

## **Dependencies:**

Graphic user interface depends on streamlit for creating web application;  
on matplotlib for plotting graphs;  
and on pandas for creating tables

## **Structure of software:**

Urania is operated by 2 independent programs that communicate one with another through JSON files.

One program is responsible for interactions with mass spectrometer, another one is responsible for data visualisation and graphic user interface.

## **Structure of GUI code:**

Code of GUI consists of following files:

File main.py is the file that needs to be executed (via “**streamlit run main.py**” command in IDE command line) to launch the program

File StreamlitGUI.py contains functions to display each 3 types of graphs, functions to display data tables and a function to display fully working sample page

File JSONoperators.py contains functions to read JSON files with spectrums and with settings configurations

File GUI\_settings\_menu.py contains functions to modify each of the parameters, to re-write JSON config with modifications applied, to reset settings to default, and to start a working Settings page

file “pages” contains .py files that are executed by Streamlit and are responsible for each of the pages

## **Structure of JSON files:**

Spectrum files contain results produced from the same pipe over different moments of time in following format:

```
{"class": "metadata"}  
{"class": "spectrum", "time": x, "array": [x1, x2, x3]}
```

Time is formatted as seconds since 01 Jan 1970, timezone questions are not resolved yet

Array is formatted as PPM's for different molar masses starting from 0 with step of 1 (therefore, zeroth element of array is insignificant and should be set to zero)

Purpose of metadata line is to be decided.

Results from different pipes are stored in different files.

Following settings of GUI page are specified in the settings file:

- page name
- name of spectrum file
- vertical or horizontal orientation
- default masses to be displayed on const\_mass graph
- default amount of spectrums to be displayed
- Options whether to display different types of graphs or no

GUI settings has the following format:

```
{"page_name": "int", "spectrum_filename": "name", "orientation":  
"vertical"/"horizontal", "default_amount_of_spectrums": "int", "default_masses":  
"int1,int2,int3...", "do_display_3d": "boolean", "do_display_const_mass": "boolean",  
"do_display_const_time": "boolean"}
```

GUI settings line specify which page it belongs to; which JSON file is parsed; whether page is displayed horizontally or vertically; how much spectrums are displayed; what masses are displayed on const\_mass graph; whether each type of graphs is displayed