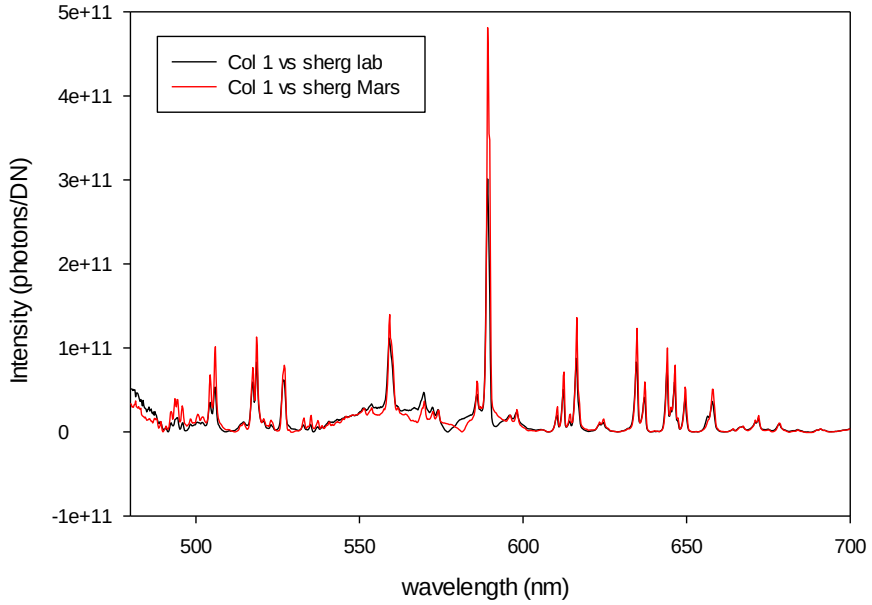

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)

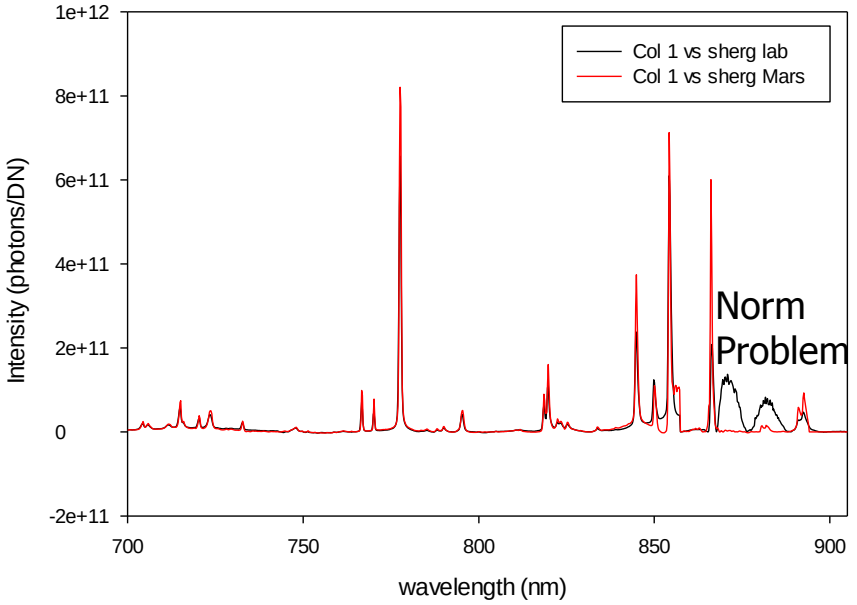

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)

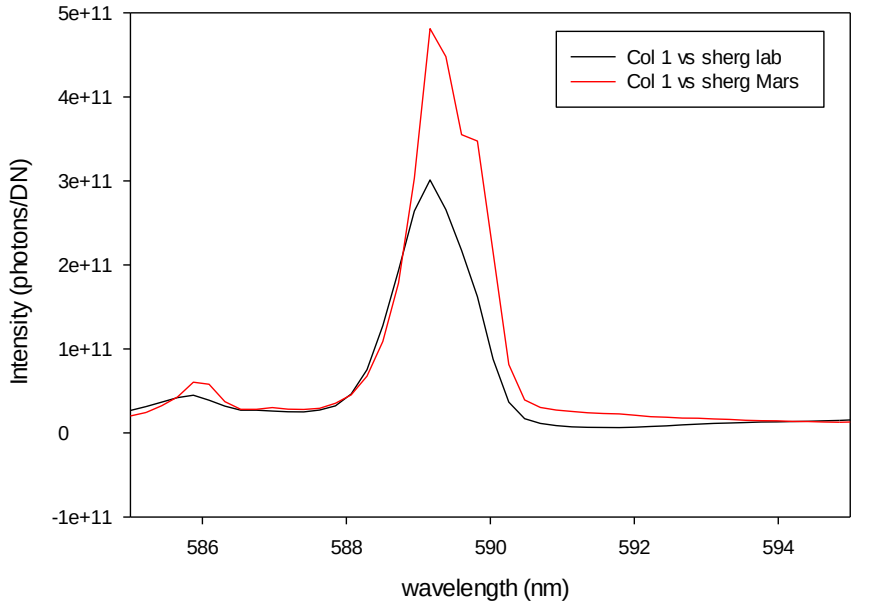

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)

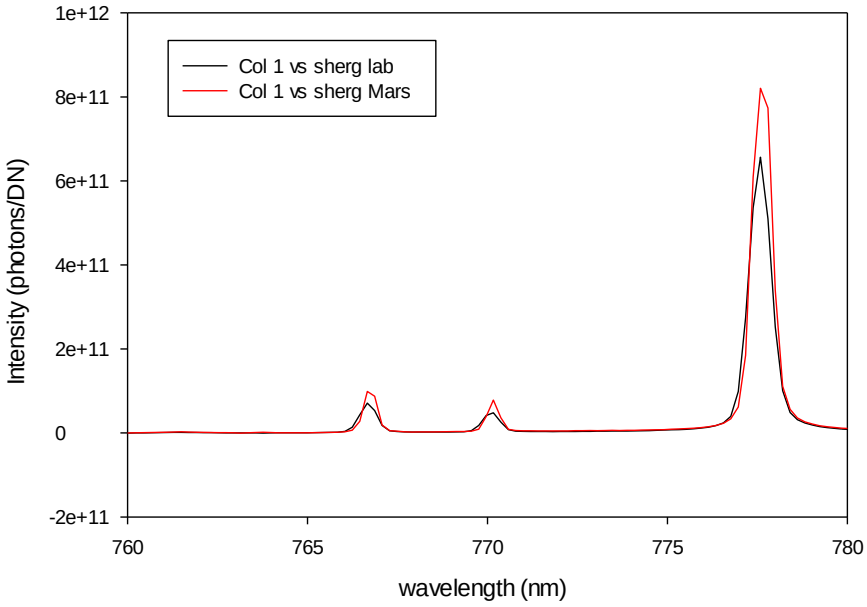

Col 1 vs sherg lab
Col 1 vs sherg Mars
Saturation?
Intensity (photons/DN)
wavelength (nm)

VNIR – no norm

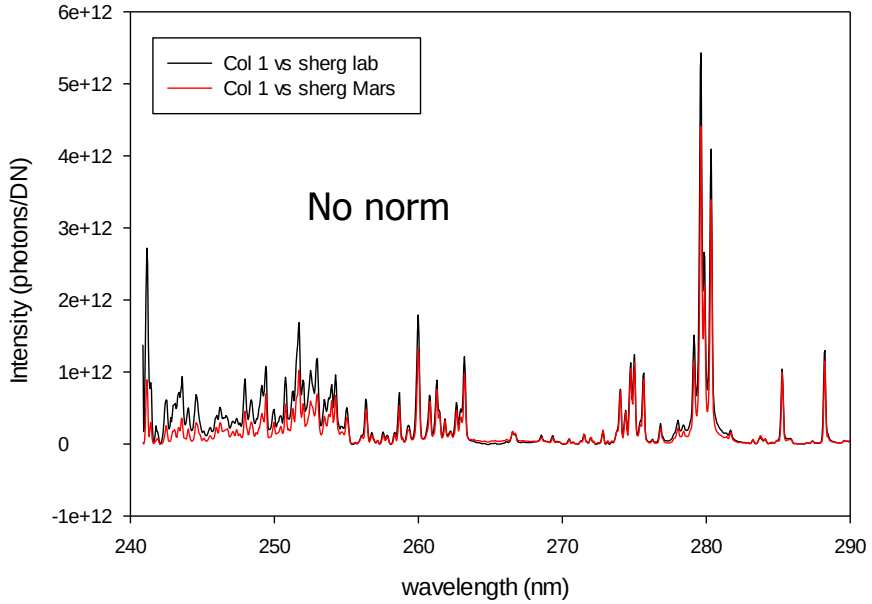

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)
5e+11
4e+11
3e+11
2e+11
1e+11
0
-1e+11
500
550
600
650
700

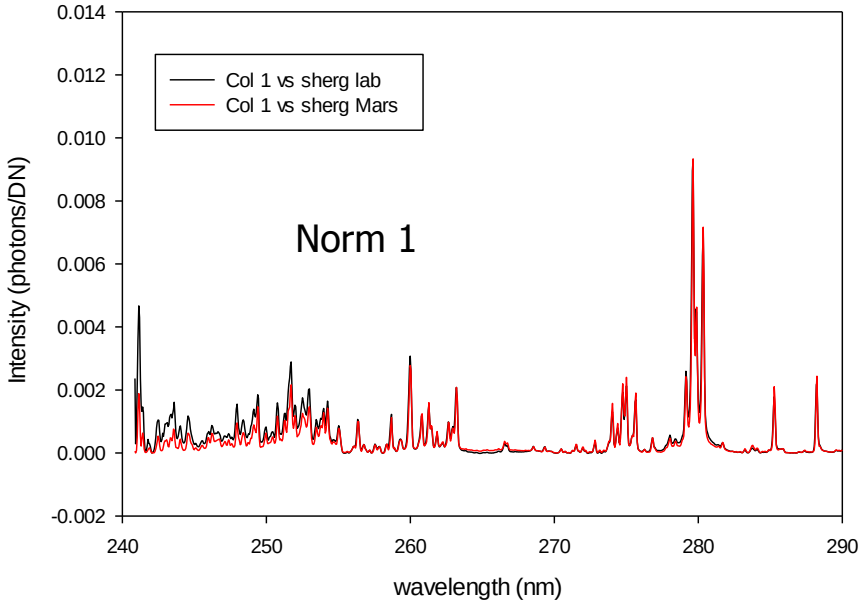

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)
Norm
Problem
1e+12
8e+11
6e+11
4e+11
2e+11
0
-2e+11
700
750
800
850
900

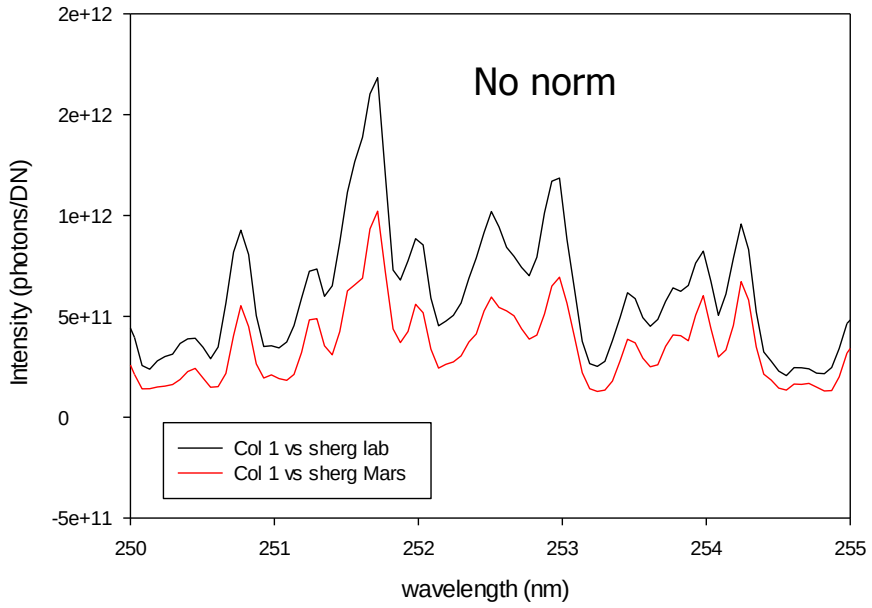

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)
5e+11
4e+11
3e+11
2e+11
1e+11
0
-1e+11
586
588
590
592
594

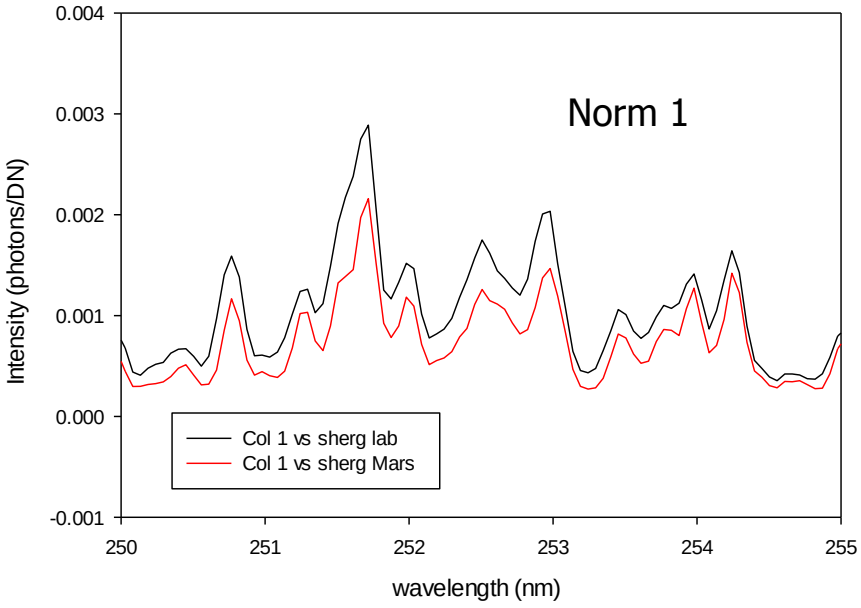

Col 1 vs sherg lab
Col 1 vs sherg Mars
Intensity (photons/DN)
wavelength (nm)
1e+12
8e+11
6e+11
4e+11
2e+11
0
-2e+11
760
765
770
775
780

UV1 – no norm vs. norm1

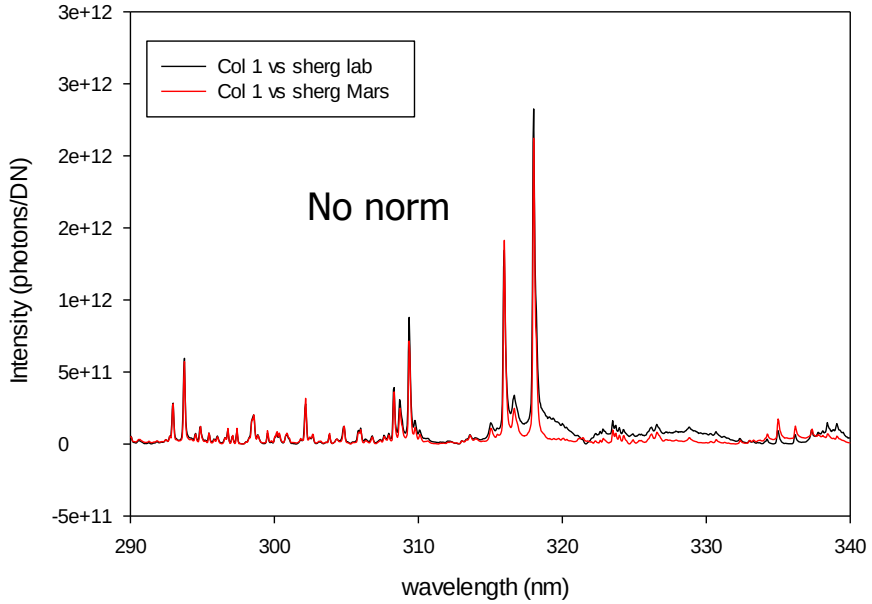


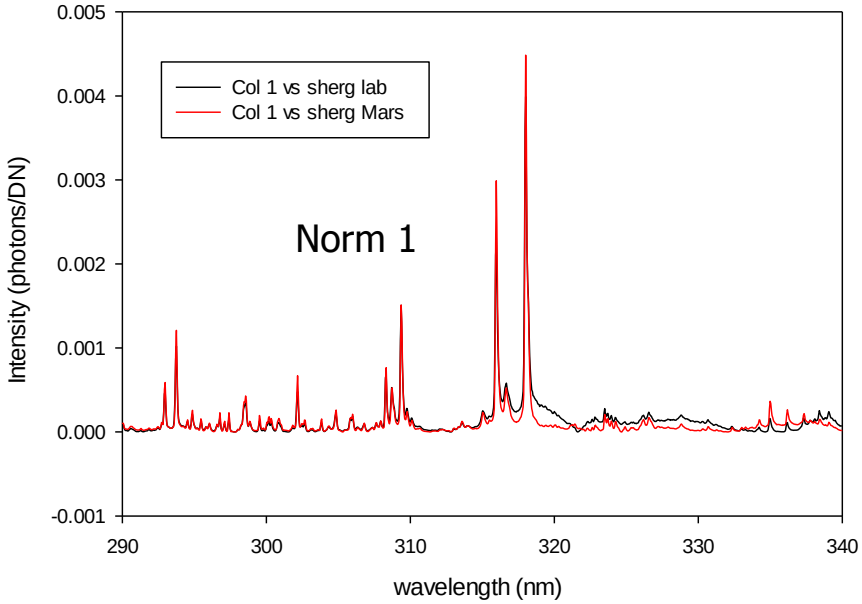


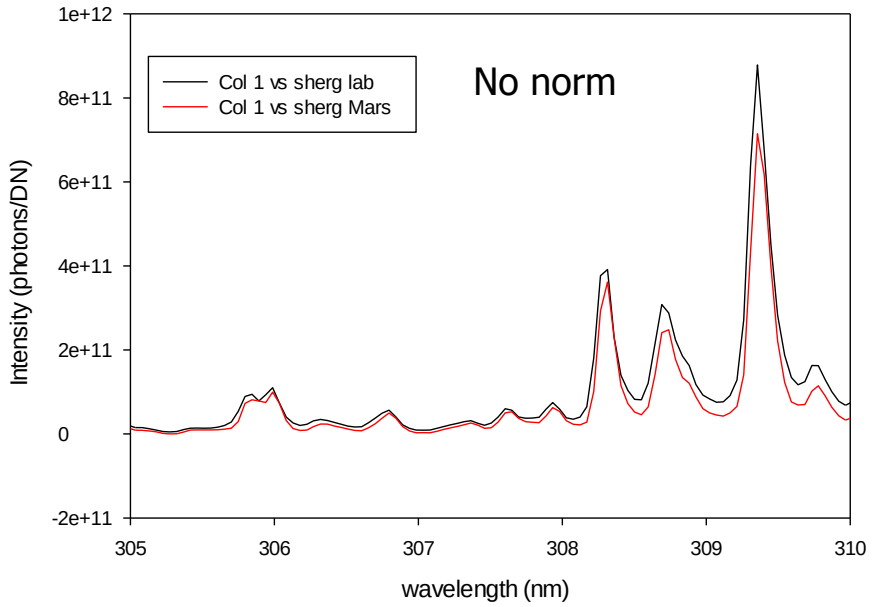


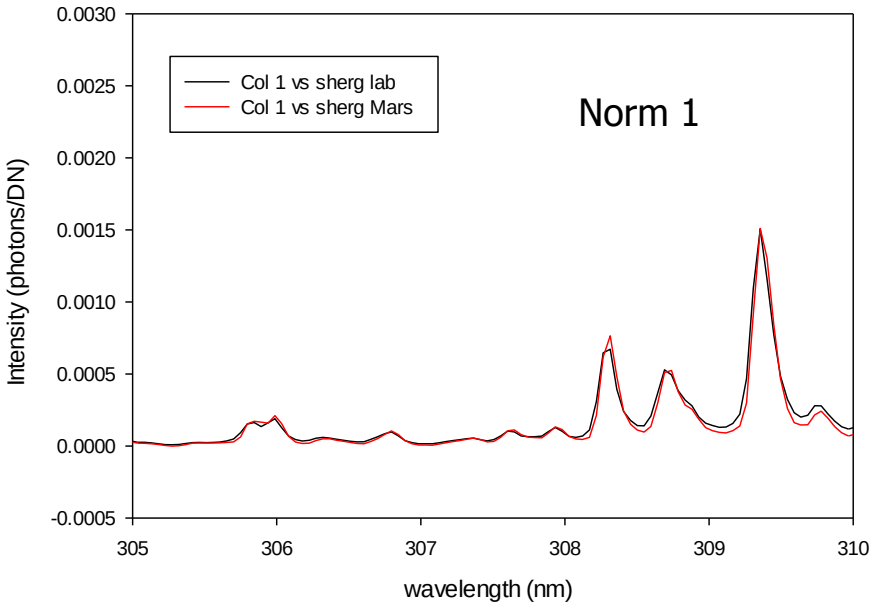


UV2 – no norm vs. norm1

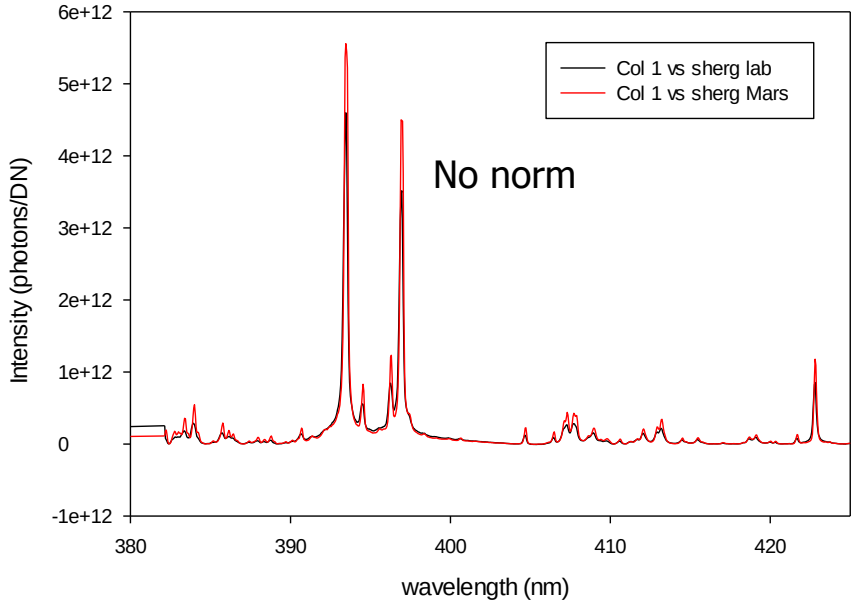


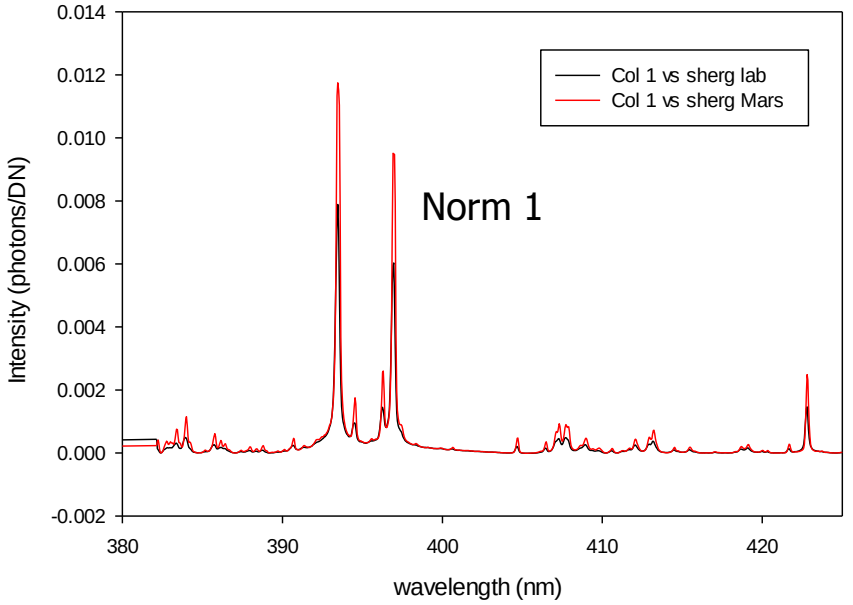


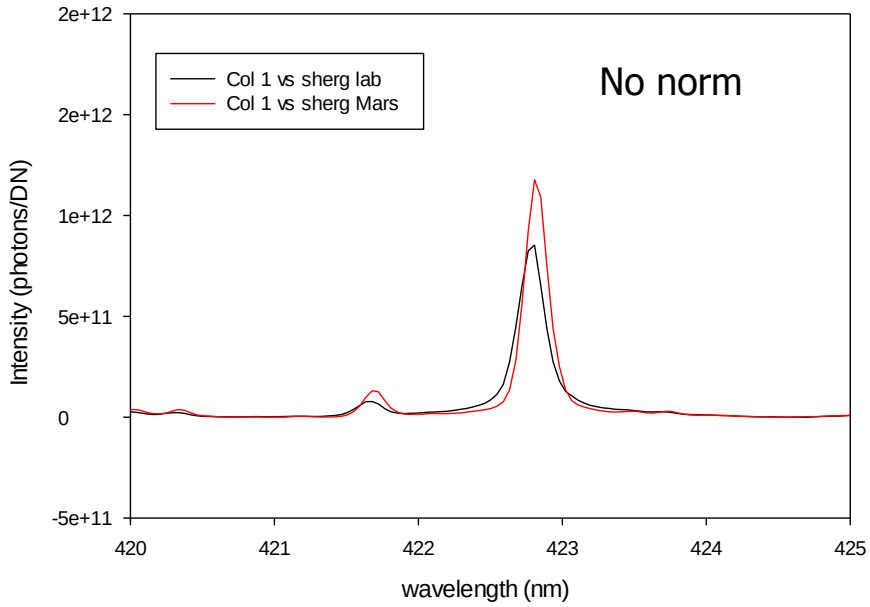


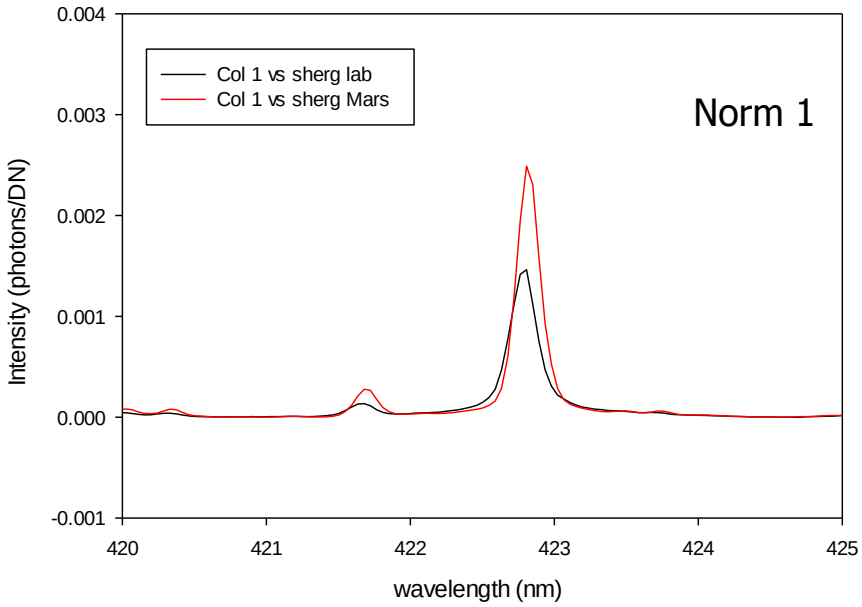


VIS1 – no norm vs norm1

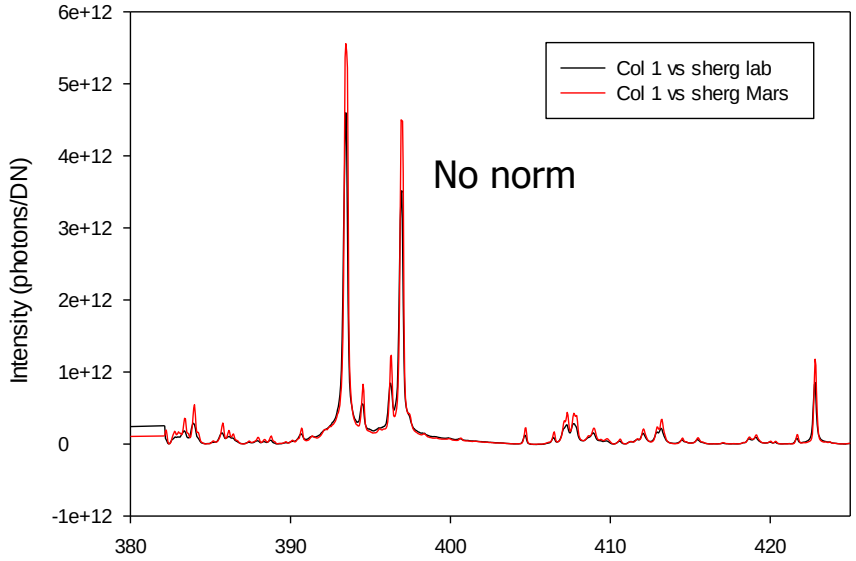


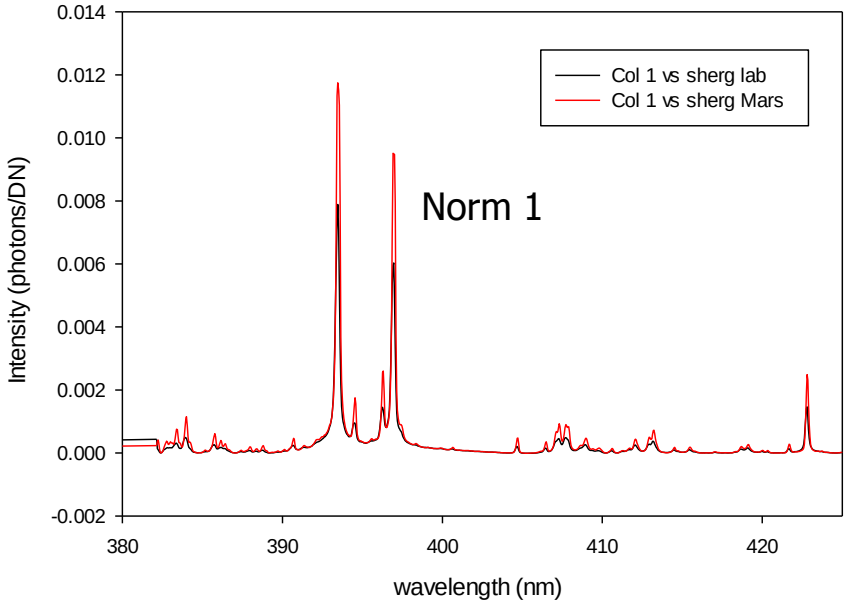


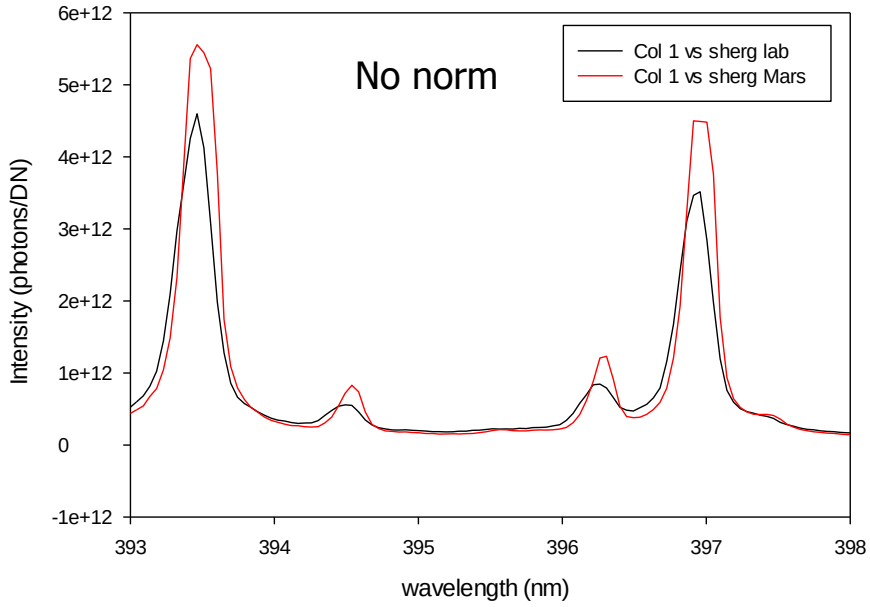


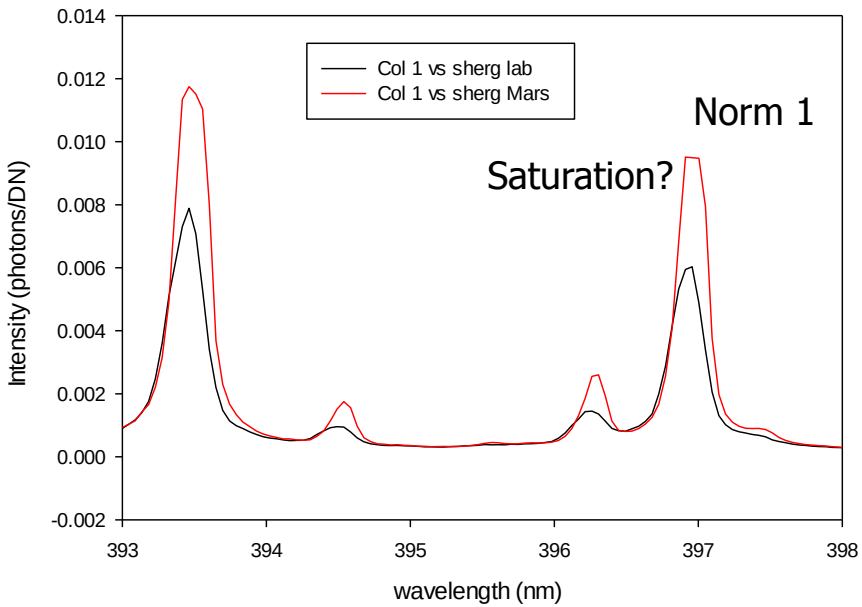


VIS1 – no norm vs norm1

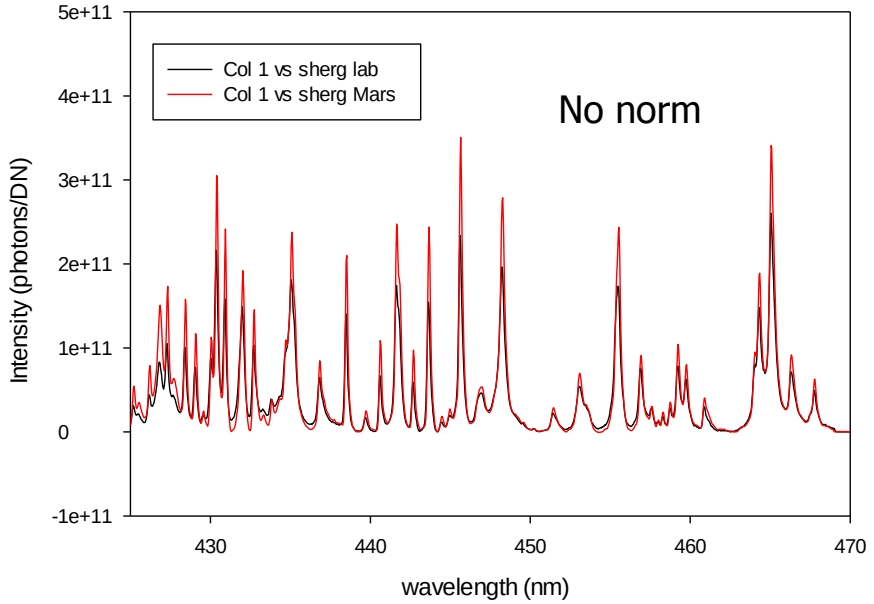


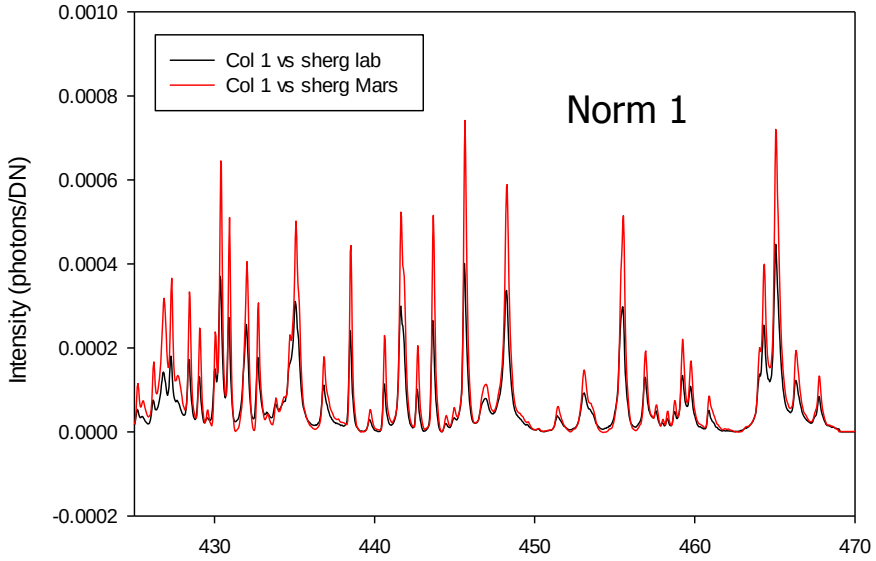


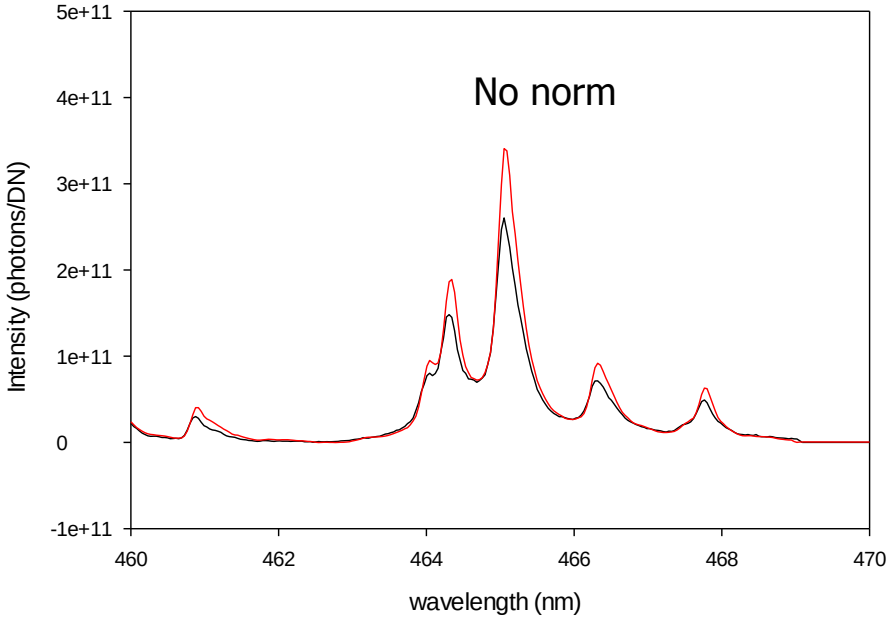


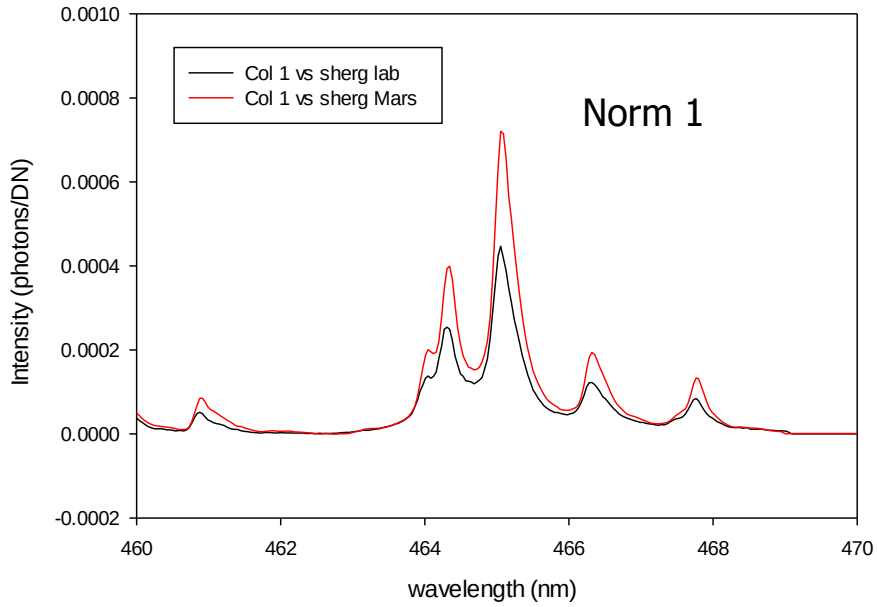


VIS2 – no norm vs norm1

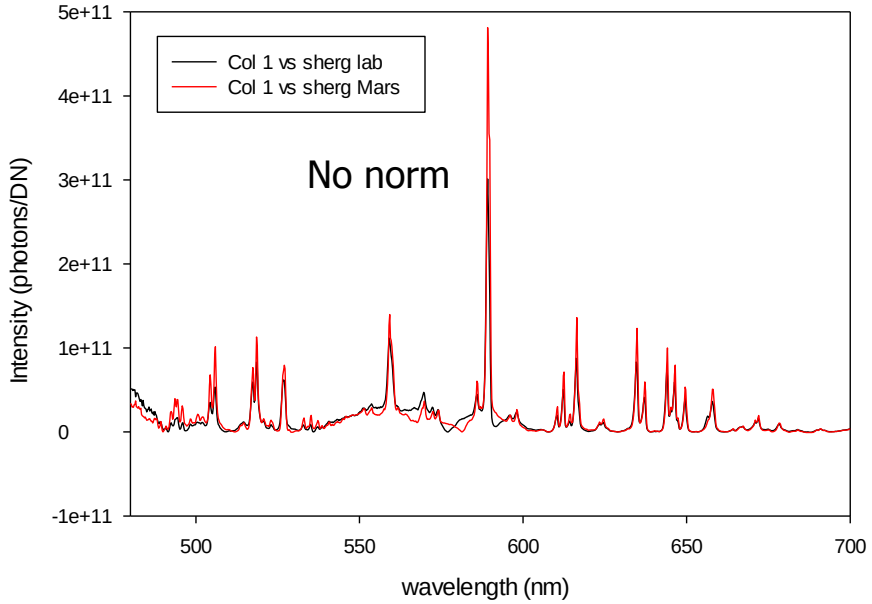


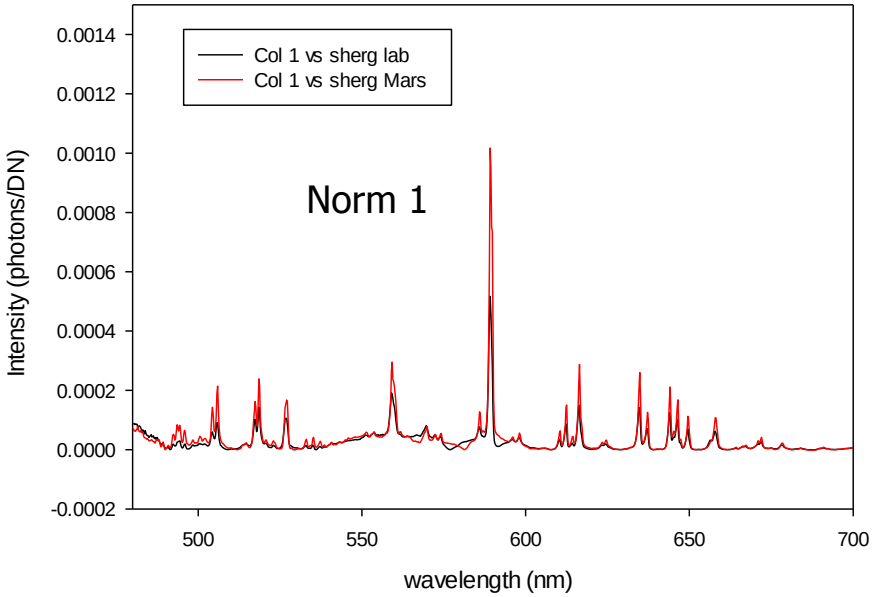


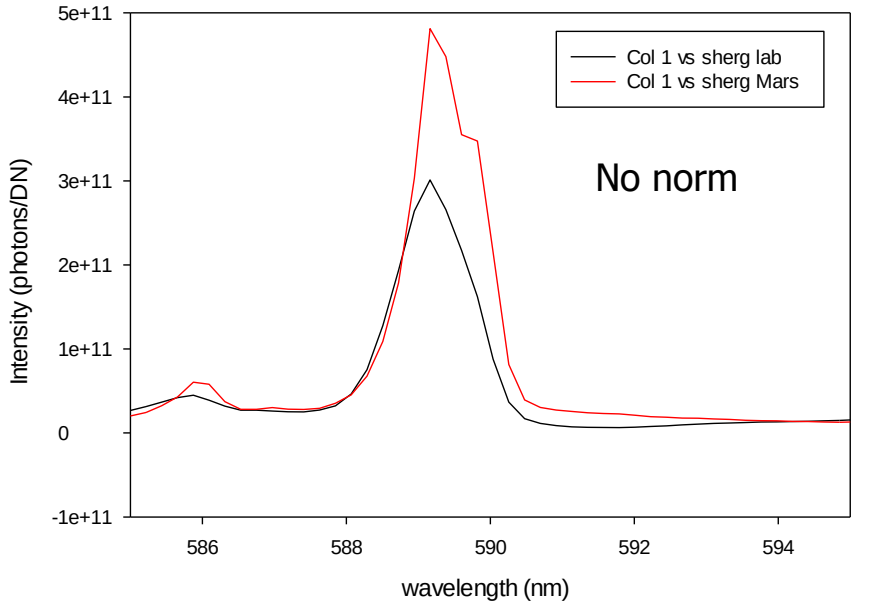


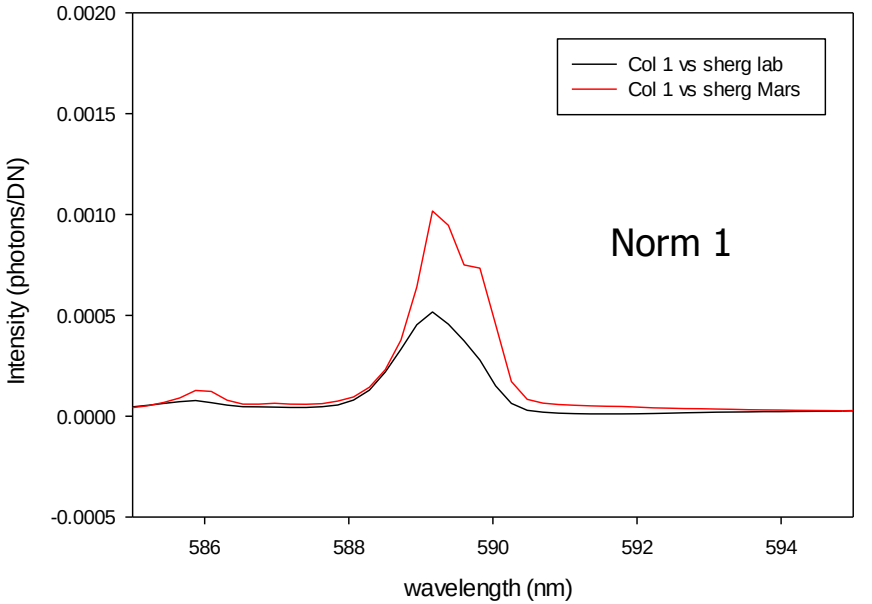


VNIR1 – no norm vs norm1

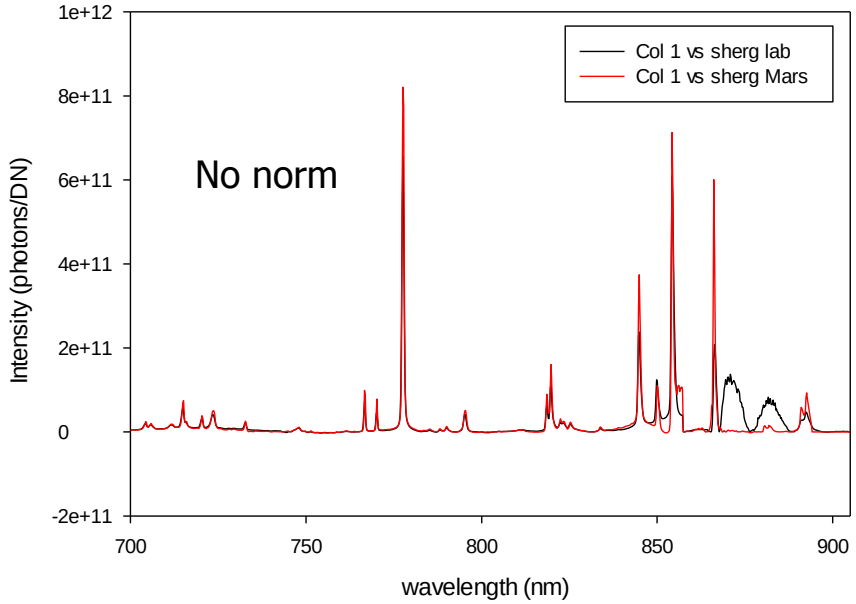


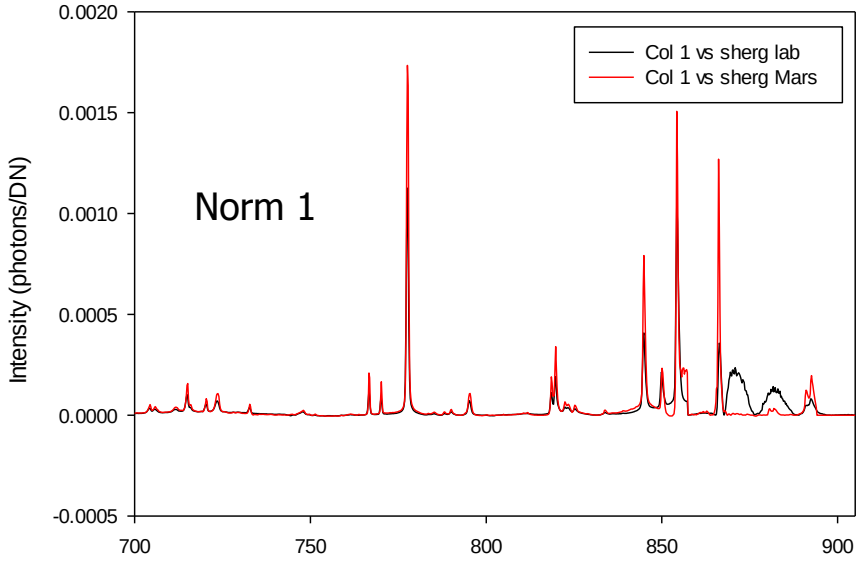


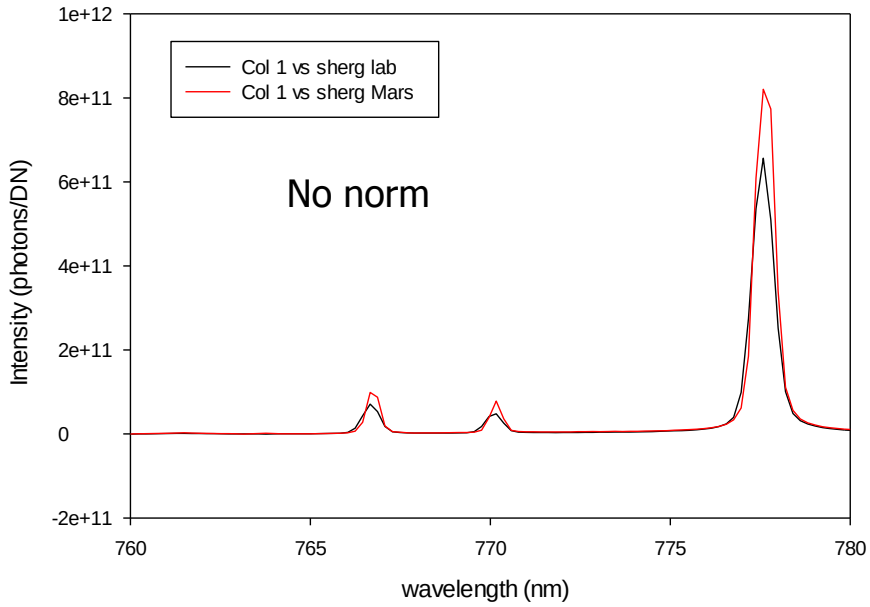


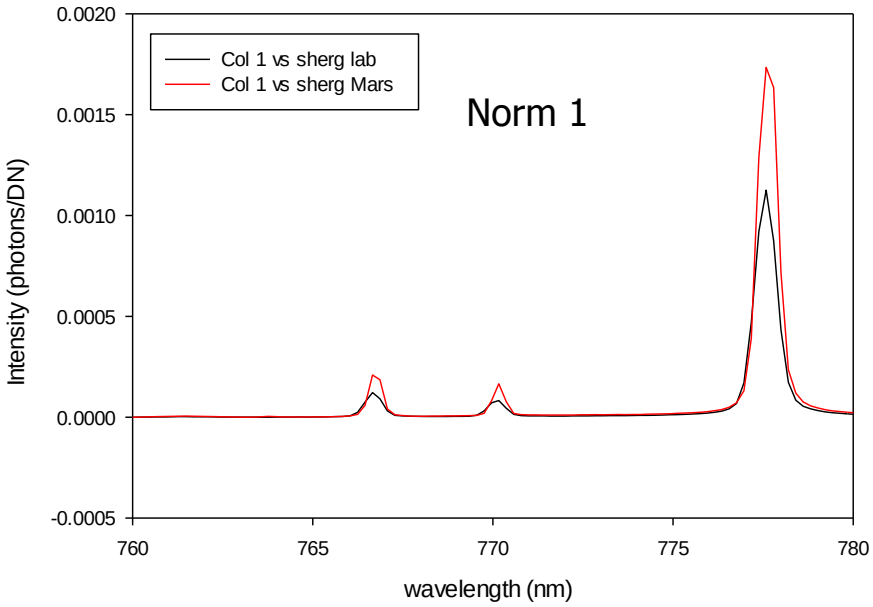


VNIR2 – no norm vs. norm1

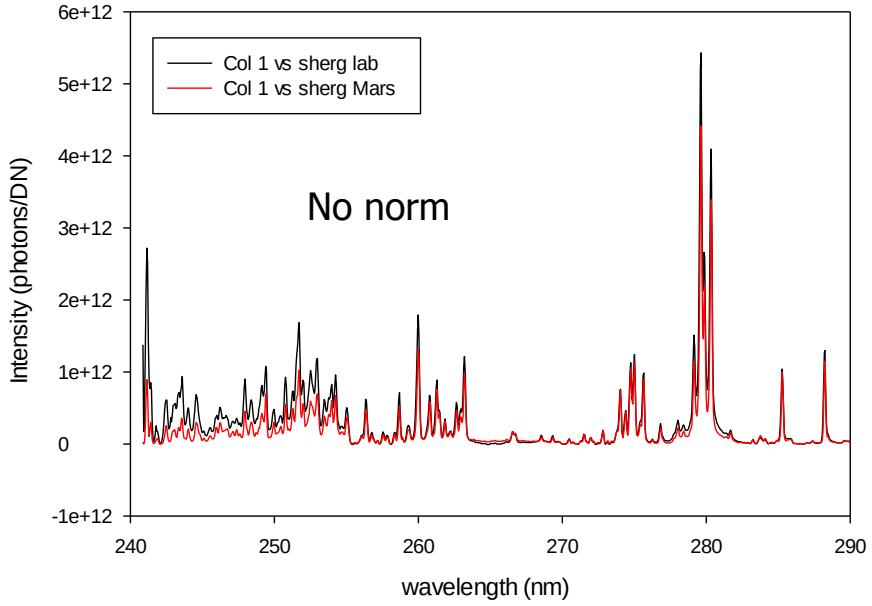


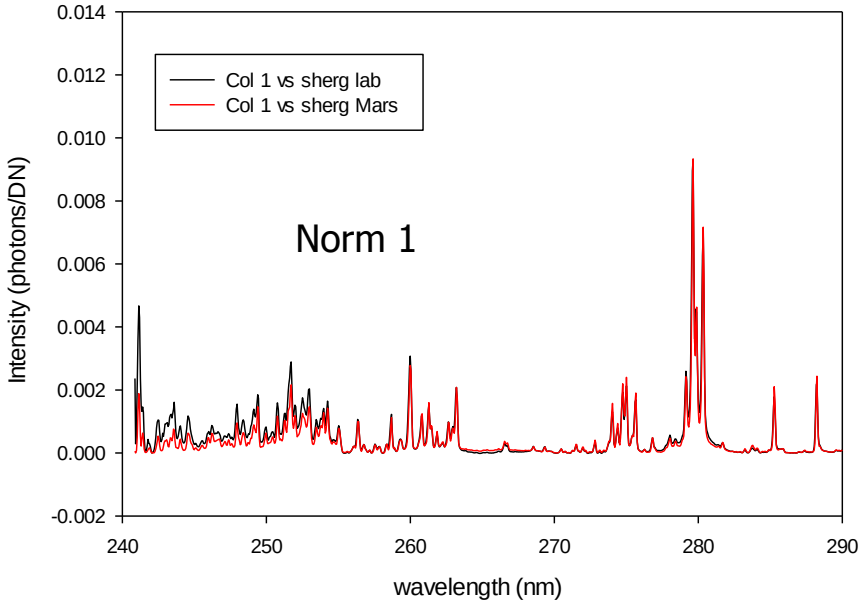


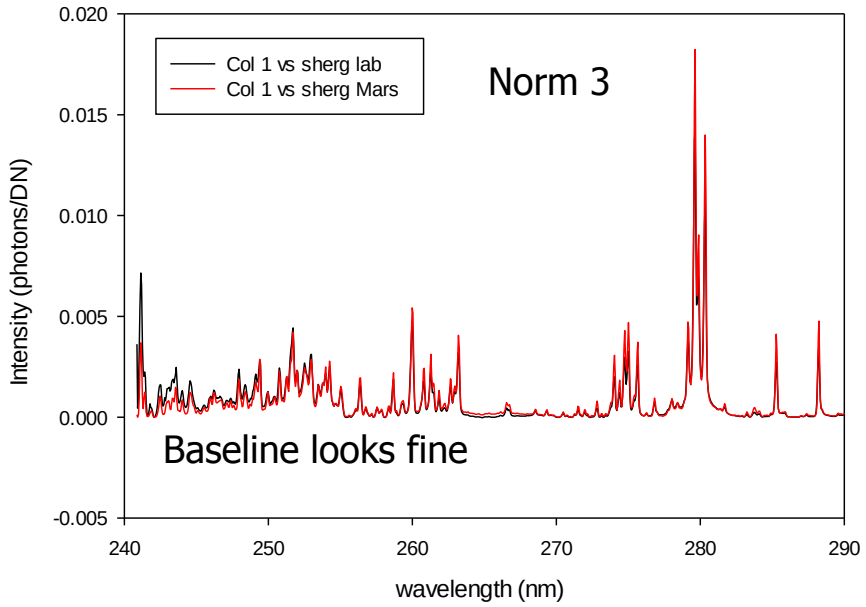


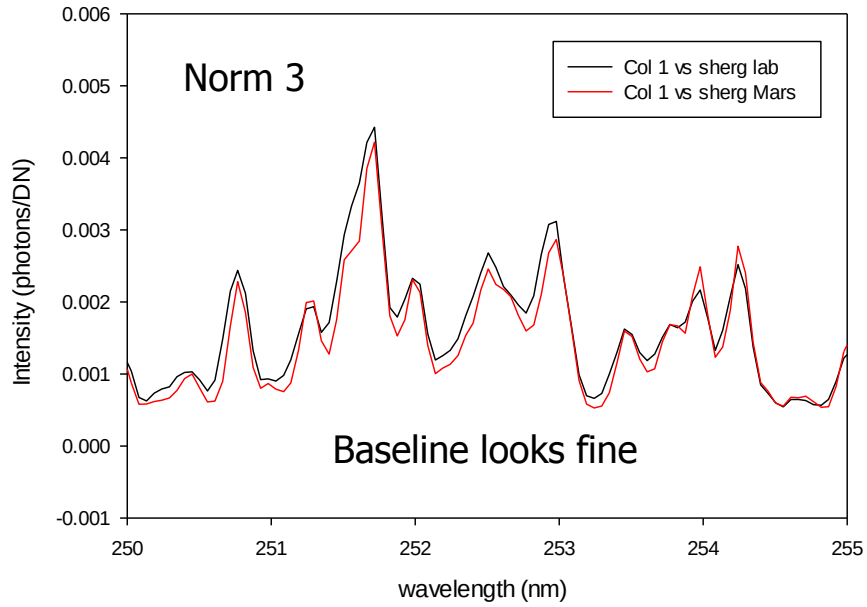


UV1 – no norm vs. norm1, 3

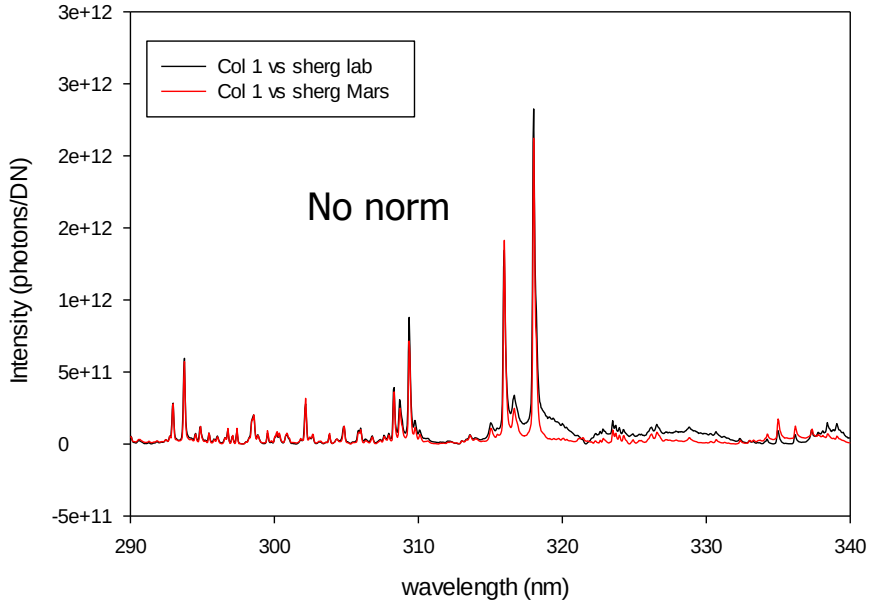


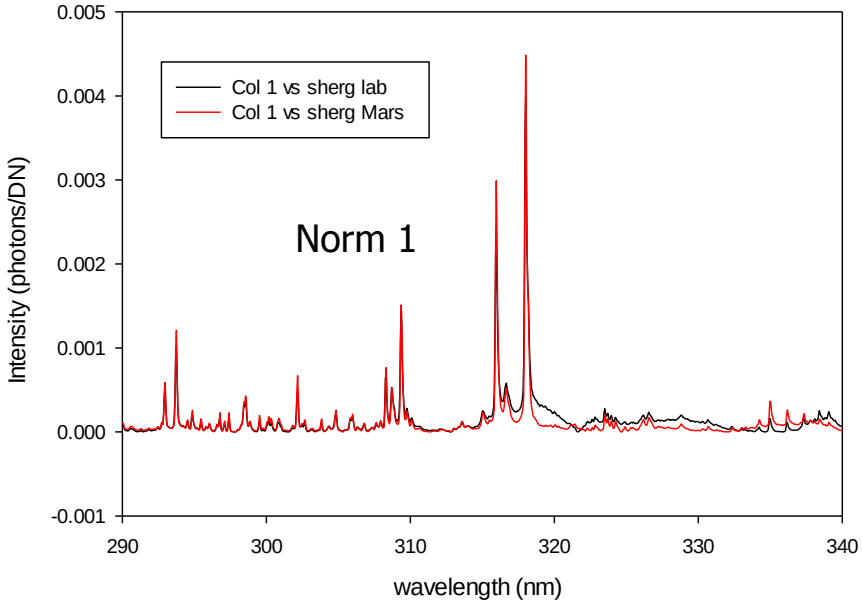


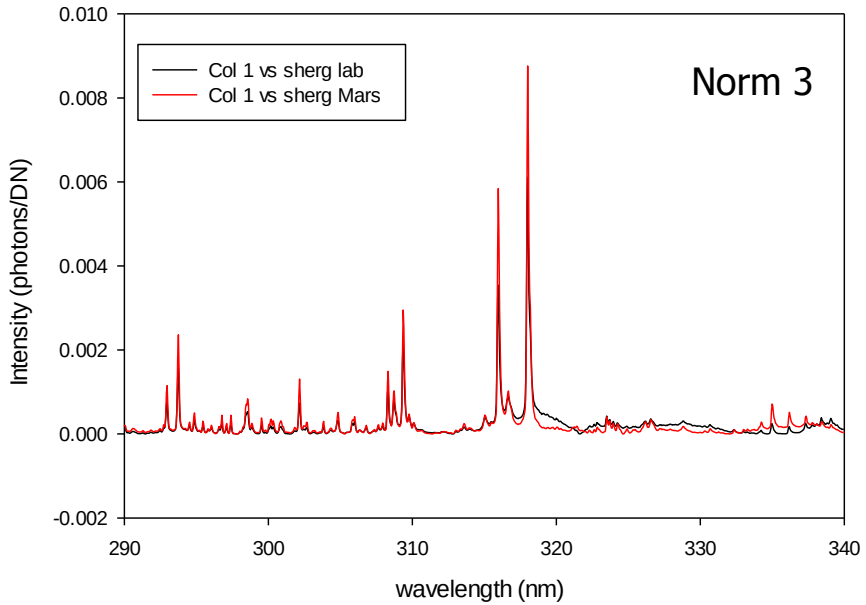


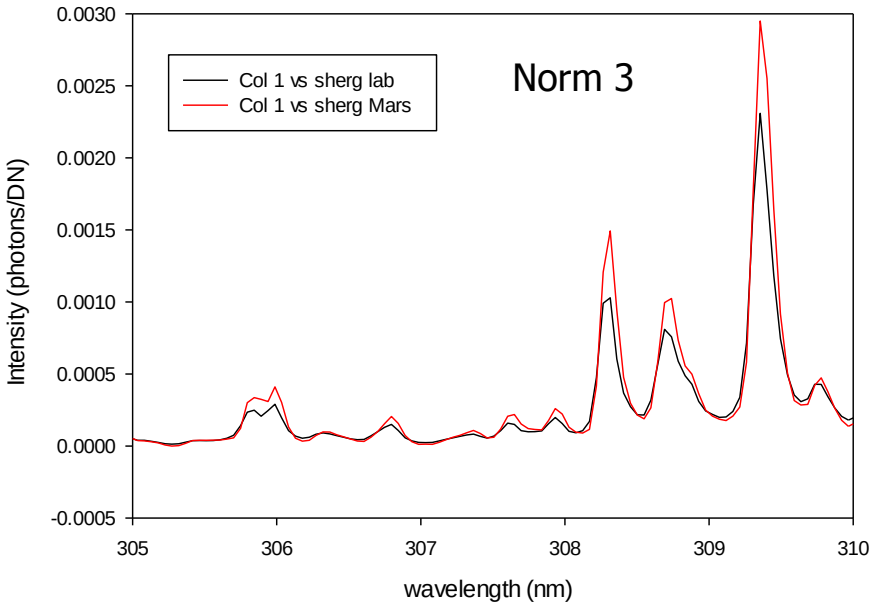


UV2 – no norm vs. norm1, 3

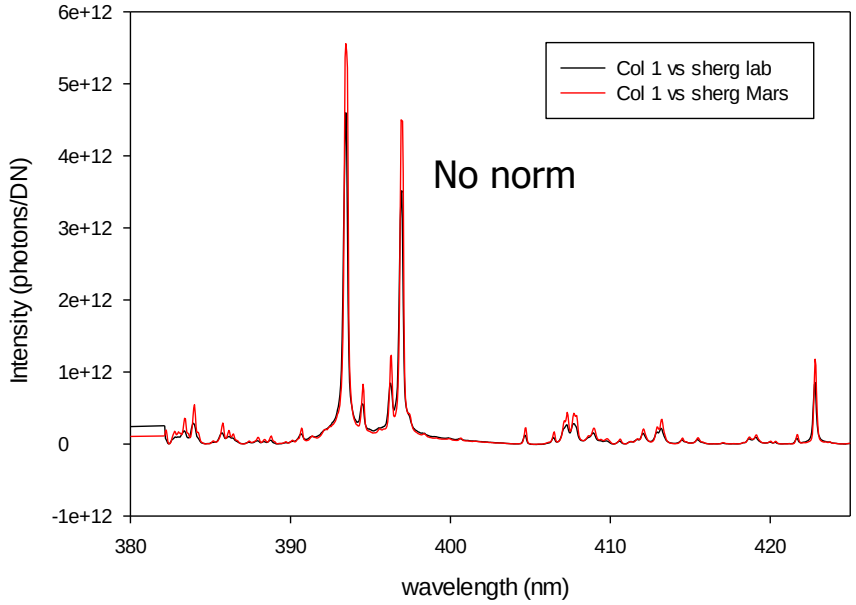


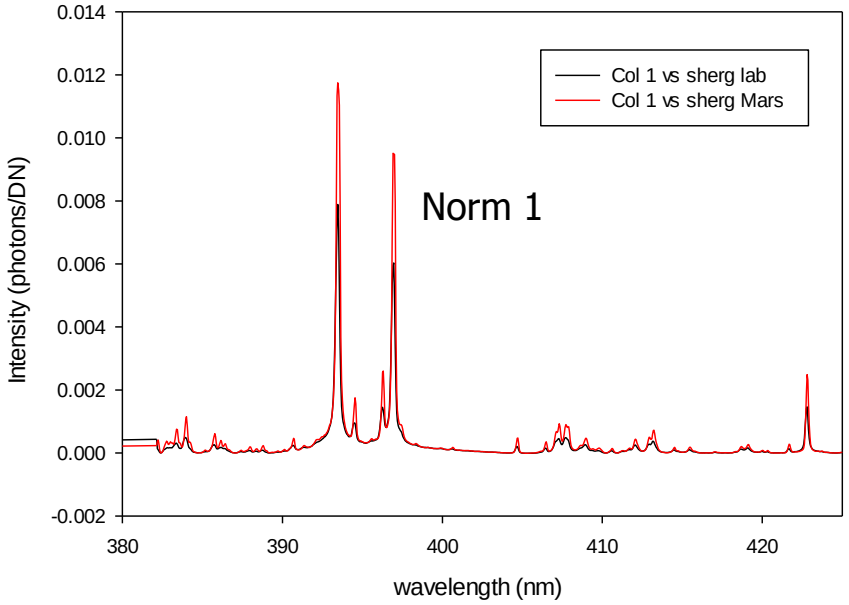


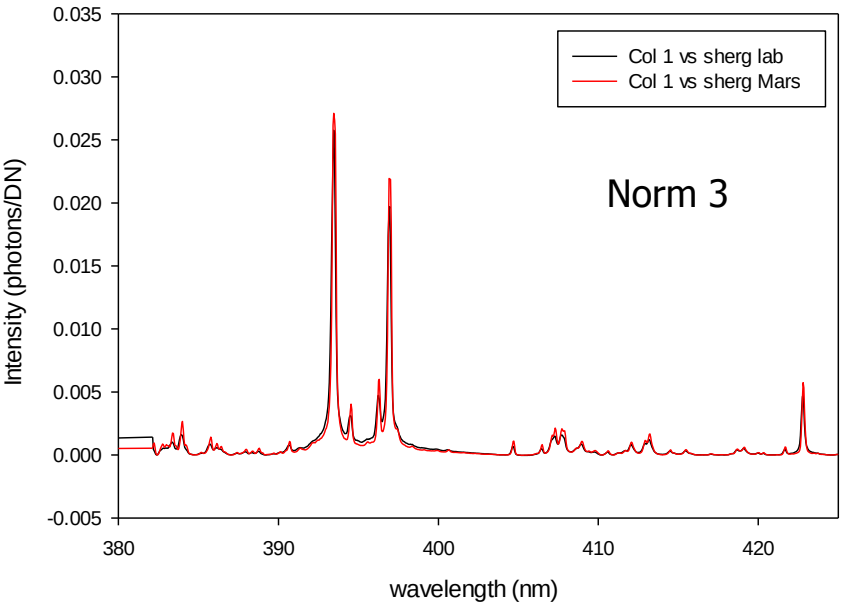


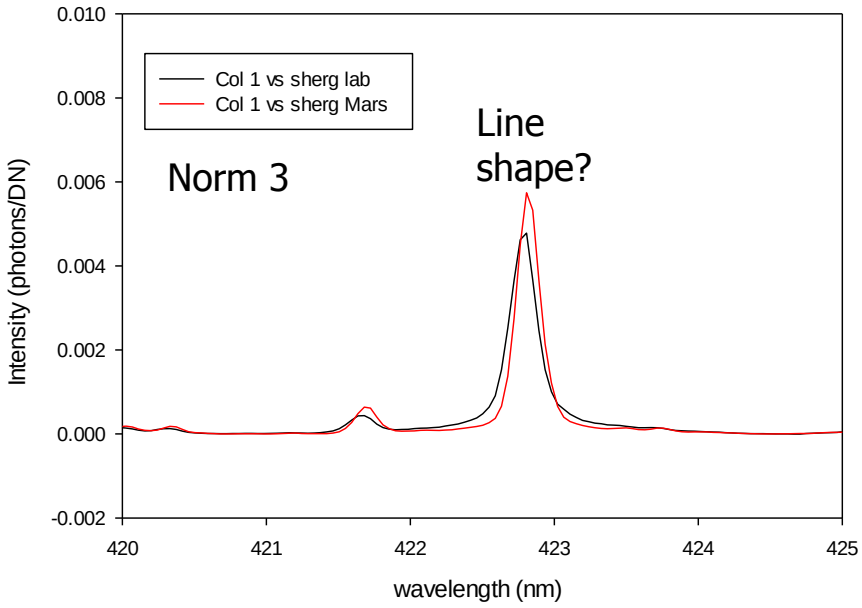


VIS1 – no norm vs norm1, 3

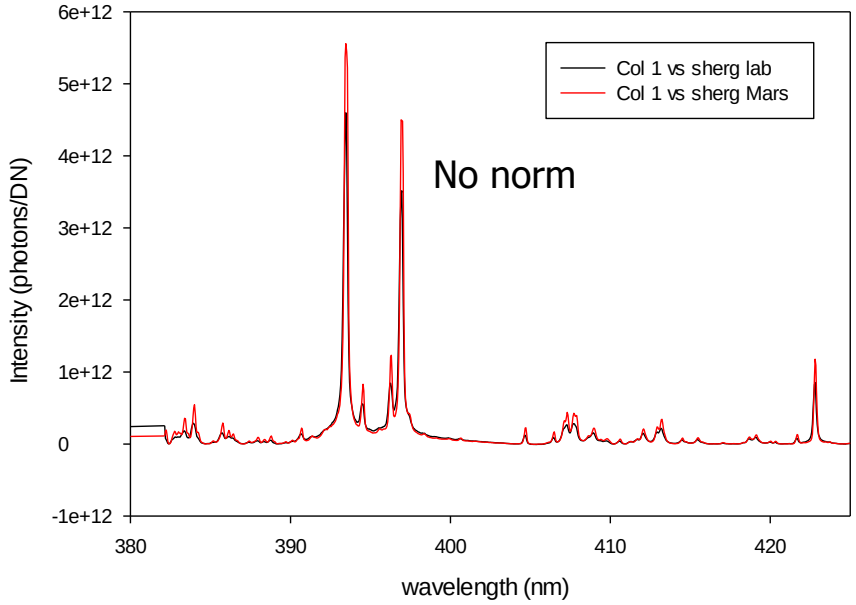


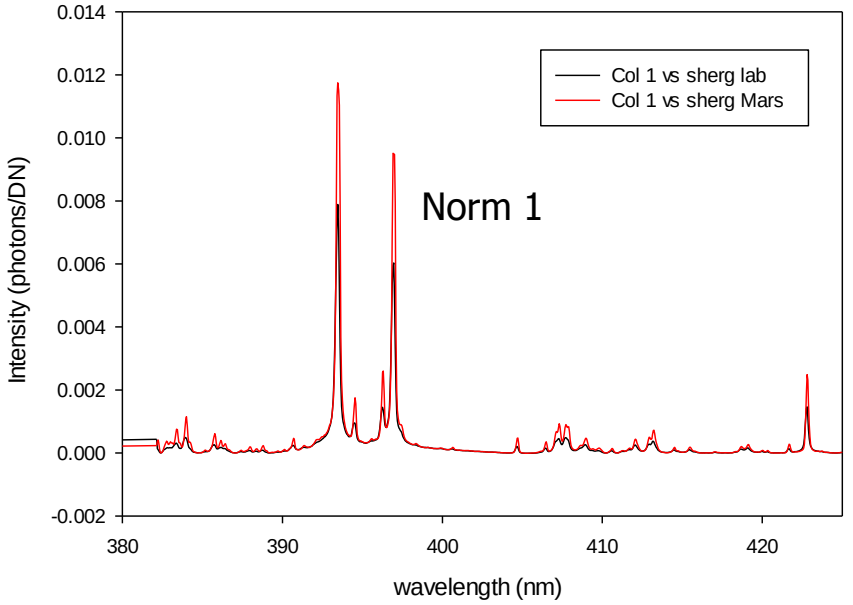


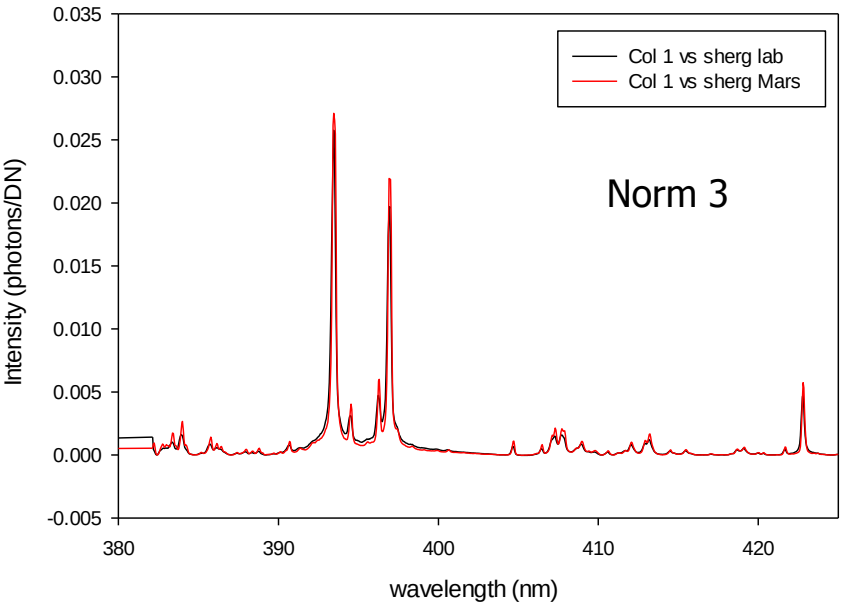


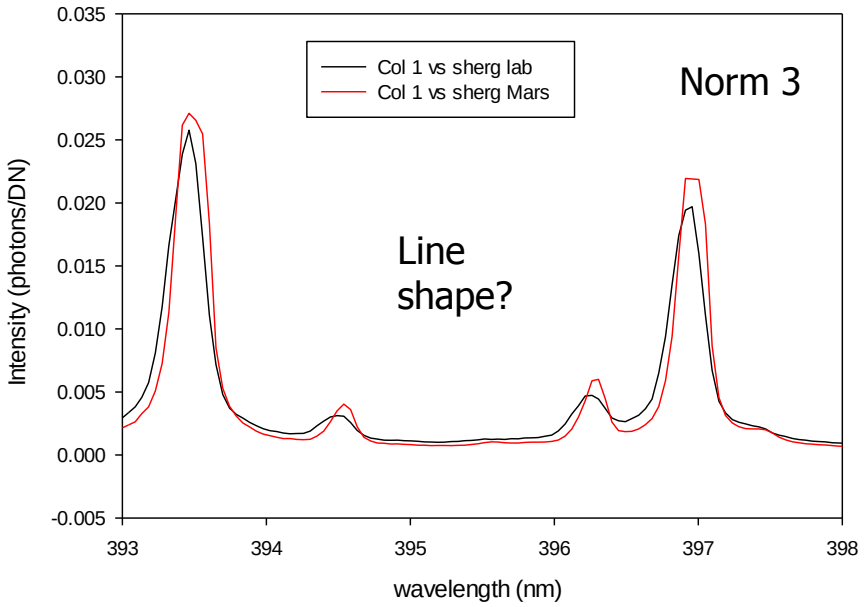


VIS1 – no norm vs norm1, 3

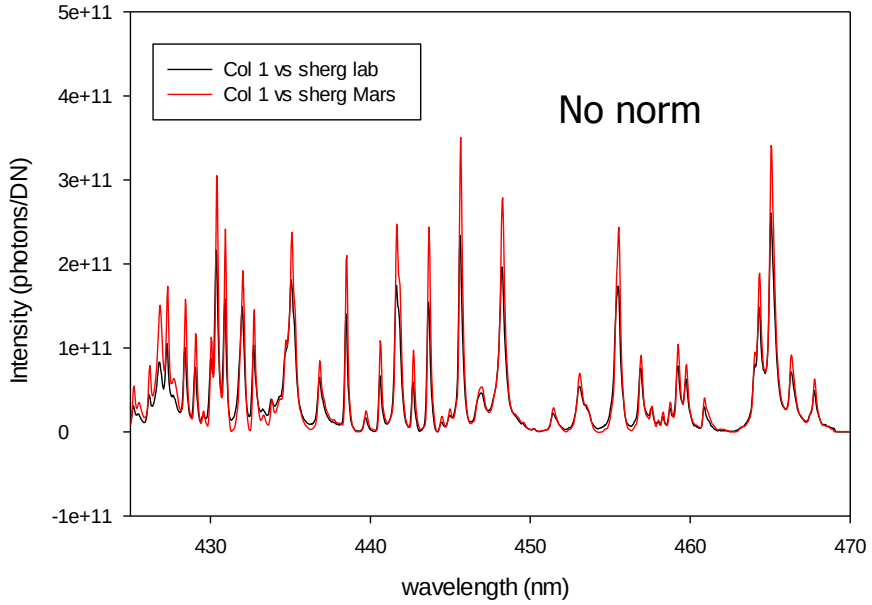


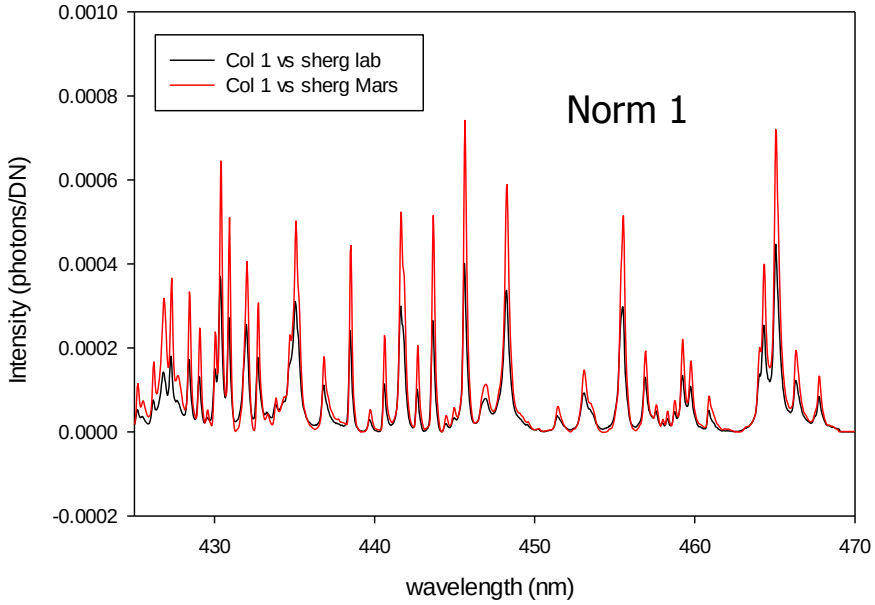


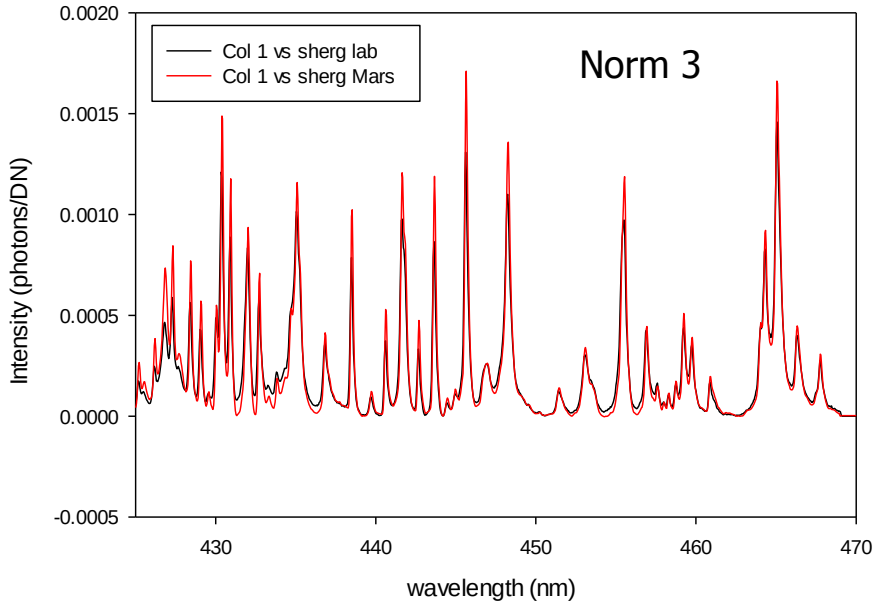


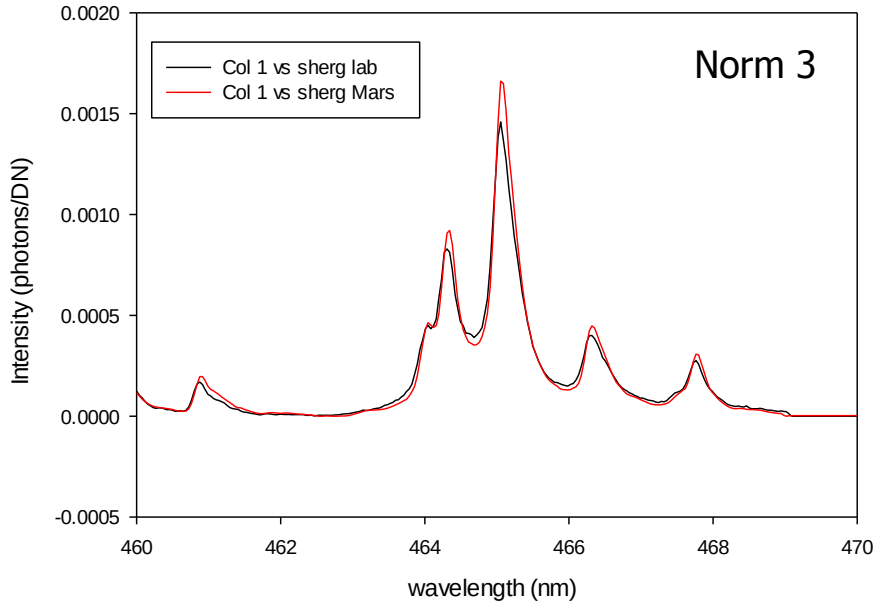


VIS2 – no norm vs norm1

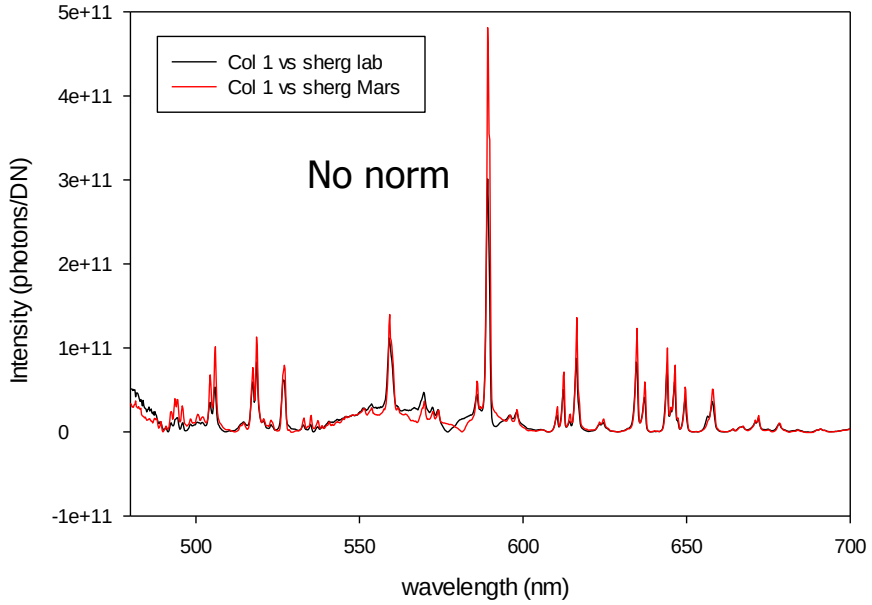


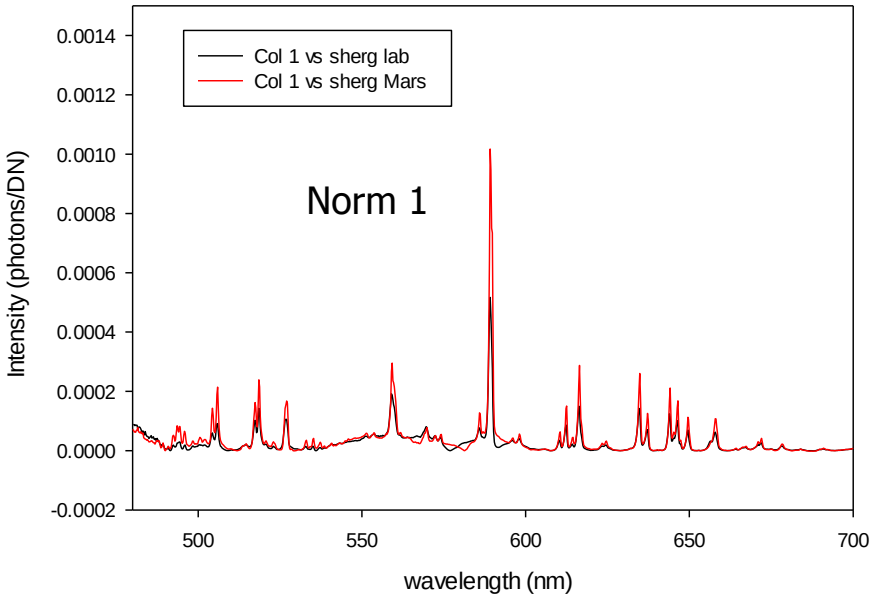


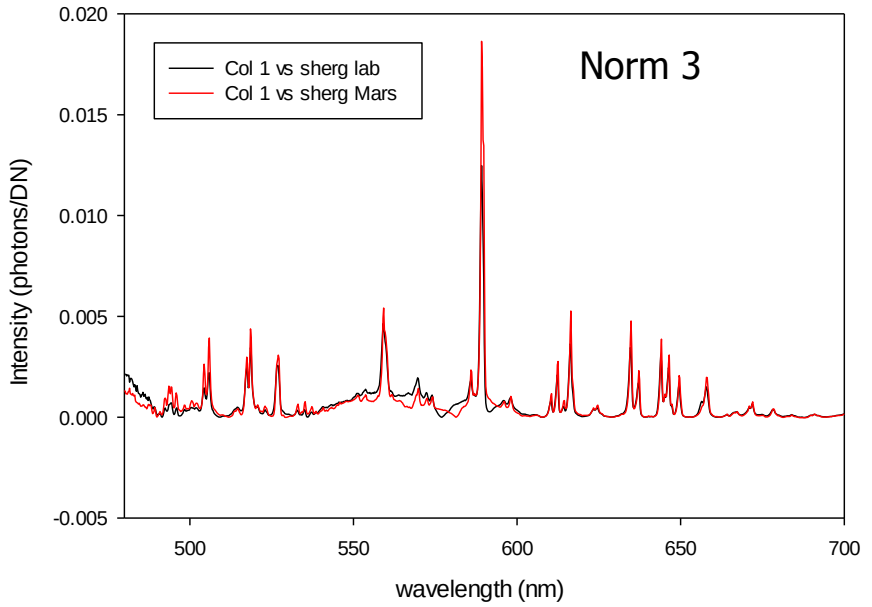


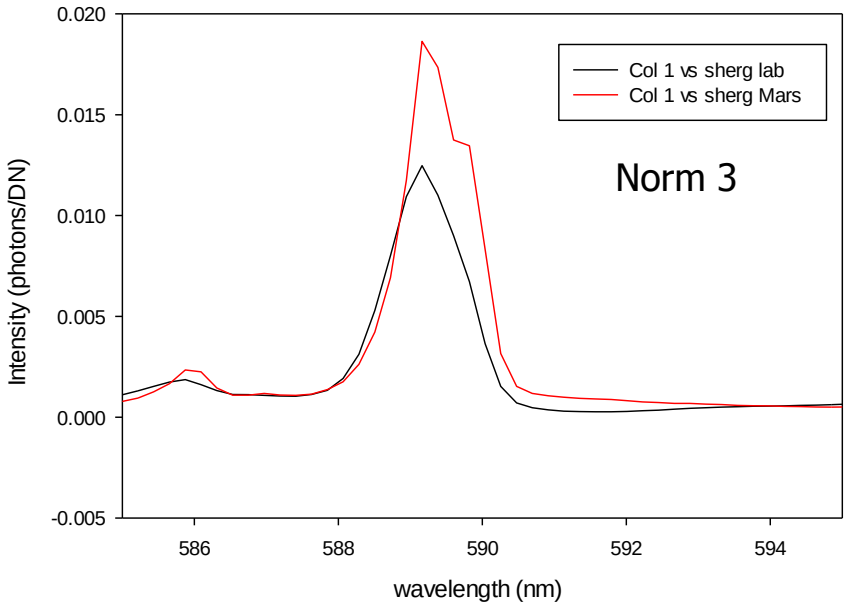


VNIR1 – no norm vs norm1

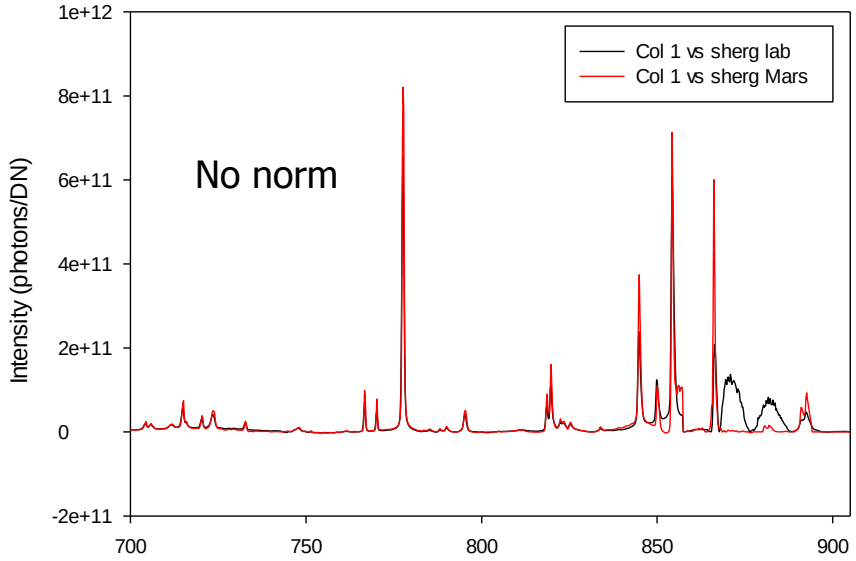


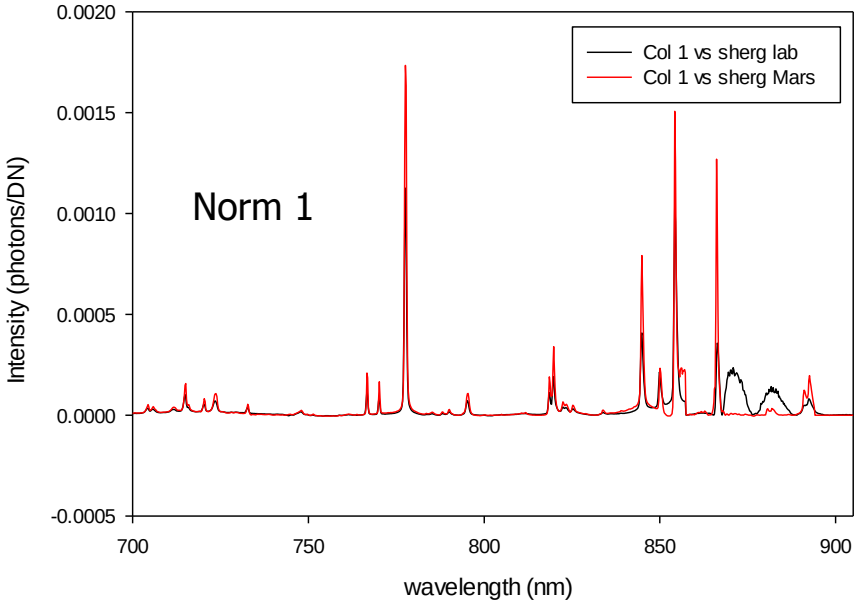


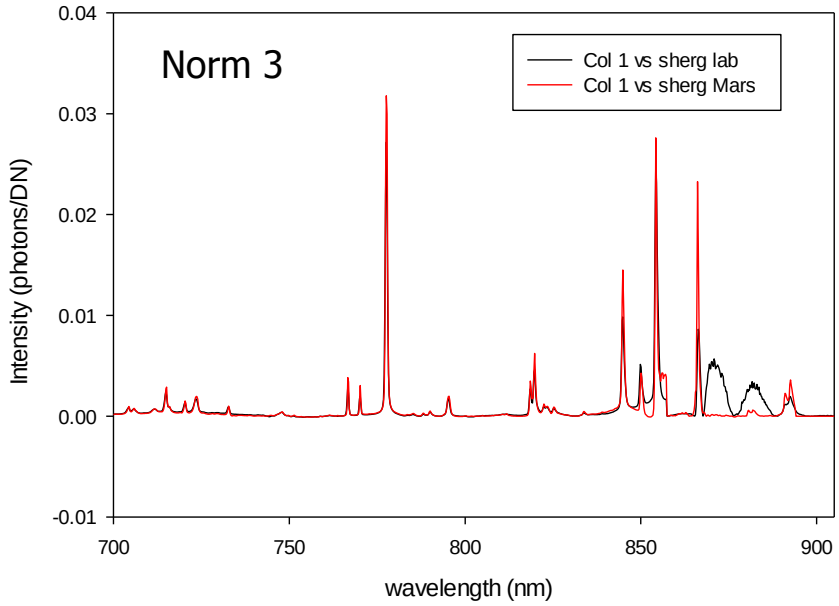


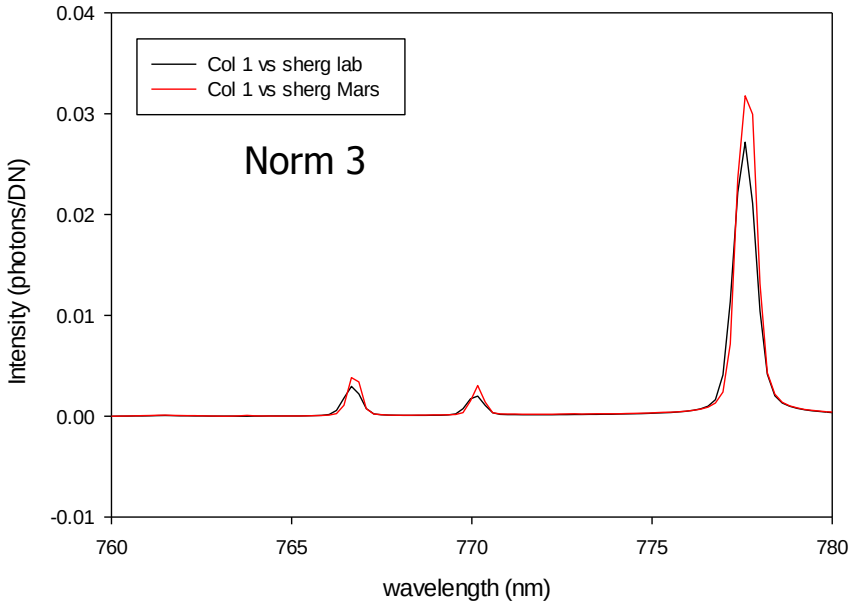


VNIR2 – no norm vs. norm1



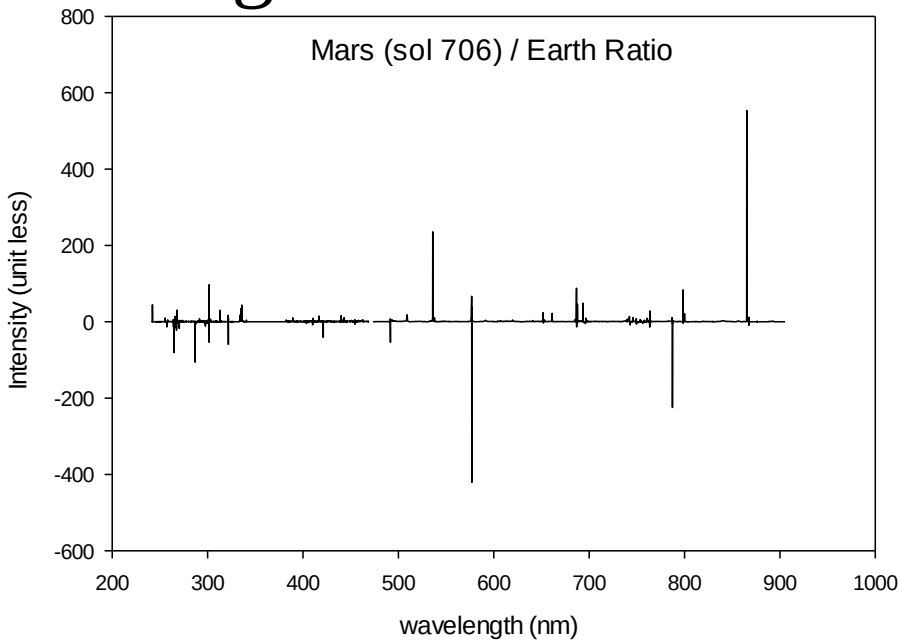






Correction

- Calculate Mars / Earth ratio for CCCT 2-4, 6-9 from sol 706.
  - Non-Normalized Spectra
- Calculate average for these 7 ratios
- Multiply Earth data and average ratio



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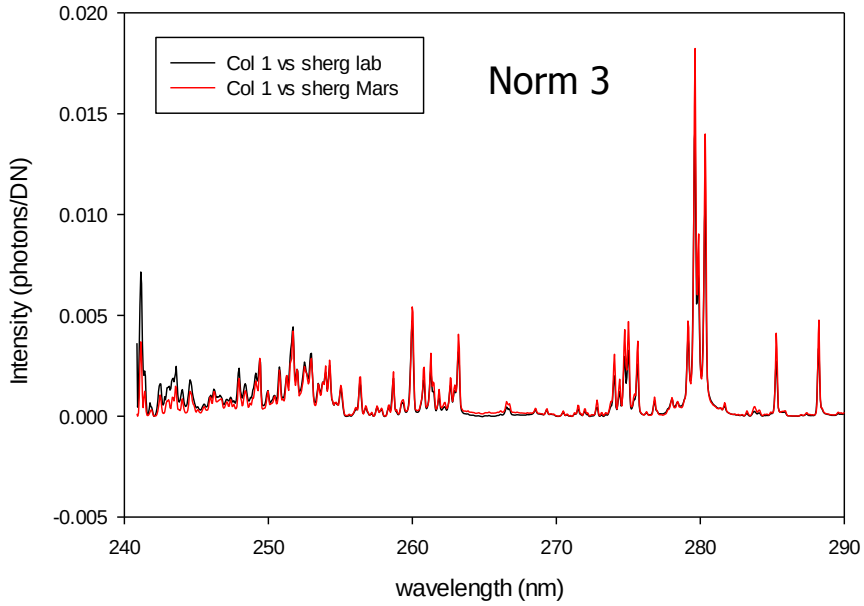
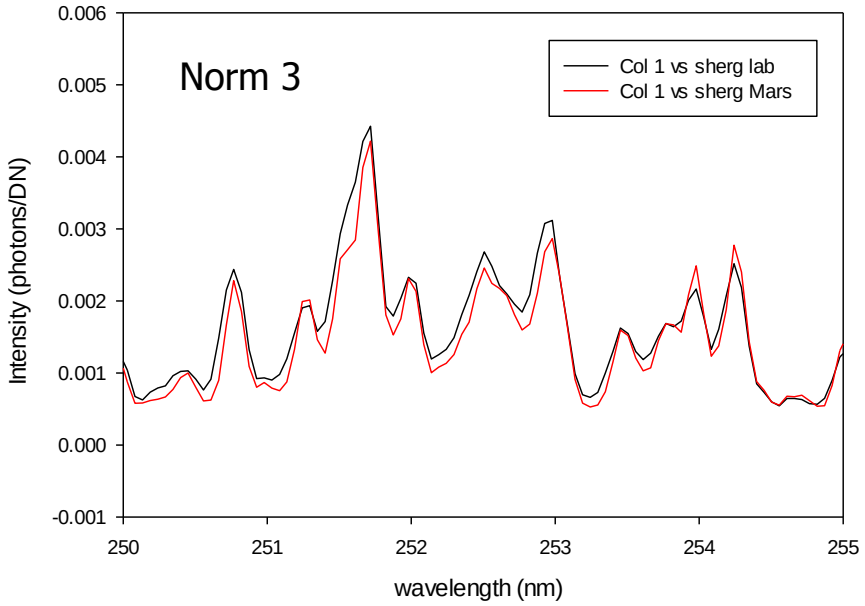
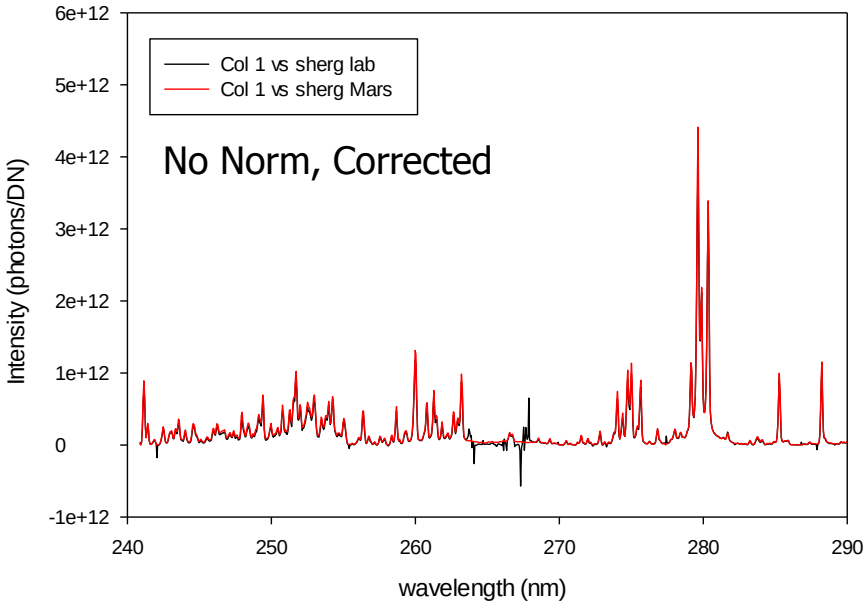
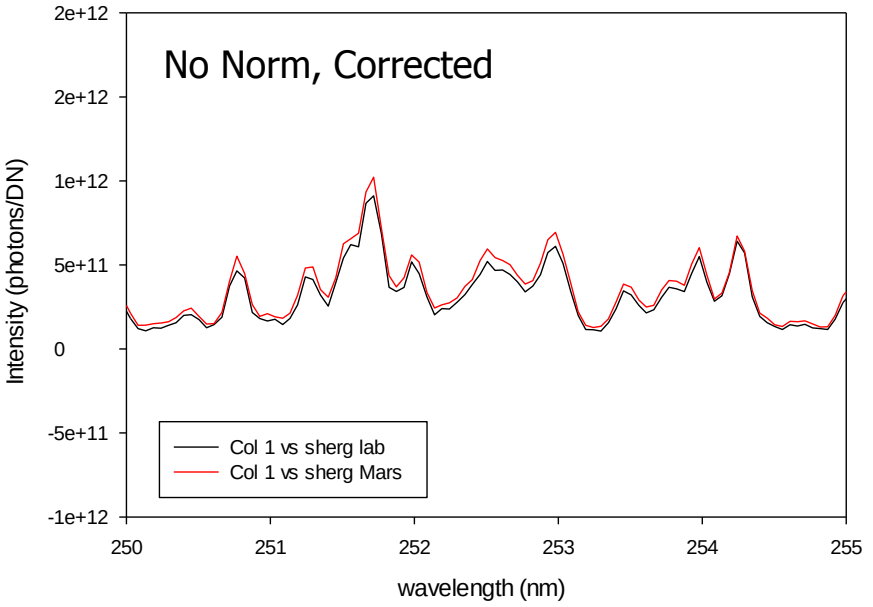
UV1 – no norm corrected vs. norm3

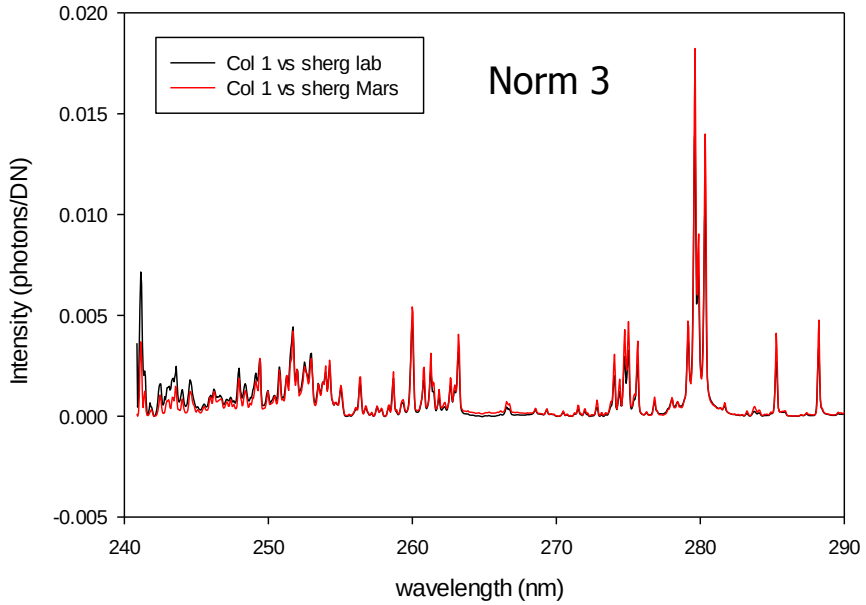


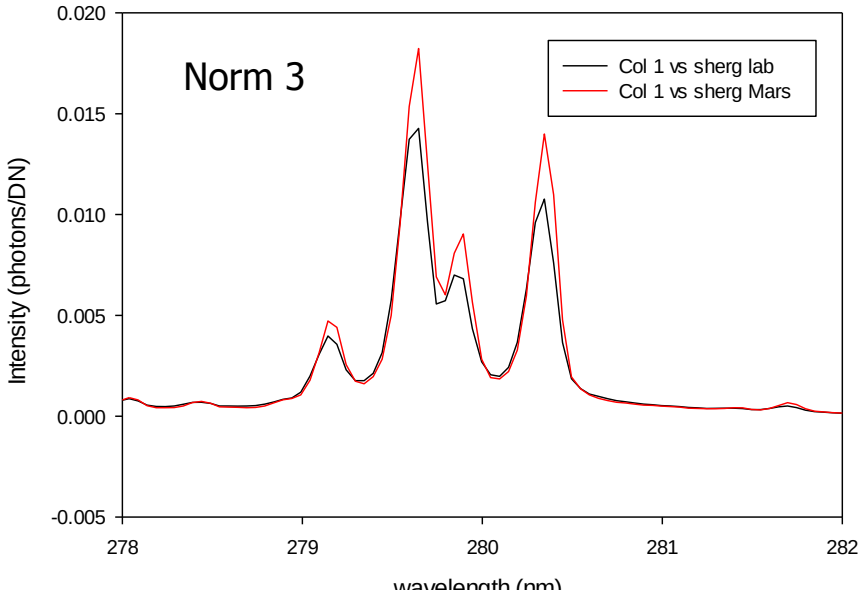


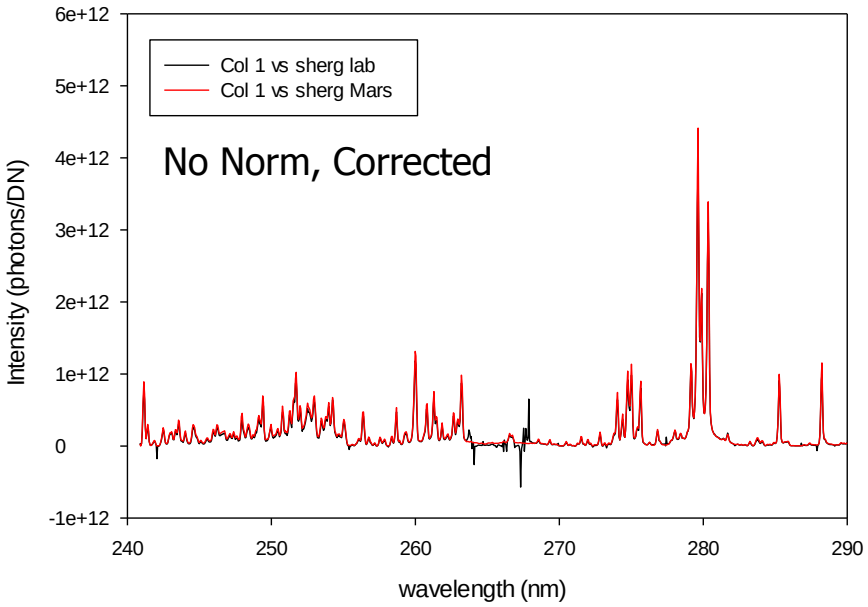


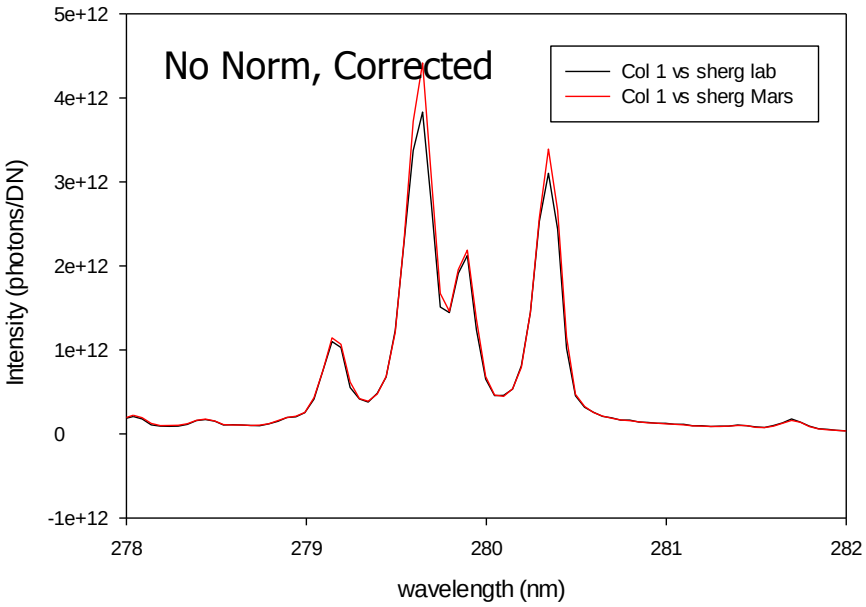


UV1 – no norm corrected vs. norm3

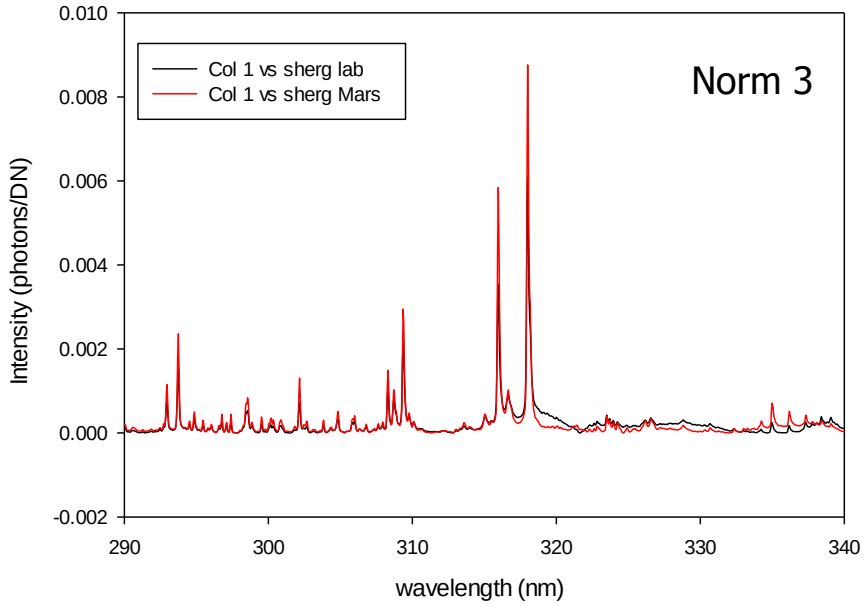


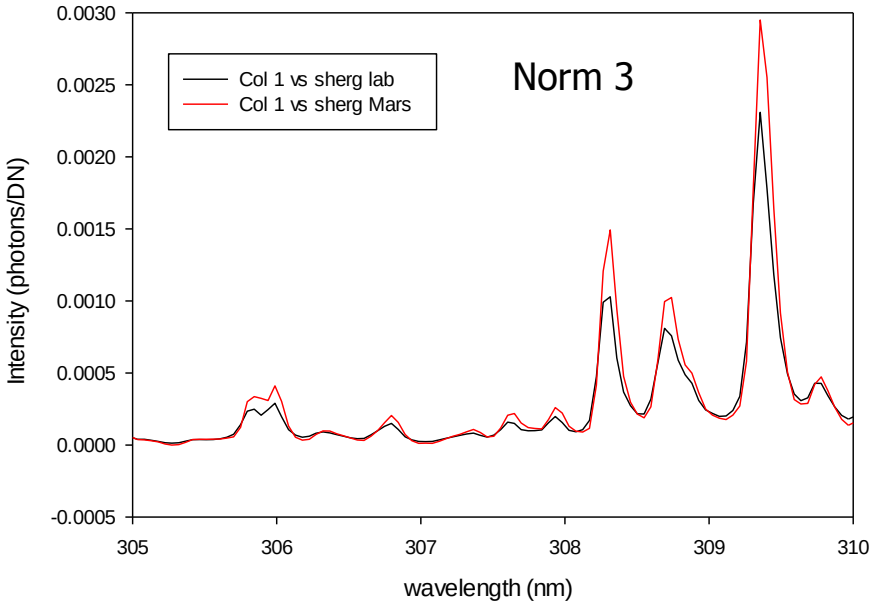


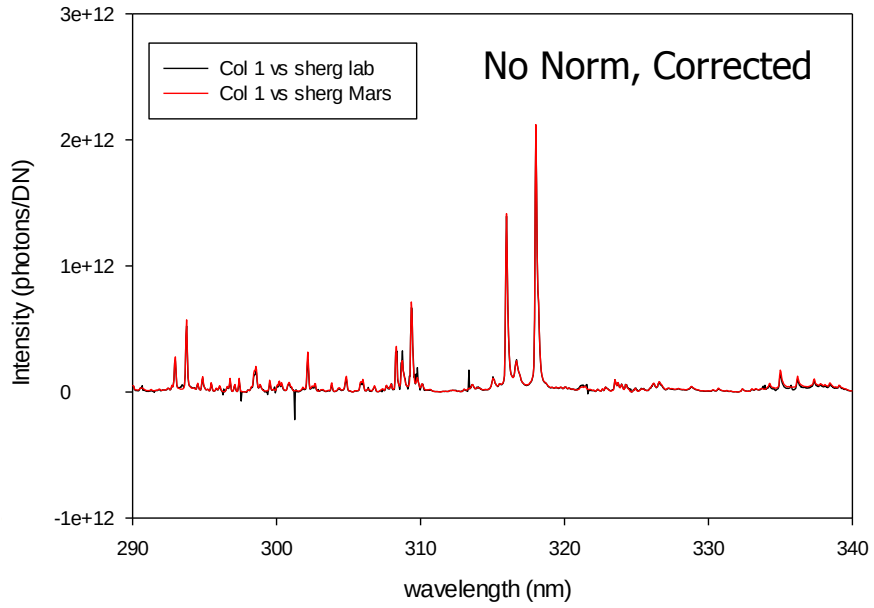


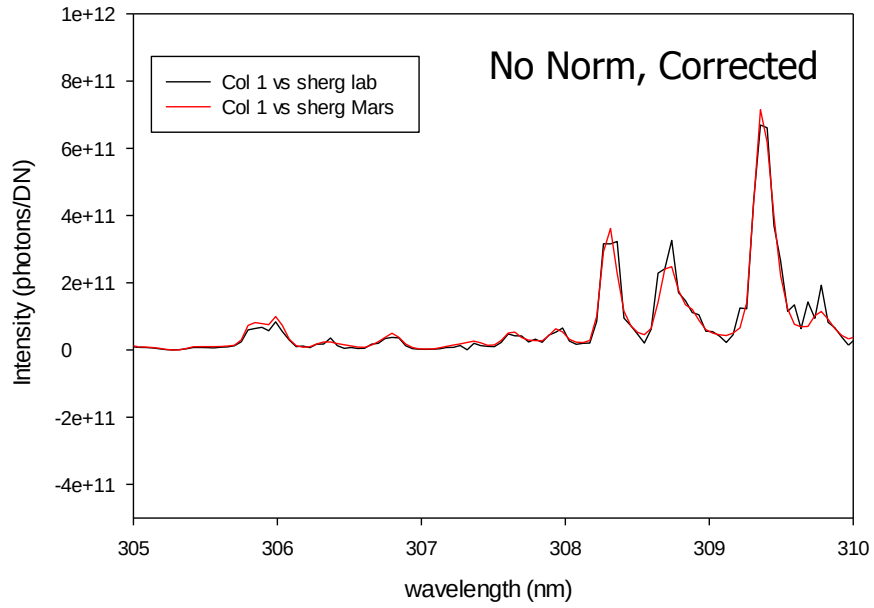


UV2 – no norm cor vs. norm3

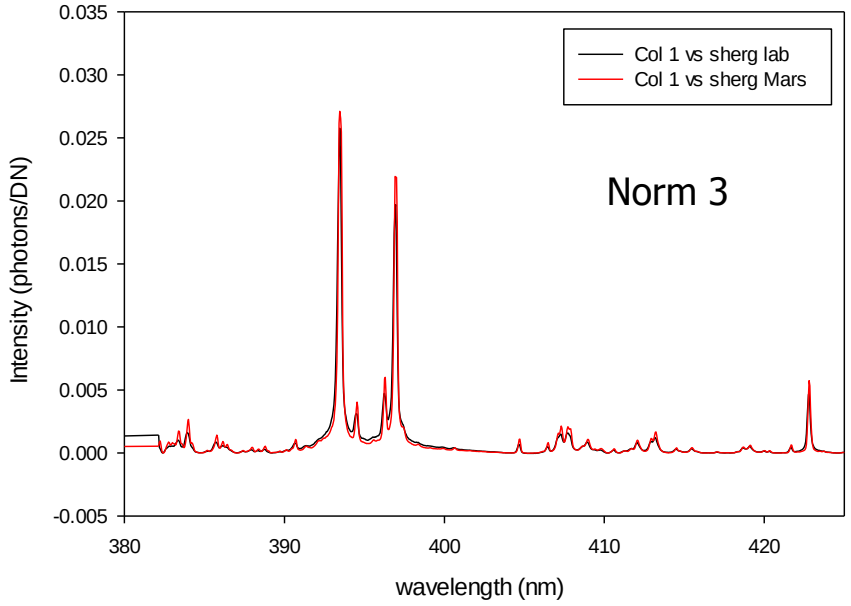


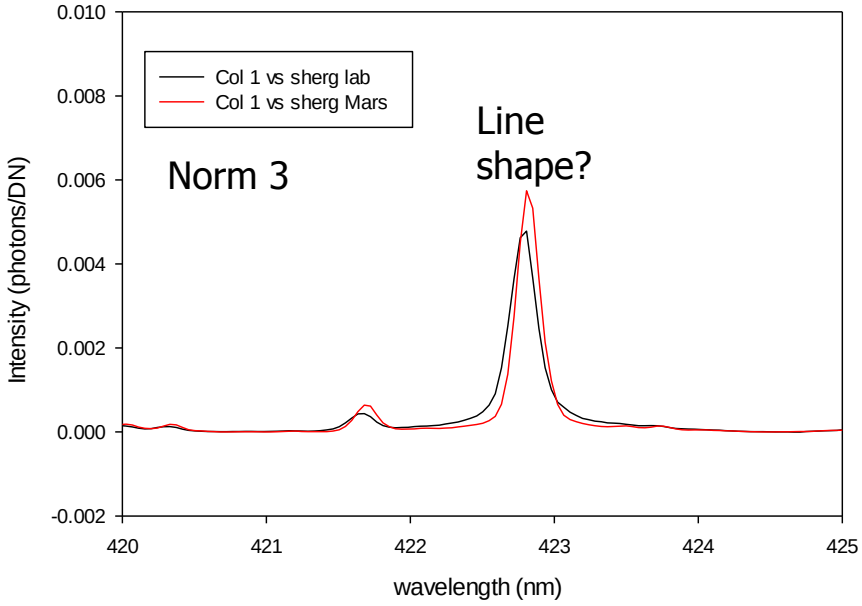


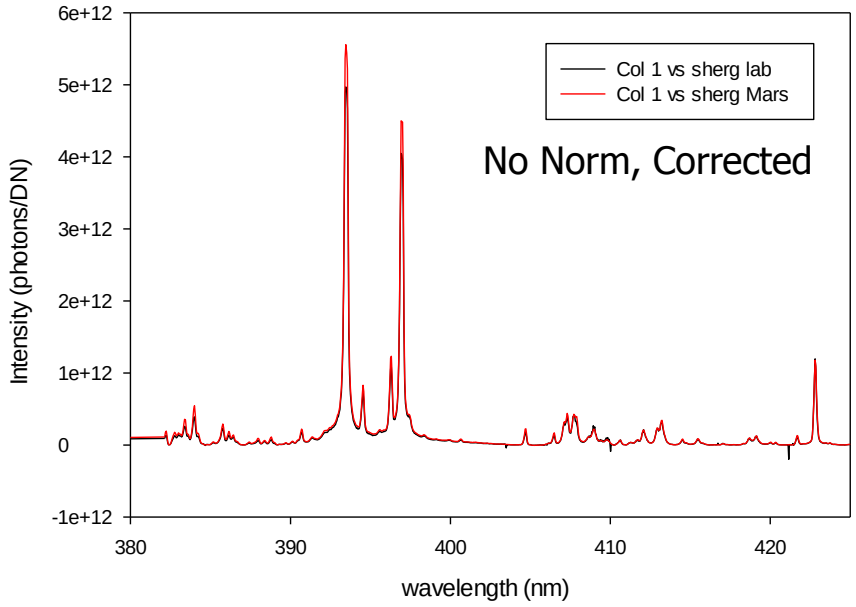


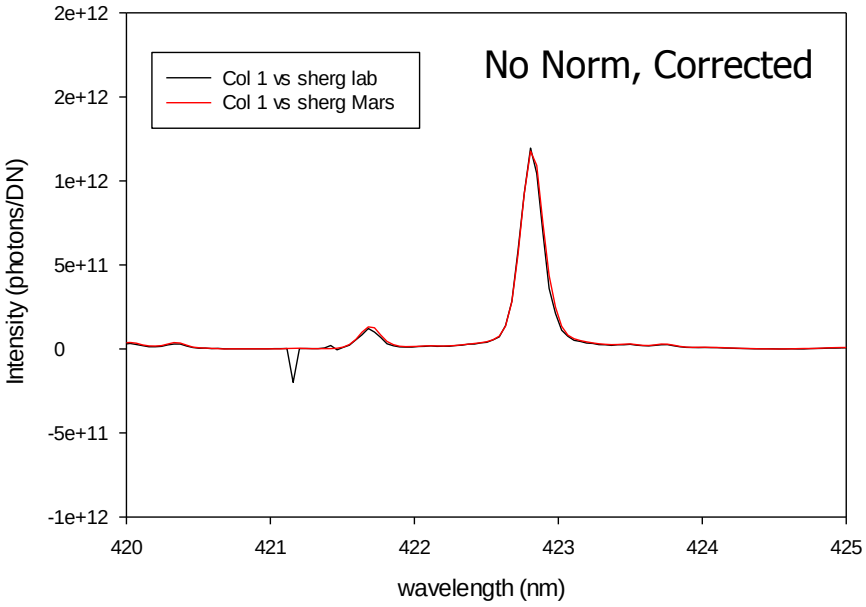


VIS1 – no norm cor vs. norm3

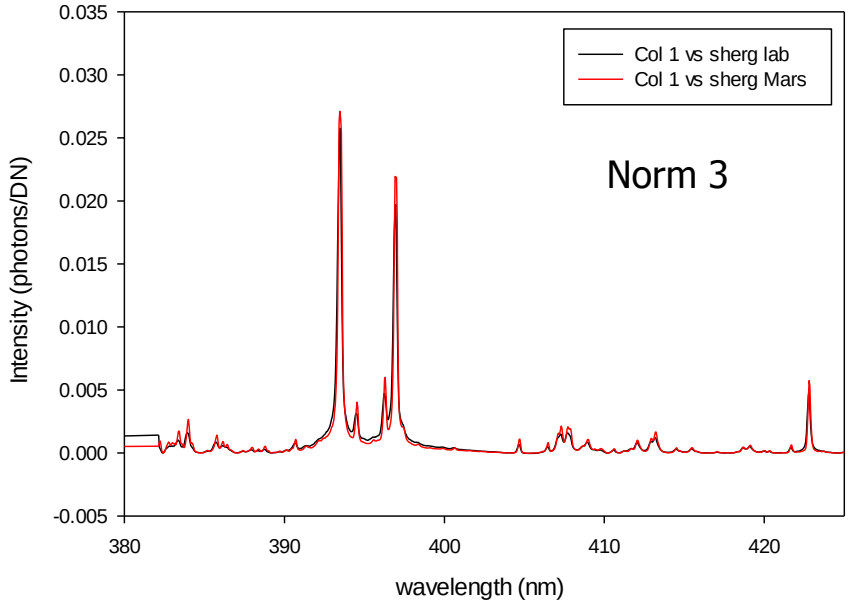


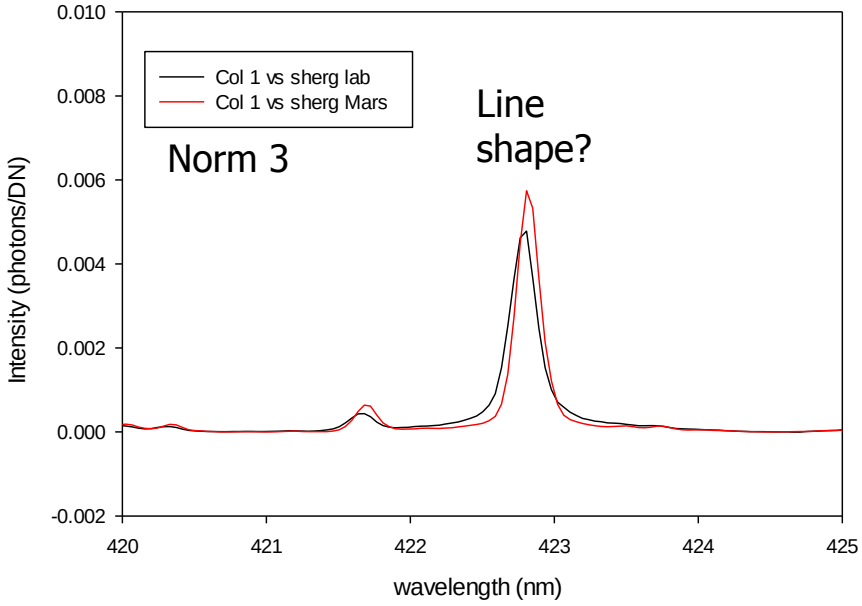


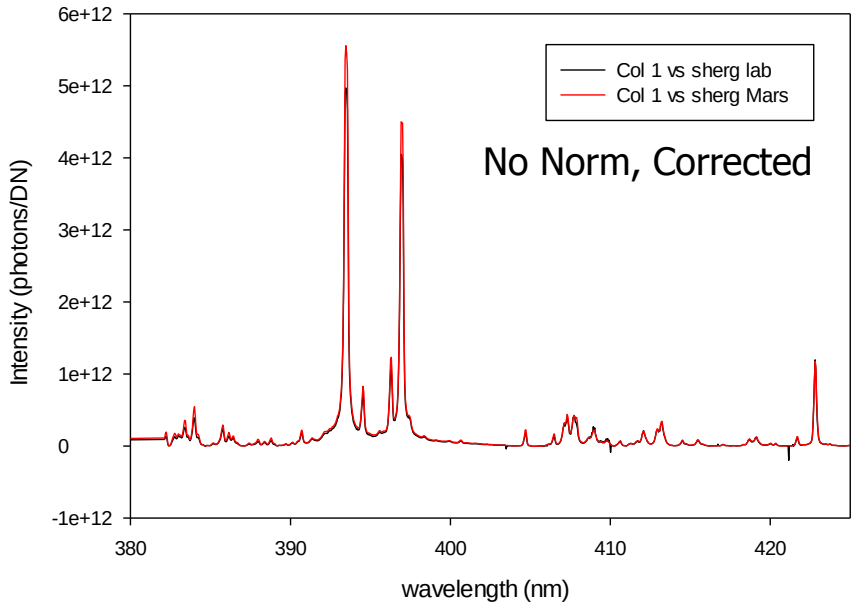


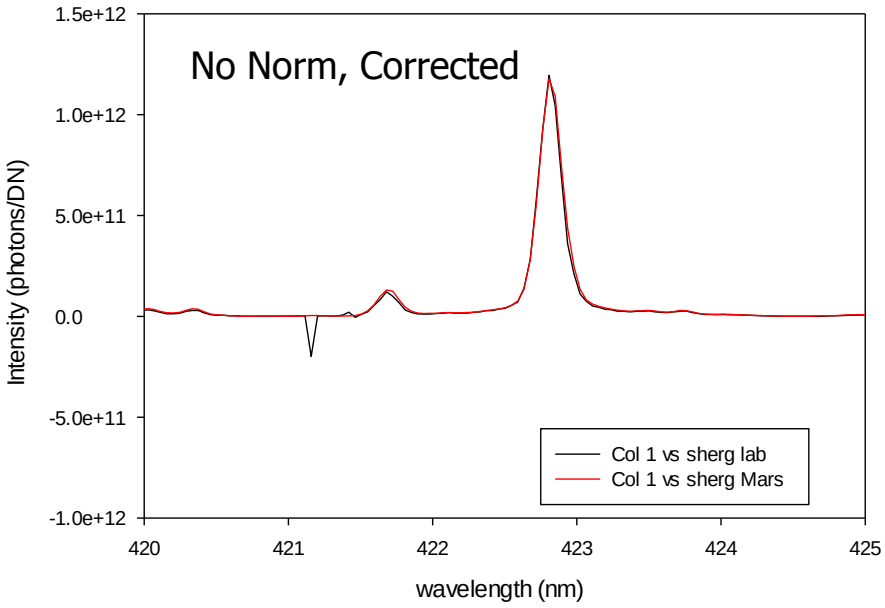


VIS1 – no norm cor vs. norm3

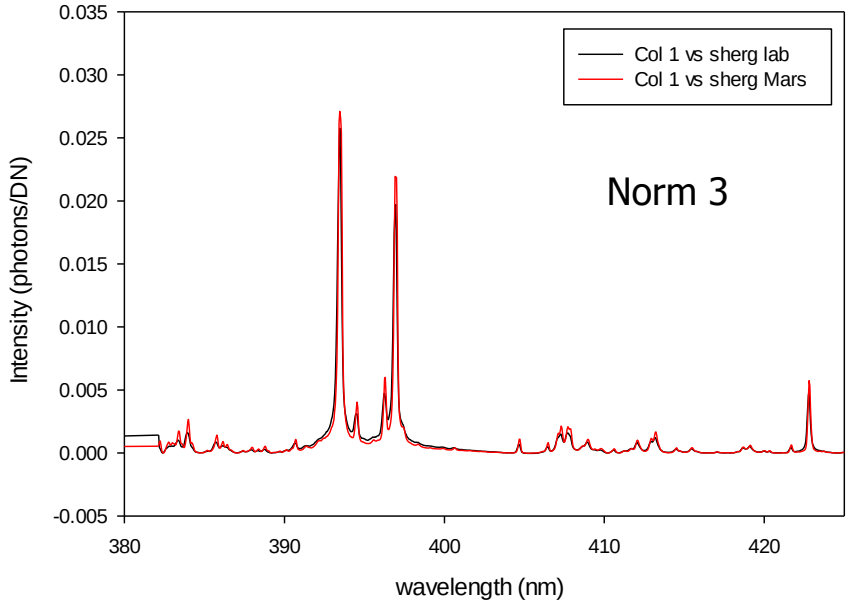


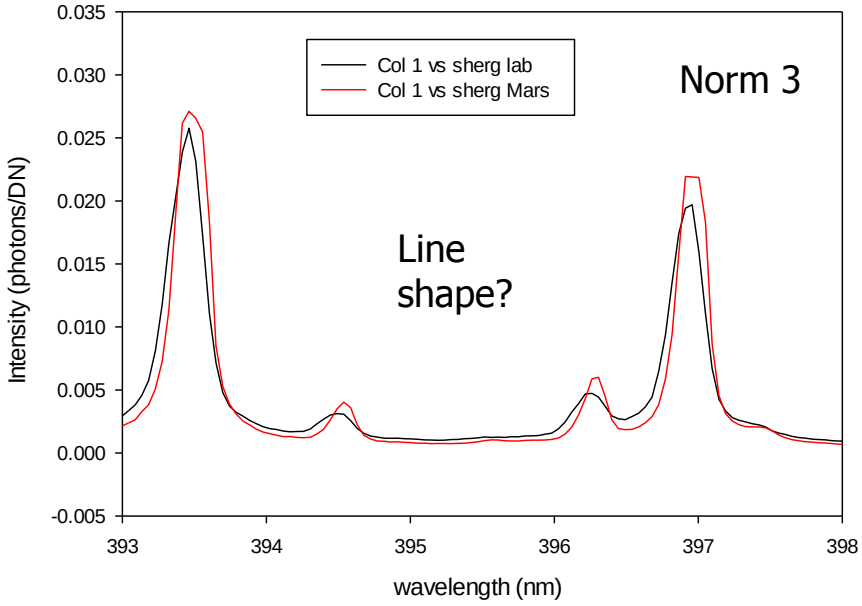


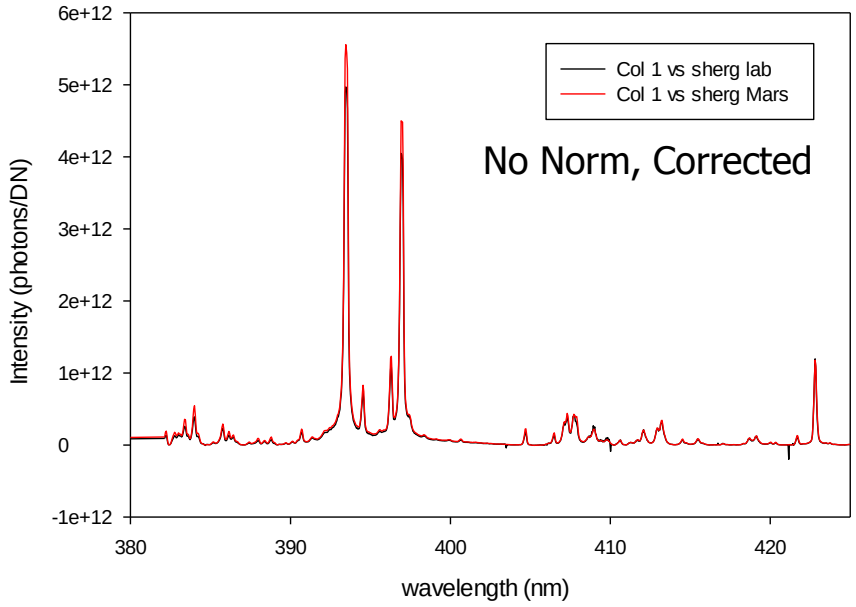


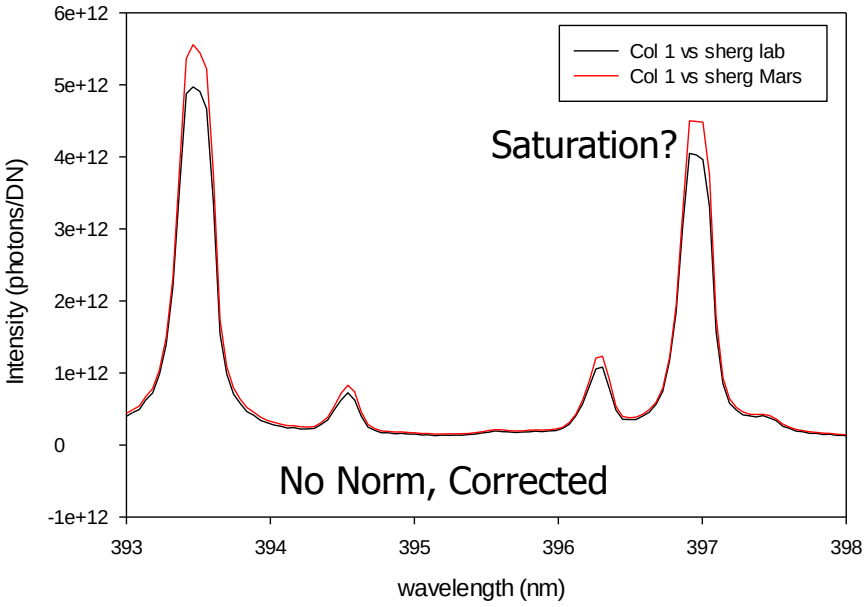


VIS1 – no norm cor vs. norm3

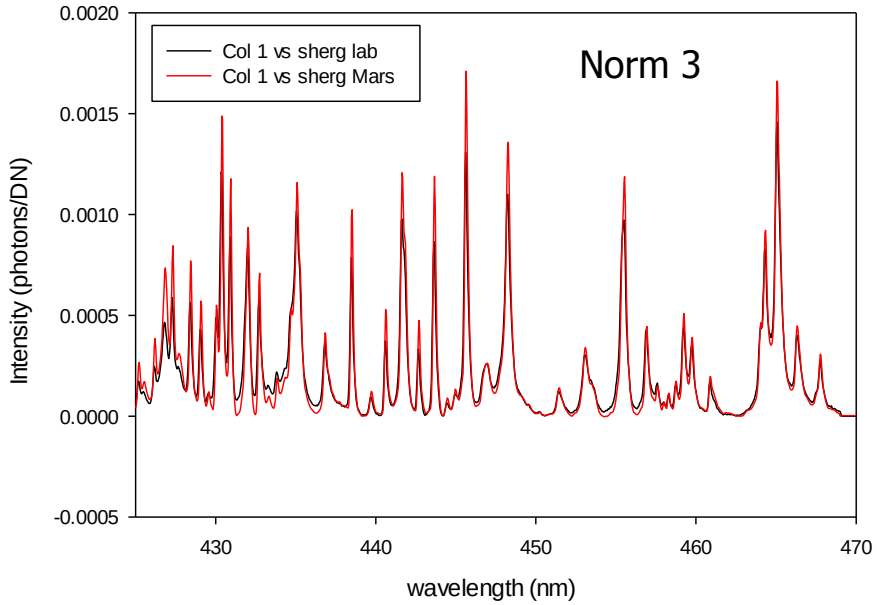


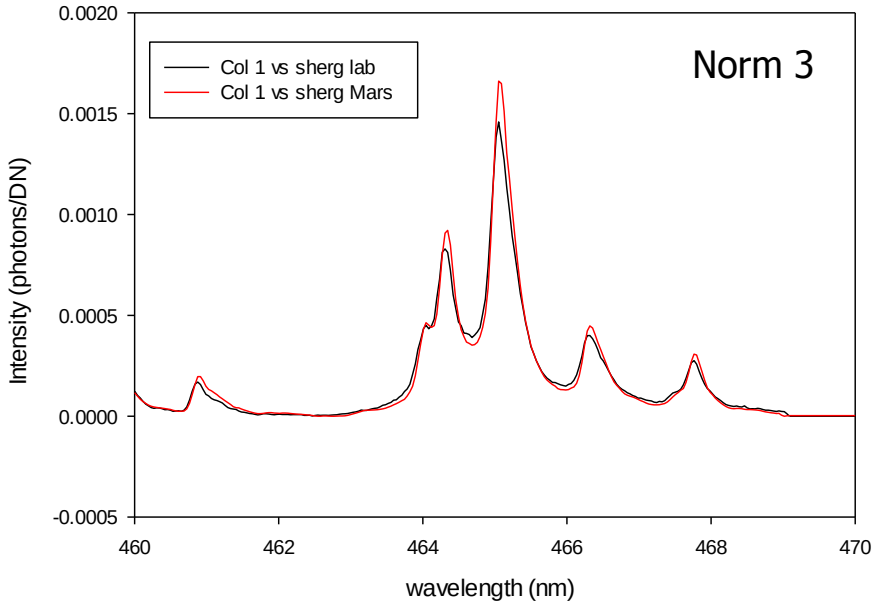


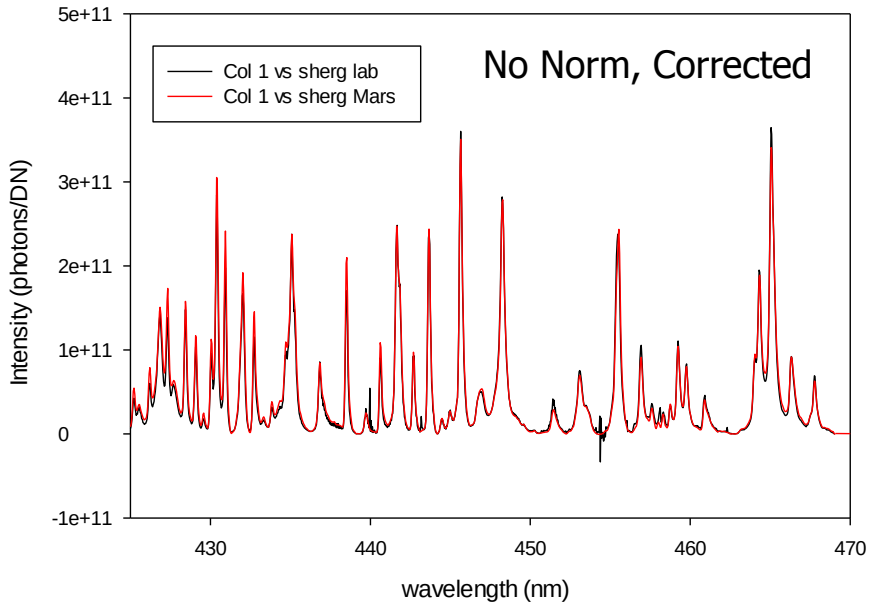


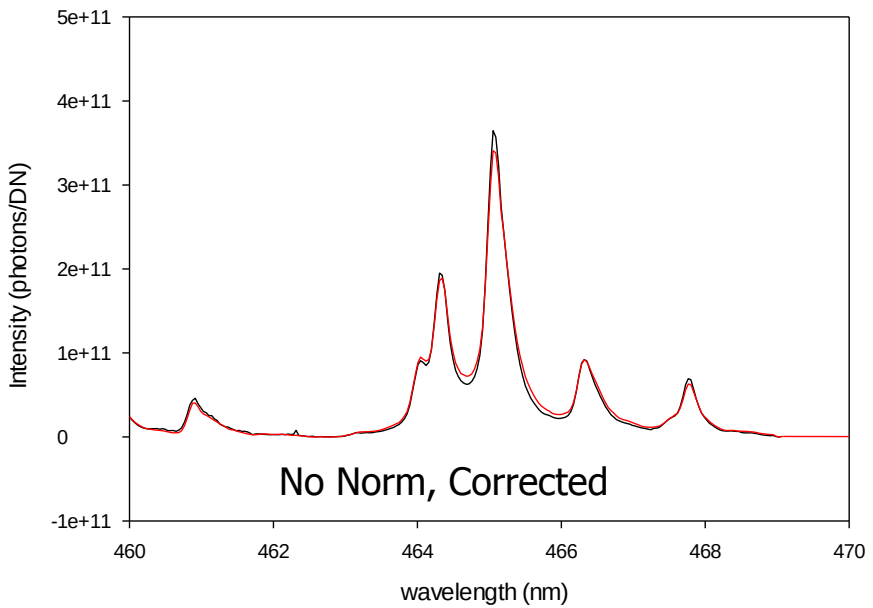


VIS2 – no norm cor vs. norm3

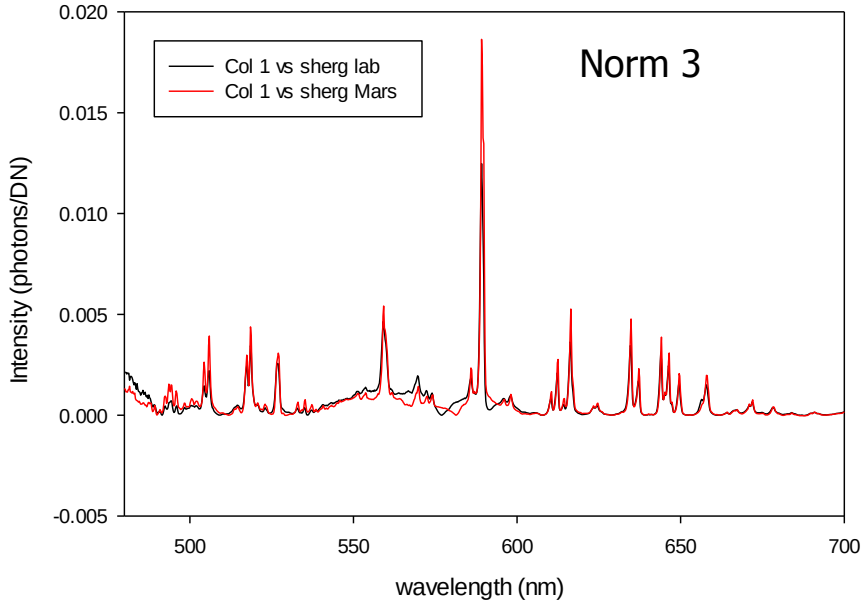


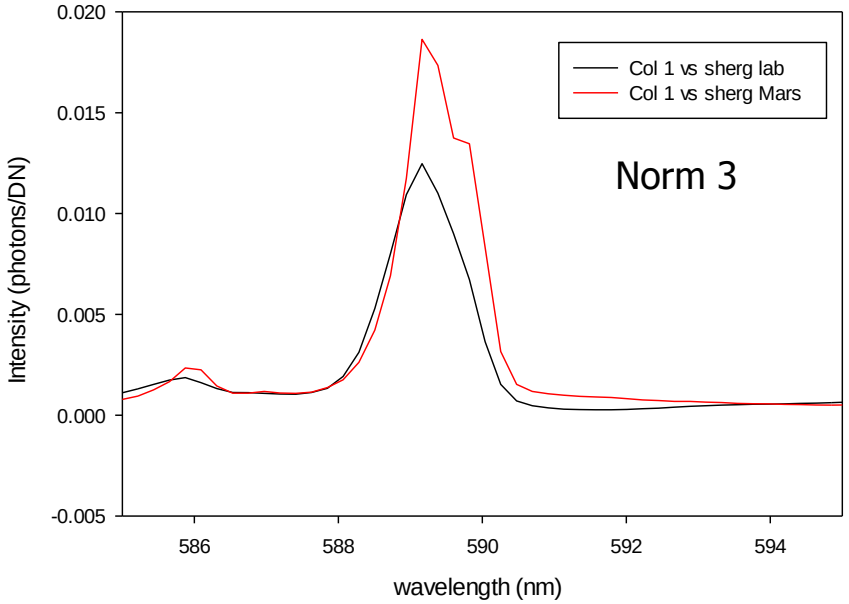


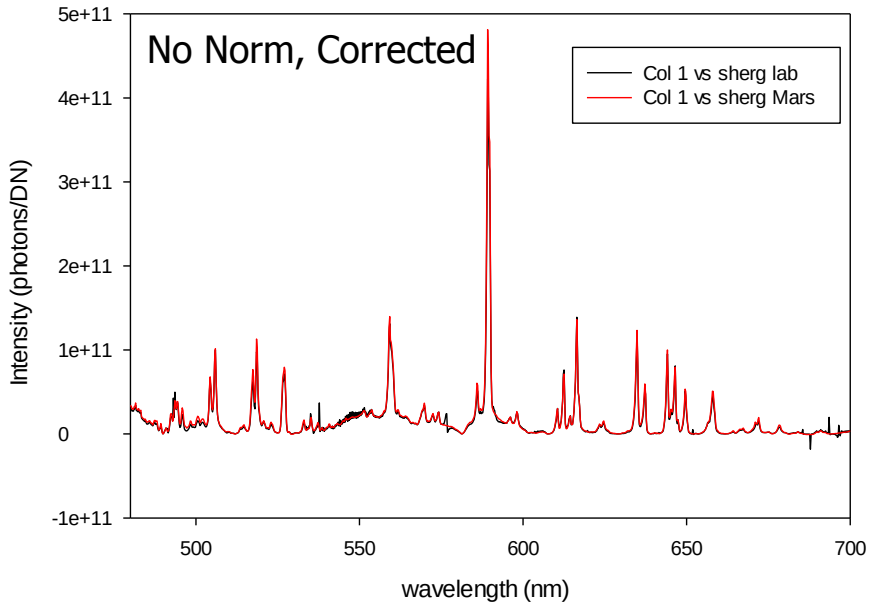


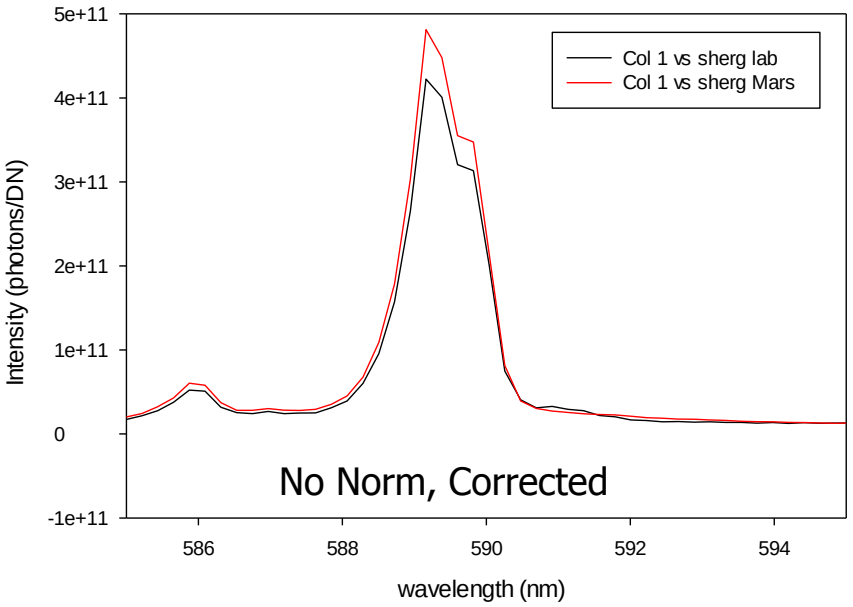


VNIR1 – no norm cor vs. norm3

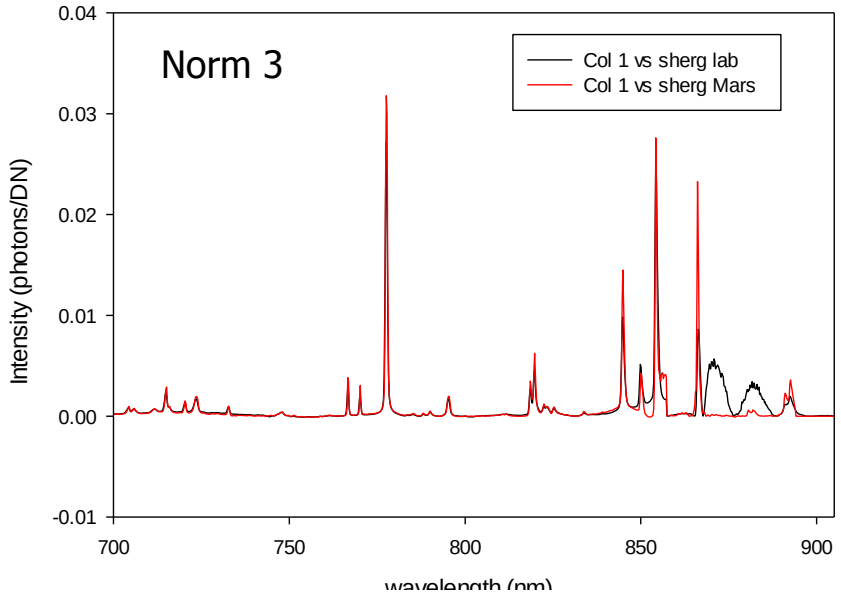


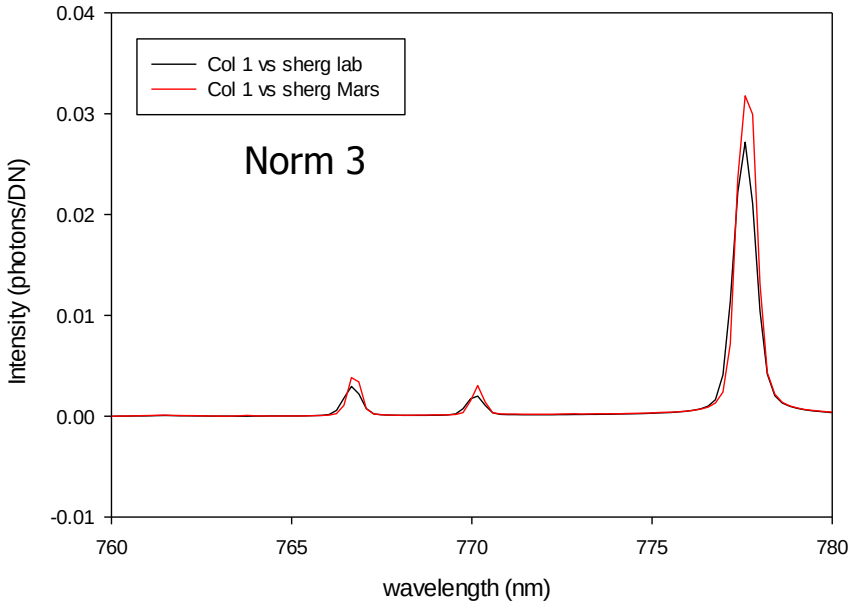


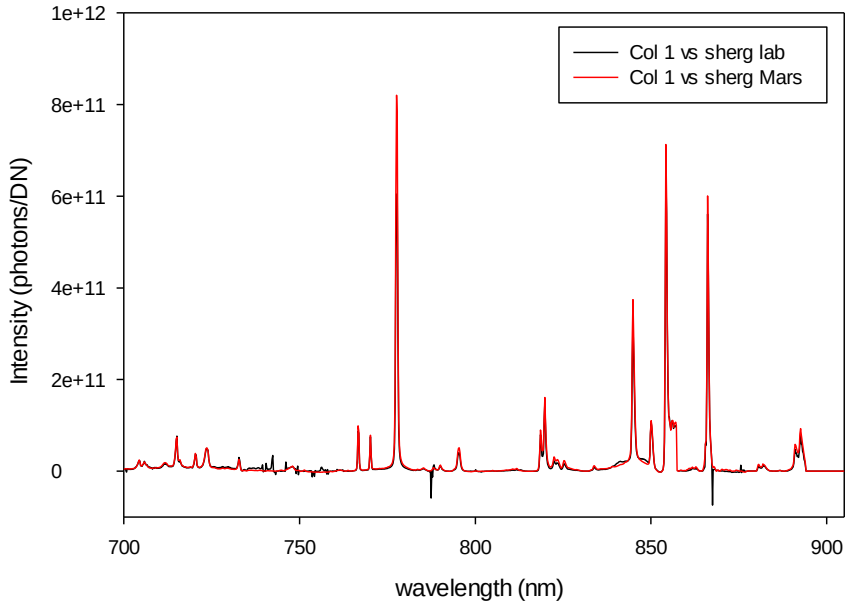


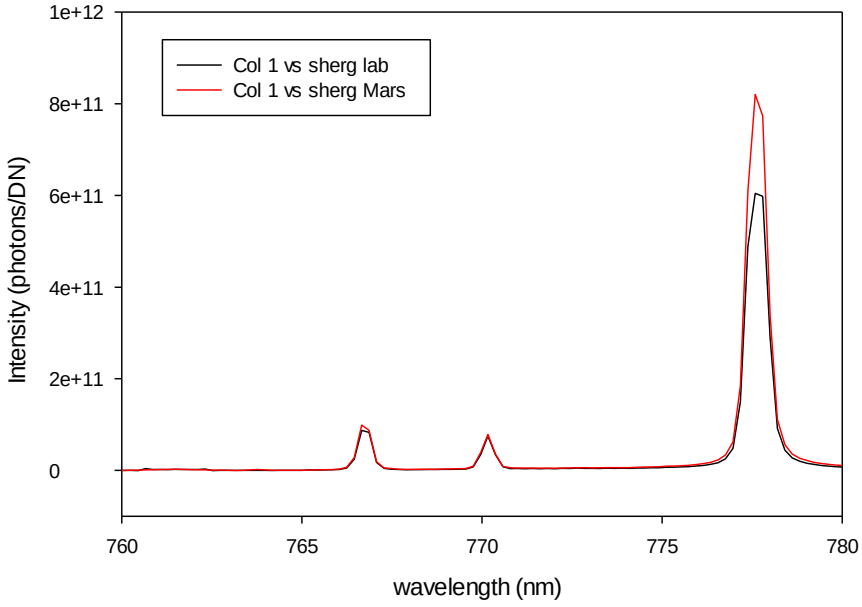


VNIR2 – no norm cor vs. norm3









Summary

- An additional Lab to FM correction is required.
- Average Mars / Earth CCCT spectra appears to work
  - Spurious signals from ratio needs to be removed.
  - Adjustments applied to Lab/Earth data
- Current corrected spectra are not normalized
  - I expect normalization still required for distance correction.