

Homework #5 Due 10/4/23

- 1) Calculate the normalized (max value of intensity is 1 in arbitrary units) emission spectrum of neutral hafnium atoms at 5000, 6000, and 7000 K over the spectral range of 542 to 544 nm. Assume a gaussian instrument function with 0.05 nm FWHM. Plot your results.

- 2) To measure plasma temperatures, two strategies are proposed using the spectral lines shown below. In the first strategy, the ratio of intensities of line B and line A is measured. In the second strategy, the ratio of line D to line C is measured. Answer the following questions with detailed explanations.
 - a. For which strategy will the optically thin approximation be more likely to be valid?
 - b. Which strategy will likely have the larger signal intensities?

Line	E'' (cm^{-1})	E' (cm^{-1})	J'	J''	$A(1/s)$
A	0	10,000	1	2	1e8
B	0	15,000	2	1	2e8
C	11,000	21,000	3	2	1e5
D	11,000	26,000	2	3	2e5