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Physics labs for Physics & Applied Physics BSc programmes in Groningen

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Students of Physics and of Applied Physics in Groningen encounter various forms of physics labs during the bachelor programmes. There are four courses (*Physics Laboratory 1, 2, 3* and *4;* 5 ECTS each) fully dedicated to physics labs and several other courses with physics labs connected to them. All these courses are compulsory, except *Physics Laboratory 4*, which is an elective for certain tracks within the programmes.

Physics Laboratory 1 (year 1, trimester 1) is the introductory lab course (also joined by Astronomy students), with emphasis on gaining experience, error analysis and how to write reports. *Physics Laboratory 2* (year 1, trimester 4) is the so-called *Physics Project Practical*, in which students investigate a topic of their own choice. In this course they experience the full research cycle of formulating and presenting a research question and hypotheses, setting up, carrying out and analysing experiments and reporting orally, in print and on a poster which is presented at a concluding student symposium.

Physics Laboratory 3 (year 2, trimester 4) is the start of the more advanced physics labs, in which students perform 2 experiments (out of a pool of approximately 15). Typical experiments are Annihilation radiation, Tunnel diode, Zeeman effect and Laser Doppler anemometry (to name a few). Students have to write a 3-page scientific article about one of their experiments instead of a normal report. *Physics Laboratory 4* (year 3, trimester 2) continues with 3 more experiments from the same pool.

In addition to these courses, there are physics labs (3 or 4 hours each) connected to the courses *Electricity and Magnetism* (2 labs, year 1, trimester 3), *Waves and Optics* (3 labs, year 2, trimester 2) and *Electronics and Signal Processing* (3 labs, year 2, trimester 3). The last course of these also has 3 computer practicals, which partly prepare for the corresponding physics labs. Student preparation of physics labs is of course always important, but for *Waves and Optics* and for *Physics Laboratory 3* and *4* it is specifically assessed before students can start their experimental work.

In my presentation I will give an overview and more details of all physics labs in Groningen and share our experiences and results.