Physics Laboratory II : written report

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Written report

- Should be a **scientific document**
  – 20-30 pages (max. 30 pages) single column are expected
- It must be uploaded on e-learning in pdf format – at least **one week before** the date of the final oral discussion (see below).
- It is authored by the **whole** group – One **single** grade

Suggestions for the written report

Audience

- Every report is targeted for some reader.
  – You should keep this in mind when you write. **Always**.

- In this case your audience is **your fellow students of Phys Lab II**
  – which are not aware of all the details of your experiment
  or the students of the coming years that will have to repeat the experience.

- You have to be very **clear** and **consistent** in defining each single **symbol** or (new) concepts you are using
- You have to refer to a good bibliography

Reproducibility

- A written report should contain enough information for another student or scientist to be able **to repeat** the experience.
- Clearly a selection of the details must be done but never forget this principle.
- You can use **tables** for the parameter configuration of the experimental setup

State your goals

- It must be clear to the reader what you were aiming to during the experiment.
- After a general (concise!) introduction to the physics context you have to write the **objective** of the experience
- Also, you should try to explain **quantitively** your goals
  – Calibrate the detector with xx % uncertainty, build a detector with such and such resolution, etc.

Follow the scheme Goal – Methods – Results

- The scientific report should have these three elements
- **Goal**: which are your objectives ?
- **Methods**: which is the measurement principle ? Which is the apparatus you are using? How do you calibrate it or measure the efficiency ?
- **Results**: did you reach your goal ? Report quantitatively the results and explain the error you are attaching to the results

Not a logbook

- The report must NOT be an historical logbook of your activity.
- It must be **a selection of results** (intermediate as calibration, check of working conditions, as well as final..).
- You must **omit** to report your **mistakes**
  – But mistakes are useful to learn, however they are not relevant for the final report
- Therefore you should follow a **logic structure**, NOT a historical one

Define all your symbols, reference your figure and table.

- A text must be **fully consistent**.
- A reader should find all the definition of symbols used in the text.
- All the figures and tables introduced in the report must be **referenced and commented appropriately** in the text.
  – Never introduce a figure without explain it !!!
- It is in fact a good practice to **start** to write your report by a collection of **tables and graphs**.
- Add the relevant and proper references to the bibliography.

Describe your apparatus.

- Never forget that your reader has never seen your apparatus.
- You should be able to draw a very **schematic picture** of it and add it to the report.
- Photos are good but not enough sometimes to explain the important things and concepts.

Errors (in the graphs and presented results)

- In ALL your graphs you should be able to plot the **experimental error**.
  – Usually the **statistical uncertainty**, especially for histograms

- Failing to do so it is considered a serious mistake
- However sometimes you are dominated by the **systematic error**
  – You should justify why this is the case

- All your results (the final one, but in general all of them) should report an estimate of the error.
  – You have also to clarify its nature, statistical only ?

Quality of the pictures

- The true **scientific content** is always in the **graphs**
- Be careful with the graphic **quality**
  – colors and size of the marks should be properly chosen
- Never forget about the **units** on both axes.
- For histograms always write on the y axis the **bin width**.
- **Captions** of figures, graphs and table should contain all the information to understand them.

Short sentences

- A scientific document should use a **terse** style.
- Use **short** sentence as clear statements
  – Especially if you are not mastering the English language
- The logic of your reasoning should follow by adding clear and synthetic information in each sentence.
- Also use short paragraph to emphasize a concept.
  – Sometimes you can use bold-face font to underline some word

Written report: summary

- Writing a good report is a **difficult task**, at all levels, not only for students but even for experienced physicists.
- Your success (in the academy, research, or any professional job you will do) will require good communication skills.
- So, use this opportunity wisely.

Final discussion and evaluation

- Final grade will be the average of tutors' mark and my mark on the written report.
- One additional point can be awarded for the final discussion

- Final discussion will be with all group members at the same time:
  – Just a short (**max. 10 slides**) oral report with your results
  – It can be from remote.
  – The written report must be uploaded at least **one week before** the final discussion

- There is flexibility to find a day for the final discussion: your preferences will be soon collected on elearning for the period 13 - 31 July and September.