Lecture: Particle Physics WS 2025/26

Lecturers: Prof. S. Degenkolb
Prof. U. Uwer
Dr. Sacha Diefenbacher, Prof. T. Plehn (Theory blocks)

Venue: INF 227, HS2
Time: Thursdays, 14:15 - 16:00,
Fridays, 14:15 - 16:00

Web Page:

The web-page contains a table with the week to week topics and the uploaded lecture material.

You can also find the links to the tutorial groups and the exercise sheets on the lecture page.

Tutorials: Thursdays 16:15-18:00 (2 groups)
Fridays, 09:15-11:00 (2 groups) and 11:15-13:00 (1 group)
Will start next week!

Exercise sheets: Appear on the web always on Tuesdays (1st next week)
Need to be handed in by Tuesday, 18:00, the week after:
Upload in the Übungsgruppenverwaltung

Will be discussed in the tutorials following the hand-in date.

The exercises will not be corrected in detail, but you will get 0 or 1 point depending if you did a decent attempt to solve the problem even if the solution is not 100% correct.

You can hand-in your exercises in groups of maximal three students. Please put always all names on the sheet. We expect every student of the group to be able to present and explain the solutions she/he has handed in: "good scientific practice"!

60% of the points on the sheets are required to be admitted for the exam.
Admissions to exams from previous years are not valid this year.

Date of written exam will announced later (we foresee it in the week of Feb 1st)

Lecture concept and topics:

Since 2025, the lecture concept is slightly modified w/r to earlier years where the lecture followed closely the book from M. Thomson.

We have included now three blocks of “light theory”, each block w/ 3 lectures. Thomson’s book is still covering large fractions of the lecture material, but not everything!

Theory blocks: given by Dr. S. Diefenbacher / Prof. T.Plehn

- QED Lagrangian and Feynman rules, calculation of ee→ff
- Electroweak interactions, Feynman graphs for W, Z
- QCD Lagrangian and Feynman rules

This term’s lecture will be followed next semester by the lecture “Particle Physics II” which will also contain theory blocks.

While this lecture primarily discusses “tree level processes”, the lecture of next semester addresses “higher orders” and loop effects.

Some remarks concerning the tutorials and the usage of AI:

AI opens fantastic opportunities in science. It simplifies our life in may aspects – we therefore encourage you to use it.

For many homework problems AI will provide you with quasi canonical solutions. Copying these solutions (or even asking AI to typeset the solutions) might result in homework points, however does not necessarily deepen your insights and your understanding.

Learning, understanding and gaining insights require personal effort: Take the homework exercises as an opportunity. Try first to understand the problems and find a solution yourself before you ask AI for the solution. Try to find the ansatz and think about the assumptions. Use AI as a discussion partner without immediately asking for the full solution of the specific problem.

The tutorials serve to clarify the physics of the problems, the assumptions and the ansatz, and not necessarily to provide you with the full canonical solutions.
The more you ask, the more you will understand. This requires your presence!

We might ask you to present your solutions – take it as an opportunity to talk about physics and also to ask questions.

At the end it is you who decides if you attend the lectures and the tutorials…