Today’s assignment: evaluate your lines — which ones are saturated, and which ones will yield good column-density measurements?

This is a graded assignment.

As we have discussed, an important step in the measurement of absorption lines is the assessment of line saturation. Which lines provide useful measurements? As part of this process, please carry out the following tasks:

1. Compare at least 3 multiplets to assess whether the lines are saturated (as we did in the previous lecture). The more multiplets you can compare, the better. Find at least one set of lines that appears to provide good column-density measurements.
2. Write up a summary of your findings from step 1 and email your write up to me before the next lecture.
3. Produce at least one postscript figure that supports your conclusions. Again, if you can make more than one figure, this could have a beneficial effect on the grade… Email your figure(s) to me as well.

BONUS

4. Compare the apparent column density profiles of some low ionization stages (i.e., neutral or singly ionized species) to the profiles of some of the high ionization stages (e.g., C IV, Si IV, or N V). Note that N V might be hard to detect. For your convenience, the atomic data for these high ions are summarized in the table below.
5. Based on the paper by Jenkins that was passed out today, send me comments on how you think that the Cl I 1347.24 Å absorption line might be particularly interesting.

<table>
<thead>
<tr>
<th>Species</th>
<th>Transition Wavelength (Å)</th>
<th>f – value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C IV</td>
<td>1548.203</td>
<td>1.91 x 10^{-1}</td>
</tr>
<tr>
<td>C IV</td>
<td>1550.777</td>
<td>9.52 x 10^{-2}</td>
</tr>
<tr>
<td>Si IV</td>
<td>1393.755</td>
<td>5.14 x 10^{-1}</td>
</tr>
<tr>
<td>Si IV</td>
<td>1402.770</td>
<td>2.55 x 10^{-1}</td>
</tr>
<tr>
<td>N V</td>
<td>1238.821</td>
<td>1.56 x 10^{-1}</td>
</tr>
<tr>
<td>N V</td>
<td>1242.804</td>
<td>7.80 x 10^{-2}</td>
</tr>
</tbody>
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