

# Guidelines for writing project reports aimed at students in courses given by the Nuclear Physics Group at KTH, Stockholm, Sweden

## **GUIDELINES FOR PREPARING A RESEARCH REPORT**

Research is a genuine exploration of the unknown that leads to new knowledge, which often warrants publication in an international peer-reviewed scientific journal. It is important to realize that science depends on precise transmission of facts and ideas. Preparation of comprehensive written research reports is an essential part of all research. Project work in the course “Experimental Techniques for Nuclear and Particle Physics” should follow the general style and outline of a scientific report. The following information on report writing and format is provided for the successful writing of the project reports. See also style guides for scientific journals, like the one provided by the American Institute of Physics.

### **Organization of the Research Report**

Most scientific research reports, irrespective of the field, follow a common method of scientific reasoning. That is: the problem is defined, a hypothesis is created, experiments are devised to test the hypothesis, experiments are conducted, and conclusions are drawn. This framework is consistent with the following organization of a research report:

- Title

- Abstract
- Introduction
- Experimental Details or Theoretical Analysis
- Results
- Discussion
- Conclusions and Summary
- References

## **Title and Title Page**

The title should reflect the content and emphasis of the project described in the report. It should be as short as possible and include essential key words. The author's name should follow the title on a separate line, followed by the author's affiliation (e.g., Department of Physics, The Royal Institute of Technology, S-10691 Stockholm, Sweden). For course project reports the affiliation of the student(s) may be omitted. It may be helpful to state the origin of the report (e.g., Project for SH2306, Experimental Techniques for Nuclear and Particle Physics, December 2017). All of the above could appear on a single cover page. Acknowledgments and a table of contents can be added as preface pages if desired.

## **Abstract**

The abstract should, in the briefest terms possible, describe the topic, the scope, the principal findings, and the conclusions. It should be written last to reflect accurately the content of the report. The length of abstracts vary but seldom exceed 200 words. A primary objective of an abstract is to communicate to the reader the essence of the paper. The reader will then be the judge of whether to read the full report or not. Were the report to appear in the primary literature, the abstract would serve as a key source of indexing terms and key words to be used in information retrieval.

## **Introduction**

The introduction should contain a clear statement of the problem or project and why it is of interest. This section should describe clearly but briefly the background information on the problem, what has been done before (with proper literature citations), and the objectives of the current project. For real scientific reports a clear relationship between the current project and the scope and limitations of earlier work should be made so that the reasons for the project and the approach used will be understood. (The latter is usually not applicable to the project work carried out in this course).

## **Experimental Details (or Theoretical Analysis if it is a theoretical work)**

This section should describe what was actually done. It is a succinct exposition of the laboratory notebook, describing procedures, techniques, instrumentation, special precautions, and so on. It should be sufficiently detailed that other experienced researchers would be able to repeat the work and obtain comparable results. In theoretical reports, this section would include sufficient theoretical or mathematical analysis to enable derivations and numerical results to be checked. Computer programs from the public domain should be cited. New computer programs should be described in outline form. If the experimental section is lengthy and detailed, as in synthetic work, it can be placed at the end of the report or as an appendix so that it does not interrupt the conceptual flow of the report. Its placement will depend on the nature of the project and the discretion of the writer.

## **Results**

In this section, relevant data, observations, and findings are summarized. Tabulation of data, equations, charts, and figures can be used effectively to present results clearly and concisely.

## **Discussion**

The crux of the report is the analysis and interpretation of the results. What do the results mean? How do they relate to the objectives of the project? To what extent have they resolved the problem? Because the "Results" and

”Discussion” sections are interrelated, they can often be combined as one section.

## **Conclusions and Summary**

A separate section outlining the main conclusions of the project is appropriate if conclusions have not already been stated in the ”Discussion” section. Directions for future work are also suitably expressed here. A lengthy report, or one in which the findings are complex, usually benefits from a paragraph summarizing the main features of the report - the objectives, the findings, and the conclusions. The last paragraph of text in manuscripts prepared for publication is customarily dedicated to acknowledgments. However, there is no rule about this, and research reports or theses frequently place acknowledgments (if any) following the title page.

## **References**

All reports will contain references. They should be indicated numerically in the text in the order in which they appear, either in brackets [1], or as a superscript<sup>2</sup>. Styles for the actual list of references vary slightly, but references to journal papers will always include the author or authors, the name of the journal, the volume, page number and the year of publication, e.g. [1] ”The quantized Hall effect” K. von Klitzing, *Reviews of Modern Physics* 58, 519 (1986). Including the title of the paper is not typically required for scientific articles, but can be very helpful, and you are strongly encouraged to do this in your report. For books the name of the book, the author, the publisher and the year should be included, e.g. 2. ”The physics of low-dimensional semiconductors”, J. H. Davies, Cambridge University Press (1998).

Make sure that all the references in the text refer to the correct reference in the list, and that no reference appears that is not referred to in the text. The literature references should be collated at the end of the report.

## **Preparing the Manuscript**

The personal computer and word processing have made manuscript preparation and revision a great deal easier than it used to be. Students should make use of a word processor and have access to graphics software which allows

numerical data to be graphed, figures to be drawn, and mathematical equations to be represented. These are essential tools of the technical writer. All manuscripts should routinely be checked for spelling (spell check programs are helpful), and all manuscripts should be carefully proofread before being submitted. The report should be submitted to your project supervisor.

**Please note that all forms of plagiarism are strictly forbidden.** This means that sections of text may not be copied from other sources, e.g. from the internet. All external materials used should be properly cited and all text material in a report must be written in the student's own words. Reports and essays written by students at KTH are subject to plagiarism checks on a routine basis.