

# Paper

Use the following description of a scientific paper and the attached papers as a guideline as you prepare your paper.

**Audience:** Your audience consists of juniors and seniors who have not done the lab you are describing. Include therefore all information which is necessary to follow your paper on the basis of that level of academic preparation.

## **Further Information (papers on the course website):**

- PFR, KPA, JJB, JCW, and KLA. *The Art of Scientific Report Writing*, University of Oxford, 2012.
- R. E. Adelberger, J. Undergrad. Research in Physics **18**, 32.
- D. Chowdhury, L. Santen and A. Schadschneider, Curr. Sci. India **77**, 411 (1999).

**Group Work and Use of Sources:** You are encouraged to work together on getting the results of your lab. You may also work together on the analysis and the corresponding figures. However, for the final write up of your paper you may **not** work together! You have to find your own words. Do not copy sections of any other source (world wide web, books, etc.) without quoting and referencing the source!

## **Contents:**

- Title
- Author(s), with Affiliations (that is Institution and Address)
- Abstract: An abstract is a short summary of your experiment/simulation and your results. The abstract is for a reader who might not have time to read the rest of your paper or who might not have easy electronic access to the rest of your paper. The reader may decide depending on your abstract if she or he reads the whole paper. The abstract should be understandable without the rest of the paper.
- Paper Text: The body text of the paper should be understandable by itself. Reference any information which you used from other sources or which includes details not necessary for the reader's understanding.
  - Introduction/Background<sup>1</sup>:  
This section might give some historical background and/or necessary background information. You might talk about similar experiments/simulations which have been done previously. The Introduction also serves as a motivation for why your experiment is of specific interest and importance. The main purpose of the introduction is to put your experiment into context and to give a general description of your project. The introduction is often the most reference-rich section, since you speak here about the work of others. You might end your introduction with an outline of the rest of the paper.

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<sup>1</sup>Sometimes this is split into two sections

- Theory:  
This is a section one uses if there are analytical calculations possible. For theoreticians this is the main section.
- Model (for Simulations):  
In this section you describe your model exactly. This includes for example the main differential equation which defines your system. For systems like the Ising model this section includes the specification of the lattice and number of dimensions. In principle, after reading your description any reader should be able to write the program with exactly the same model as yours.
- Simulation (for Simulations):<sup>2</sup>  
This section includes the method you use (e.g. Euler-step or fourth order Runge-Kutta method). Together with the model section all information should be provided that the reader could reproduce your data, i.e. all used parameter values should be given.
- Apparatus (for Experiments):  
This section describes the experimental set-up. It should describe the equipment used, how the experiment was set up, and experimental techniques. A diagram of your setup may be useful. Reference external documents related to this equipment or the development of your technique. You should provide enough information, so that the reader could in principle reproduce your results.
- Results:  
This section describes the results of your experiment or simulation (including uncertainties). It can include tables, formulae and figures. Tables and figures should have captions and formulae should be numbered rather than inline in the text. Captions should allow the essential aspects of figures or tables to be understood without reference to the body text.
- Conclusions/Discussion:  
This should include a summary of the story that you are telling the reader with the entire paper: what you have done, what your basic method was, and what results you found. Draw conclusions from your results and place them in the context of the work of others and the present state of the field. This connects things to the context for the work that you provided in the introduction. You might include a discussion of what one could do in future work. If there is a great deal to say about what could be done in future this could be included in a separate 'Outlook' section.
- References:  
This is the bibliography of all references to which you refer in the text. You may define your references inside the .tex file or separately in a .bib file using the bibtex approach, according to your preference.

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<sup>2</sup>This section is often combined with the section “Model.”