III. Physikalisches
Institut A

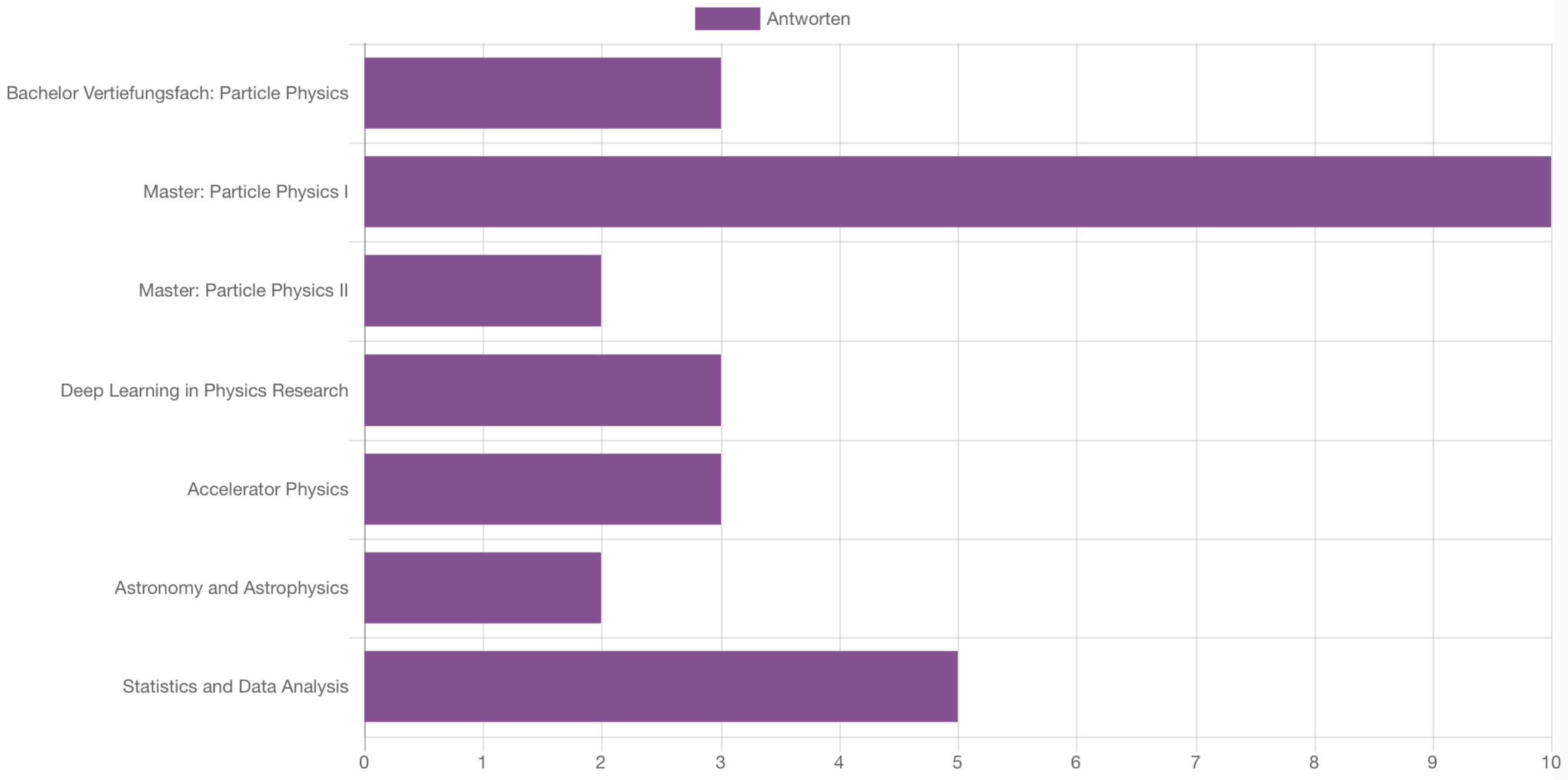**Experimental Techniques in Particle Physics   (WS 2020/2021)**

Exercises

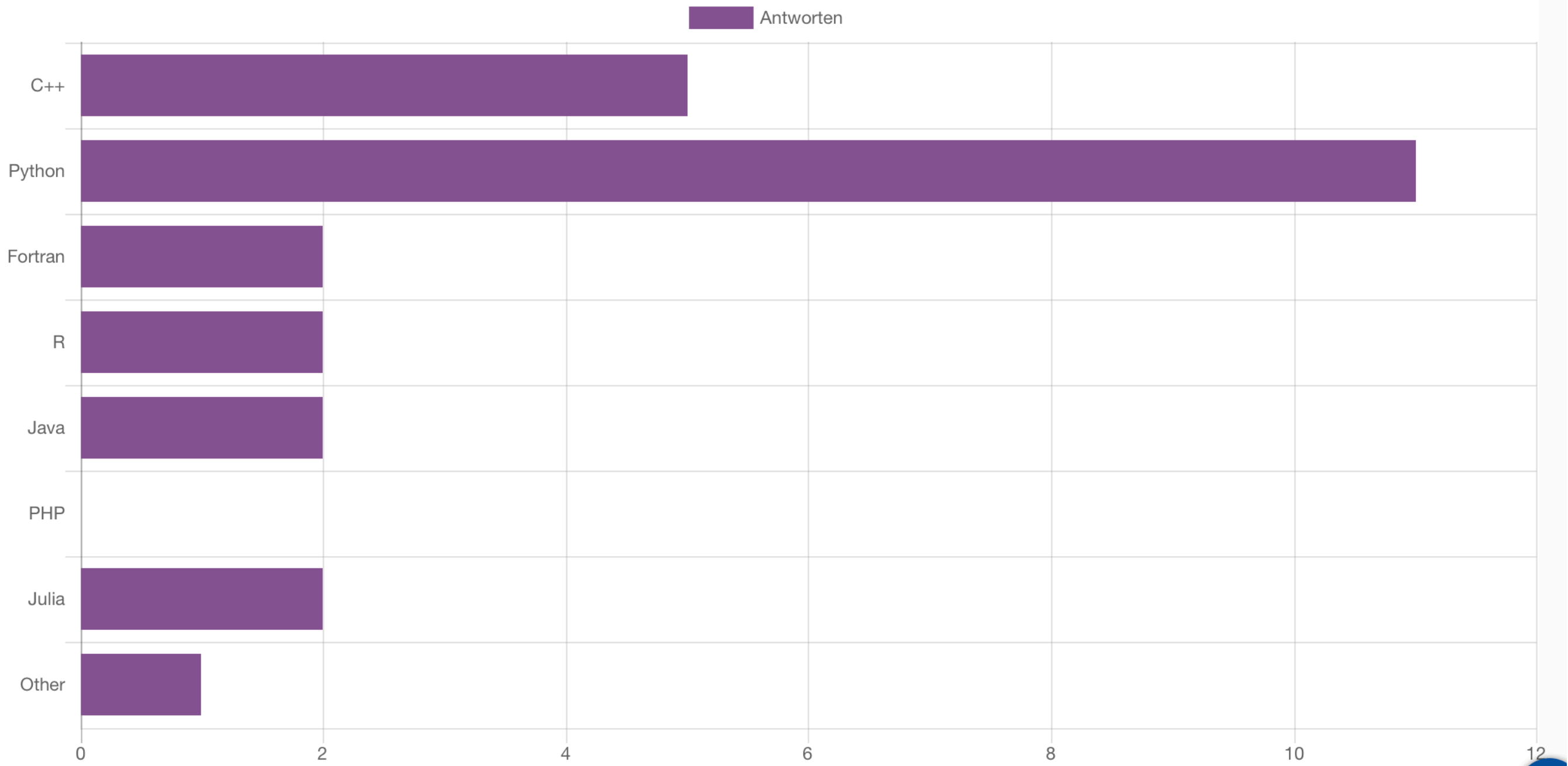Prof. Alexander Schmidt

03.11.2020

Questionnaire

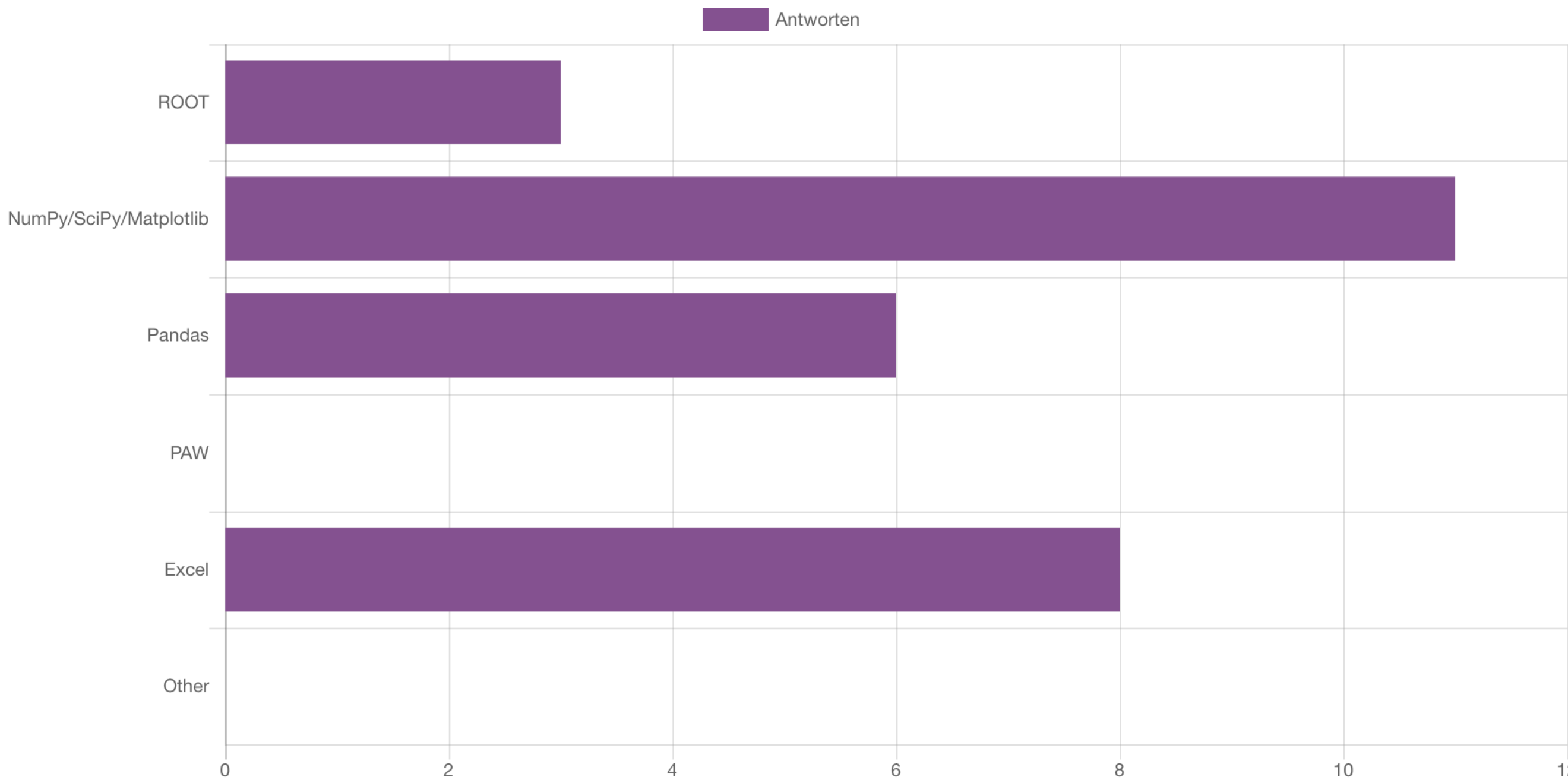**I am attending or have attended the following courses:**

Questionnaire

I know the following programming languages

Questionnaire

**I know how to do data analysis with the following tools**

Exercises

- the ROOT exercises today are very simple and short (you find them in Jupyter Hub)

- they are mainly to make sure everybody is now able to
  - open files
  - inspect files
  - do basic math with TMath
  - knows some basic C++
  - fill histograms with given data
  - draw conclusions from it

- you should really make sure you can solve the exercises today by yourself, based on the material that was given last week (otherwise you will not be able to follow the exercises next week)

- next week we will start with some concrete applications on interaction of radiation with matter

- if you are finished early, you can study yourself the ROOT examples in `https://root.cern/tutorials/`

- you can form teams of 2-3 people for these exercises and use breakout rooms to work by yourself

- you can call us into your breakout rooms to ask questions

- you need the **latest zoom version** for this to work !!!

ROOT exercise I

- study the ROOT user guide

- solve the following problem:

  - fill two histograms with 5000 Gaussian distributed random numbers each

  - create a panel with a ratio plot of the two histograms, including statistical uncertainties

Two gaussian plots and their ratio
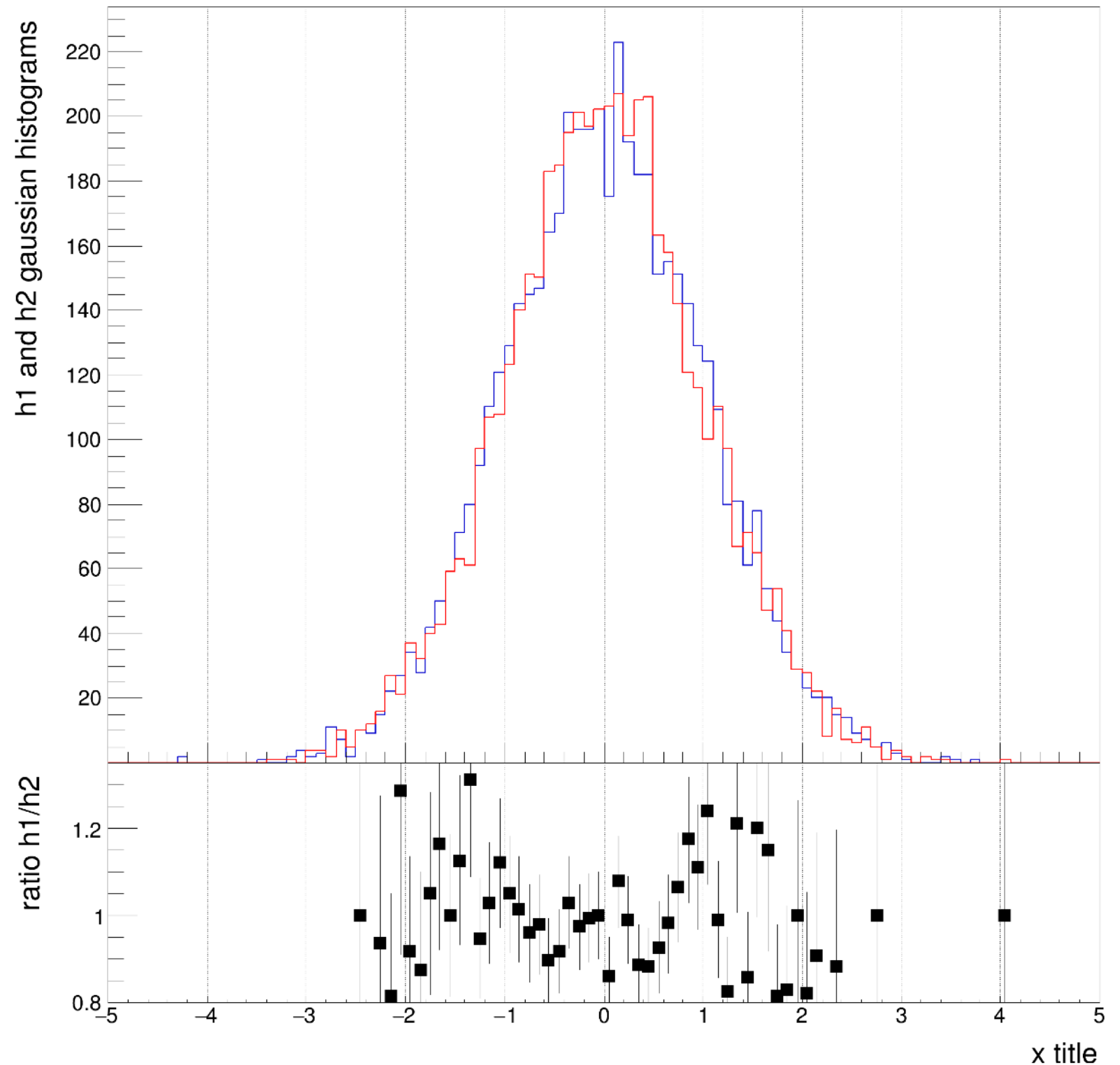
ROOT exercise II

- the moodle page contains a ROOT tree (data file) with time measurements of a radioactive probe of a material. The mean lifetime is τ=8y.

- The data represents the time intervals between two radioactive decays

- the data is cutoff at 1200 seconds (!)

- solve the following problem:

  - open the file and look inside with a ROOT "TBrowser"
  - make a histogram of the decay times
  - calculate the amount of radioactive material
  - determine the statistical uncertainty of the measurement