Provenance of data used in lesson "Loading, testing, and wrangling experimental data"

Marianne Corvellec[1]

[1]Data Carpentry

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1 Introduction

In our lecture on Loading, testing, and wrangling experimental data, we use real data, courtesy of Pierre-François Duc (Department of Physics, McGill University). These data were acquired in a physics experiment designed to study the flow of superfluid helium in a confined geometry tending towards 1D. The interested reader can find details about the physics, results, and discussions in this open-access article (Duc et al., 2015) and references therein.

2 Variables

The control variables (i.e., knobs of the experiment) are pressure difference ΔP and temperature T. The response variable is the flow, denoted by Q. In the data file,

- T corresponds to `T_CH8`,
- ΔP corresponds to `(PRESSURE - P2)` $\simeq$ `PRESSURE` , and
- Q corresponds to `FLOW`.

In a certain regime, the flow is expected to be a power law of the pressure difference and temperature:

$$Q \sim T^{\alpha} \tag{1}$$

$$Q \sim (\Delta P)^{\beta} \tag{2}$$

3 Experimental runs

The scientist can run, control, and monitor the experiment with a native GUI (we say 'native' as opposed to 'web'). Pierre-François Duc developed the GUI entirely in Python, using the PyQt API.

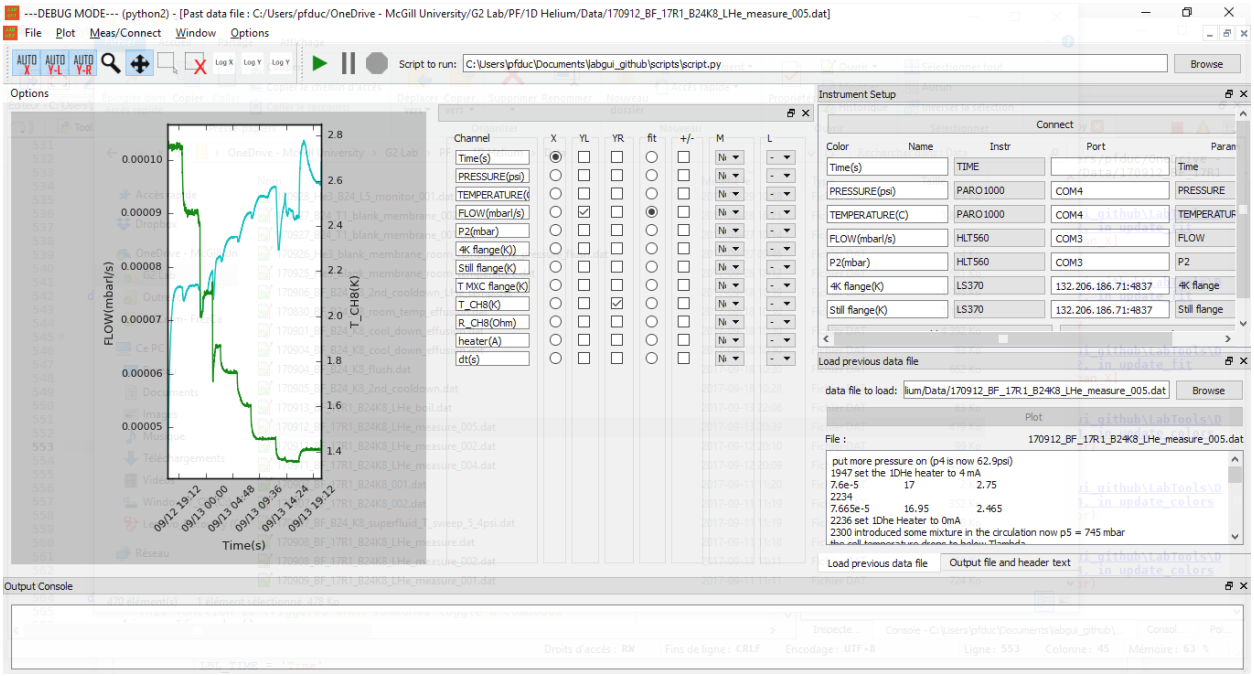

Figure 1: Native GUI for data acquisition (start, monitor, stop).

References

P.-F. Duc, M. Savard, M. Petrescu, B. Rosenow, A. Del Maestro, and G. Gervais. Critical flow and dissipation in a quasi-one-dimensional superfluid. *Science Advances*, 1(4):e1400222–e1400222, may 2015. doi: 10.1126/sciadv.1400222. URL https://doi.org/10.1126%2Fsciadv.1400222.