

Advanced Computational Physics Lab

summer term 2025

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Learning goals of the ACPL course

- implementation of advanced computational methods as used in actual physics research
- basics code development skills, e.g. versioning tools such as git
- code validation, numerical error analysis and discussion
- processing of numerical data, interpretation in physical context
- documentation of results, graphical visualisation of data
- documentation of computer code

implementation

three coding projects from three different fields

statistical physics, particle physics, soft-matter physics

target group

MSc students, in particular, in the theoretical physics stream

Recommended Prerequisites

- coding experience with Python, C++ or similar language
- Methods of Computational Physics or equivalent
- Advanced Statistical Physics or equivalent
- Advanced Quantum Mechanics or equivalent

credits

6 ECTS earned by passing 30 minutes oral exam

list of examiners (need to have completed corresponding project)
co-examiner, picked by examiner, will enquire on 2nd project

- Prof. Ph.D. Peter Sollich
- Prof. Dr. Steffen Schumann
- Prof. Dr. Marcus Müller
- Prof. Dr. Fabian Heidrich-Meisner
- Prof. Dr. Stefan Kehrein
- Prof. Dr. Viola Priesemann
- Prof. Dr. Stefan Klumpp

on FlexNow sign-up with coordinator of the respective term

↪ for summer term 2025 this is Prof. Dr. Steffen Schumann

↪ contact coordinator and main examiner for exam scheduling

exam admission prerequisites

successful completion of three coding projects

- successful code implementation, physics tasks addressed
- individual code submitted to project tutor (via git repo)
- individual written report, $\mathcal{O}(10)$ pages, submitted to tutor
- feedback meeting with tutor to discuss report/code grading
- score of at least 50% to pass project
- you might collate projects over several terms

tutors keep records of successfully completed projects

Organisational Matters – generalities

- sequential work on projects 1-3 (about 4 weeks each)
- each project preceded by focused **introductory lectures**
- tutors available during 4 week project period (possibly beyond)
 ↪ Wed 2-6pm, Fri 10-12 in person/zoom (see project intros)
- communication via e-mail & studIP
- **Goal:** complete each project within the given 4-week period
- **hard deadline** for all projects, completion by 15.09.
- upon completion of 3 projects, sign-up in FlexNow and schedule the oral exam (likely to happen in term break)

note: ACPL regularly offered in winter & summer term

Organisational Matters – important dates

- course times Wed, 2-6pm (HS4/3), Fri 10-12 (SR4)
- introductory lectures project 1: statistical physics
Peter Sollich, Rafael Diaz: April 23rd & 25th 2025
- introductory lectures project 2: particle physics
Steffen Schumann, Christian Preuß: May 21st & 23rd 2025
- introductory lectures project 3: soft-matter physics
Marcus Müller, Jiayu Xie: June 18th & 20th 2025

communication is key

contact lecturers & tutors with questions on specific projects
contact coordinator Steffen Schumann for general matters