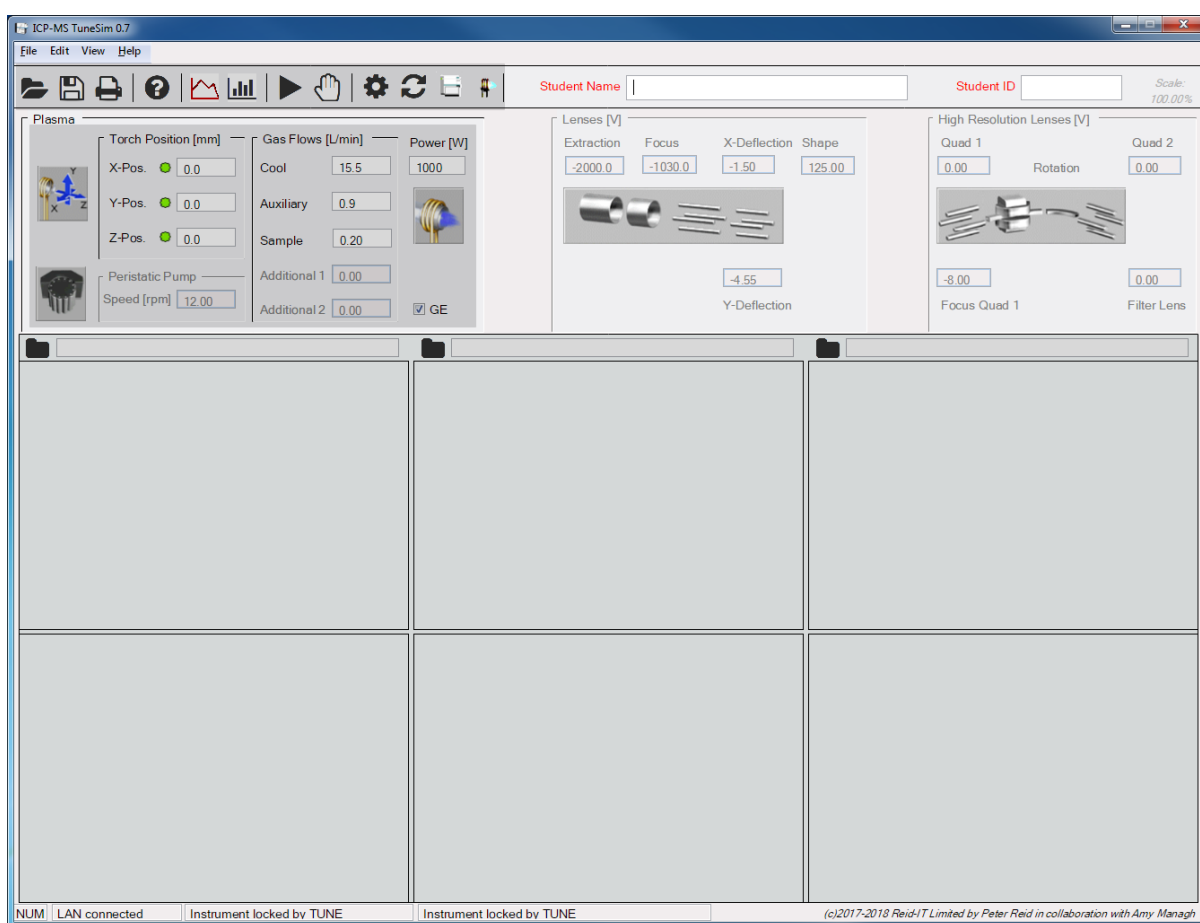# ICP-MS Tuning Simulator

This app doesn't require any special installer or uninstaller if you decide to remove it. Simply unzip the archive you've downloaded and place the **"ICP-MS TuneSim"** folder wherever is convenient. The app uses associated text and HTML files "ICP-MS TuneSim.ini" and "ICP-MS TuneSim.htm" to control the facilities and behaviour of the app. These 2 files must remain in the folder alongside the app itself (*.exe or *.app).
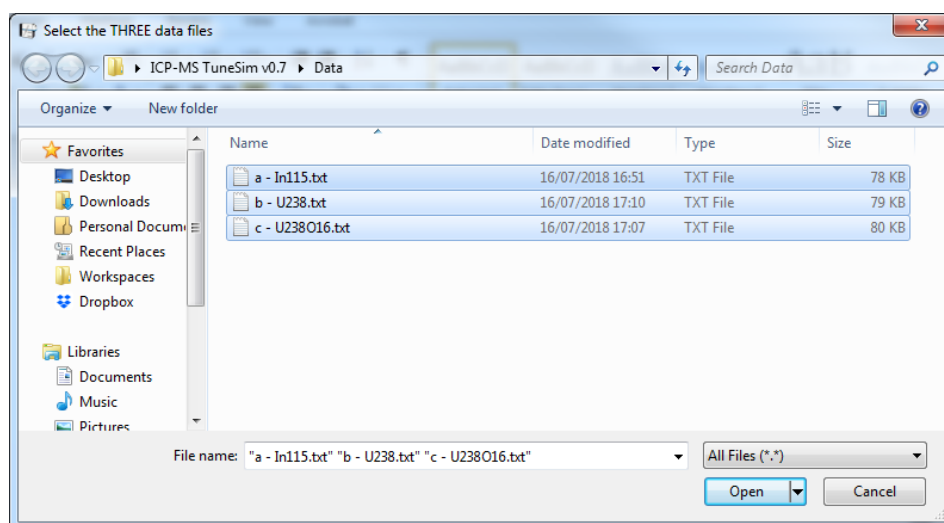
1. Open the file ICP-MS TuneSim.exe. The program will initially appear as shown below:

The window can be resized by navigating to the View menu and selecting Zoom In/ Zoom Out or using the following shortcuts Ctrl+= / Ctrl+- (Windows) or Cmd+= / Cmd+- (Mac).

The program functions will remain locked until a name and student number are inserted into the boxes located at the top right of the screen. Note, after entry these details are locked into the app and cannot subsequently be altered. Student numbers should follow the Loughborough University convention i.e. a letter followed by 6 numerical digits. This numbering convention can be altered to accommodate other institutions, upon request. Non-academic users can use the student number A123456 to access the app.

2. Load data by navigating to the open file icon at the top left of the screen.
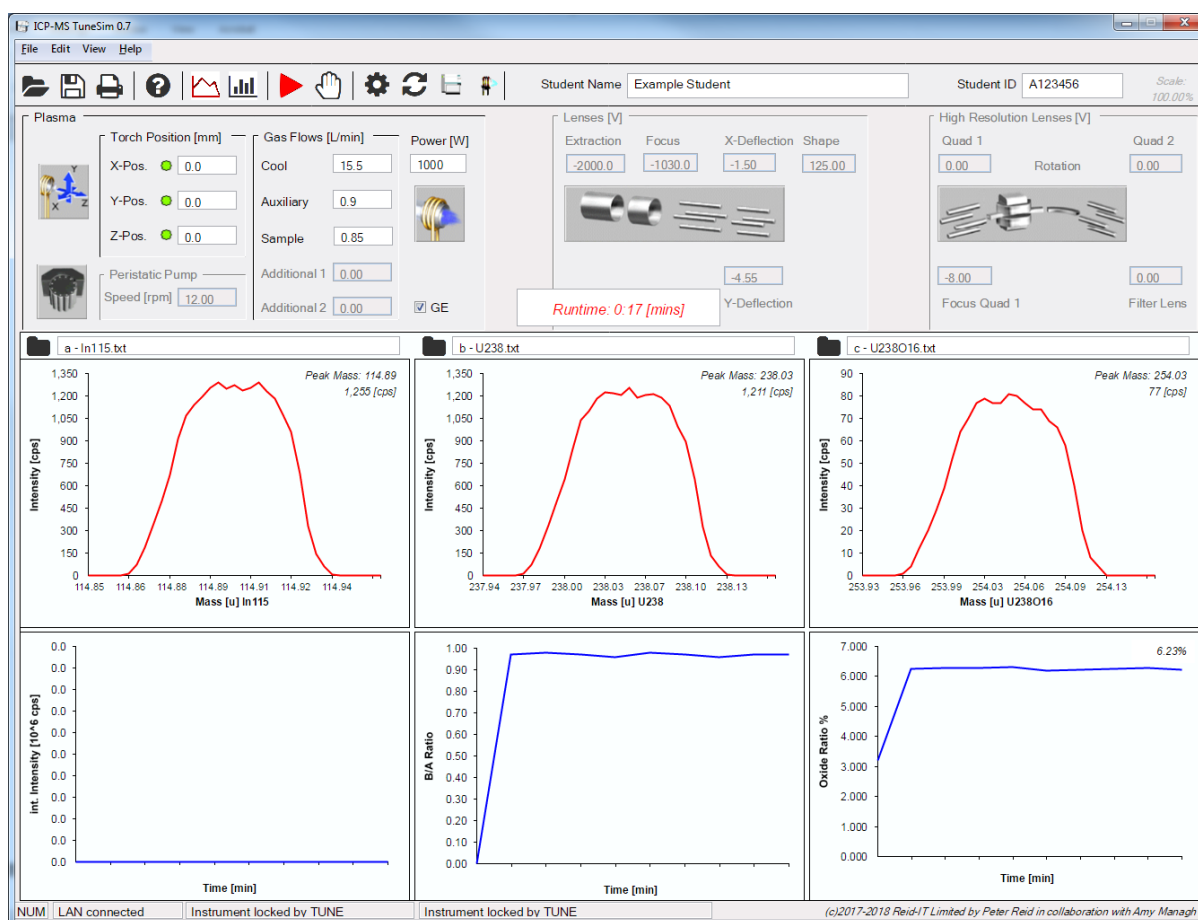

Select the three data files provided and click Open. Do not rename these files.

3. To begin the simulation, press the start button.

The initial view will appear, as shown below:

The loaded files contain data for the analysis of a solution containing 1ppb of indium and uranium, sprayed into the ICP-MS using a concentric nebuliser and a cyclonic spray chamber.

The top panels show the measured signal for the three analytes selected in real time:

- Top left: ^{115}In signal – to assess sensitivity
- Top middle: ^{238}U signal – a marker for mass balance
- Top right: ^{238}U^{16}O – to indicate possible polyatomic interferences

The lower panels show the trend in the integrated peak areas for the analytes over the tuning session:

- Lower left: the trend in signal from ^{115}In.
- Lower middle: the ratio between ^{238}U238 and ^{115}In
- Lower right: the oxide ratio (UO/U x 100)

4. Adjust the tuning parameters to obtain the highest possible sensitivity for indium, whilst keeping the oxide ratio as low as possible. As a guide, the Element XR has a factory specification of 1 million counts per second (cps) per ppb of indium, but in practice much higher signals than this can be achieved. The desired oxide ratio will depend on the application being performed, but should usually be below 5%.

   In this simulation the Cool and Auxiliary gases and the lenses have been set for you and **should not be adjusted**. However, the torch positions, sample gas flow and RF power will require tuning. To adjust the tune settings, click the torch position and plasma logos:

   This will open a pop-up with slider controls. It is advisable to begin by first turning up the sample gas to a value between 0.7 and 1.0 L/min.
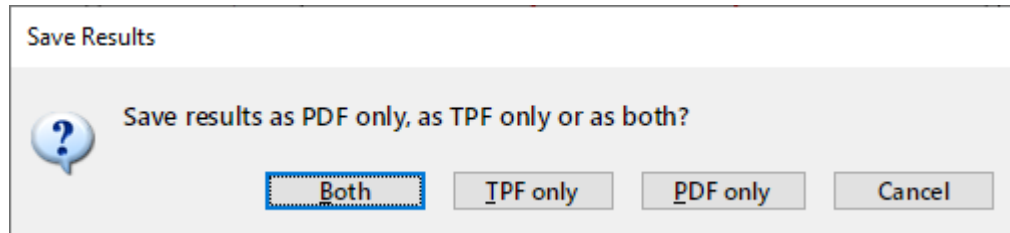
5. Help on these settings is available by clicking on the question mark icon.

6. Once tuning is finished, click on stop.

7. Save the results in both pdf and tpf formats by clicking on the save icon.

The pdf will provide a screenshot of the tuning exercise, which you can submit for assessment. The tpf (tune parameter file) will be used to set the analysis conditions for any subsequent experiments.

Note that the save and print functions are not available whilst the simulation is still running, but you can later restart the simulation (using the start button).

8. Once finished, close the program by navigating to File and then Quit.