

If used, please cite

Fierro, Laity and Neuber “Optical emission spectroscopy study in the VUV-VIS regimes of a developing low-temperature plasma in nitrogen gas,” *J. Phys. D: Appl. Phys* 2012.

Input File

1	N I	Buffer Lines								
2	nm	ek	gi	gk	ak	acc	ei			
3	100.0145,			119210.0,		6,	6,	3.72e-01,	C+,	19224.464
4	100.0145,			119210.0,		6,	4,	3.92e-02,	C,	19224.464
5	100.0232,[1]			119210.0,[2]		4,[3]	6,[4]	2.72e-02,[5]	C,[6]	19233.177[7]
6	100.0232,			119210.0,		4,	4,	3.62e-01,	C+,	19233.177
7	100.337,			99663.912,		4,	4,	1.86e-06,	B,	0.000
8	100.338,			99663.427,		4,	6,	8.40e-06,	B,	0.000
9	106.7614,			112891.238,		6,	8,	3.53e-01,	C,	19224.464

Arrows indicate: Buffer Lines (lines 2-8) and Data Lines (lines 3-9).

The data is preceded by two buffer lines that are required. After this, the data from NIST is inserted into a specific format. The following list gives details for each entry above along with the necessary unit. Each entry is followed by a comma and tab except for the last entry in each line.

- | | |
|-----------------------------------|---------------------|
| [1] Wavelength | [nm] |
| [2] Upper energy level | [cm ⁻¹] |
| [3] Lower level degeneracy | [unitless] |
| [4] Upper energy level degeneracy | [unitless] |
| [5] Einstein coefficient | [s ⁻¹] |
| [6] Accuracy of line information | |
| [7] Lower energy level | [cm ⁻¹] |

Input into program

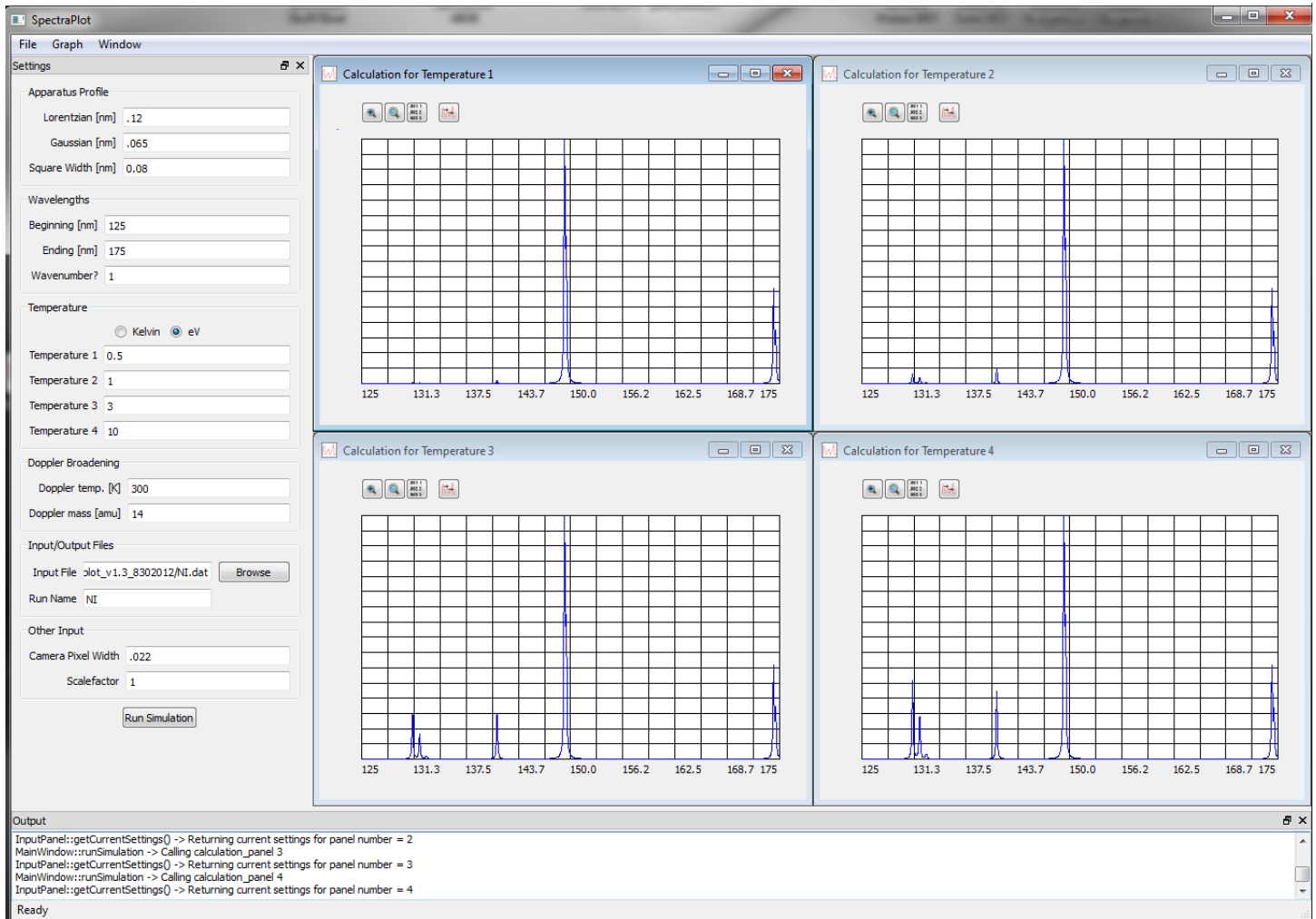
The screenshot shows the 'Apparatus Profile' window with the following fields and annotations:

- Apparatus Profile:**
 - Lorentzian [nm]: .12
 - Gaussian [nm]: .065
 - Square Width [nm]: 0.08
- Wavelengths:**
 - Beginning [nm]: 125
 - Ending [nm]: 175
 - Wavenumber?: 1
- Temperature:**
 - Units: ☒ Kelvin ☐ eV
 - Temperature 1: [empty]
 - Temperature 2: [empty]
 - Temperature 3: [empty]
 - Temperature 4: [empty]
- Doppler Broadening:**
 - Doppler temp. [K]: 300
 - Doppler mass [amu]: 14
- Input/Output Files:**
 - Input File: [empty] (with Browse button)
 - Run Name: [empty]
- Other Input:**
 - Camera Pixel Width: .022
 - Broadening scale factor: [empty]

Annotations on the right side of the window:

- Apparatus profile for Lorentz, Gauss, and square profile given in nanometer.
- Wavelength regime to calculate and display. These are specified in nanometers. Leave wavenumber = 1, will be removed later.
- Temperature inputs. Units are based on radio button in Kelvin or eV. Not all temperatures need to be filled in.
- Doppler broadening parameters. Gas temperature in Kelvin and mass of species given in atomic mass units.
- Input file in the format of the previous section. Run name indicates all output files to be prefixed by this entry.
- Camera pixel width represents ‘binning’ the data. Scale factor scales the natural Lorentz linewidth. Set to 1.0 if no pressure or higher to account for other Lorentz broadening mechanisms.

Example Program Run



Output data is given in the form of the prefix selected (Run Name) plus the panel number and temperature simulated in Kelvin.

Other Information

How to get the basic atomic data for other atoms or ions: NIST, see Appendix and reference [22] of Fierro, Laity and Neuber "Optical emission spectroscopy study in the VUV-VIS regimes of a developing low-temperature plasma in nitrogen gas," *J. Phys. D: Appl. Phys.* 2012.

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