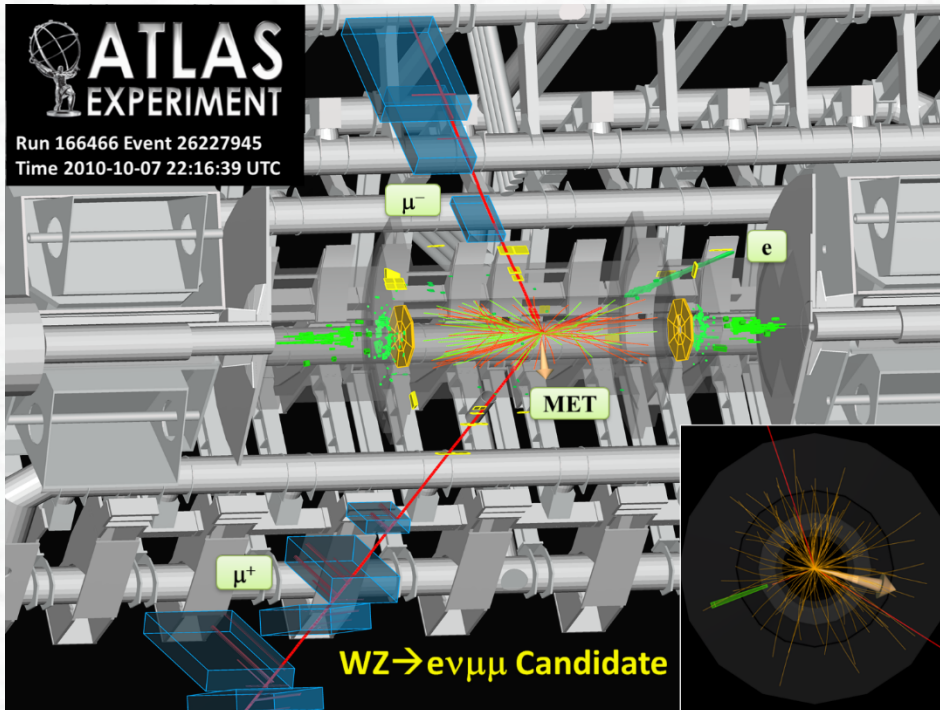


Particle Detectors



- Basic Information on the Lecture Programme
- Tutorials
- Final Exam (Klausur)

Particle Detectors

Lecture in the area of “Advanced Experiment” (Particles and Fields) of the Freiburg Physics Master Studies

- Principles of particle detection
 - Interaction of charged and neutral particles with matter
- The basic measurement concepts and technical realisations
 - Individual detector components and detection principles
 - Large-scale detector systems in particle and astro-particle physics
- Selected applications in medical imaging and other areas

Lecture Plan (Dates, subjects (prel.))

Vorlesung Teilchendetektoren WS 2015/16

		VL Std.	Bilanz Std.
22. Okt.	Introduction	2	
23. Okt.			-1
29. Okt.	Interaction of charged particles with matter	2	
30. Okt.	Interaction of charged particles with matter	2	1
05. Nov.	Interaction of neutral particles with matter	2	
06. Nov.			-1
12. Nov.	Ionisation measurements	2	
13. Nov.	Ionisation measurements	2	1
19. Nov.	Tracking detectors I (MWPC, driftchamber)	2	
20. Nov.			-1
26. Nov.	Tracking detectors II (driftchamber, TPC)	2	
27. Nov.	Tracking detectors III (Silicon detectors)	2	1
03. Dez.	Tracking detectors IV (Silicon detectors)	2	
04. Dez.			-1
10. Dez.	Measurement of particle momenta, muon	2	
11. Dez.	Photomultipliers	2	1
17. Dez.	Scintillators, Time measurement	2	
18. Dez.		2	1
Weihnachtspause			
07. Jan	Energy measurement in calorimeters I	2	
08. Jan	Energy measurement in calorimeters II	2	1
14. Jan	Energy measurement in calorimeters III	2	
15. Jan			-1
21. Jan	Particle Identification, Cherenkov detectors	2	
22. Jan	Particle Identification, Transition radiation	2	1
28. Jan	Detector systems	2	
29. Jan			-1
04. Feb.			-2
05. Feb.	ATLAS and CMS detectors	2	1
11. Feb.	Applications in medicine and other areas	2	
12. Feb.	Klausur	1	
Summe		45	0

Additional Information

Dates: Thursday 10:15 – 12:00, Friday 8:15 - 10:00 h, GMH, Seminarraum

Lecturer: Prof. K. Jakobs
Gustav-Mie Haus, 3. Stock, Room 03-021
Contact hour: Friday 11.00 – 12.00 h
Phone: 203 – 5713
Secretariat: Frau Chr. Skorek, Phone: 203-5715
email: christina.skorek@physik.uni-freiburg.de or
karl.jakobs@uni-freiburg.de

Style of lectures: - Mainly black board (e.g. important derivations),
Figures, plots, tables on slides which are provided on:

<https://portal.uni-freiburg.de/jakobs/Lehre/ws1516/particle-detectors>

Prerequisites: - Bachelor studies
Experimental Physics V (Nuclear and Particle Physics)

Tutorials

Dates: Presumably 1 group;

Two time slots possible: Monday 14-16 h and/or Thursday 14-16 h

Discussion today, during the lecture break

Discussion leaders: Dr. Frederik Rühr, Dr. Kilian Rosbach

email: frederik.ruehr@physik.uni-freiburg.de
kilian.rosbach@physik.uni-freiburg.de

- Exercise sheets:
- Have to be solved weekly (home work);
 - Delivery: letter box, Gustav-Mie-Haus, ground floor
until: Wednesday 16 h
 - At most two persons can work together
 - Occasionally, Computer problems
Simulation of particle interactions & detectors (GEANT program)
CIP-Pool account required

Tutorials: - Discussion of problem sheets, corrected sheets are

- Everybody who has delivered a correct solution must be capable to present the solution during the tutorial on the black board

Evaluation

1. Tutorial and Final Exam

Participation in the tutorials is compulsory,
50% of points in exercises are required for participation in final exam (Klausur)

Final evaluation: pass, if 50% of total number of points from exercises and final exam achieved

Weighting:	Problem sheets/ tutorials:	25 %
	Final exam	75 %

- Date of Final Exam (Klausur): Friday, 12 February 2016, 08:15 – 10:00 h

2nd Exam:

(Nachklausur, for those who fail): Monday, 21 March 2016, 10:15 – 12:00 h

(Points from tutorials enter as before, i.e. not changed)

- Inscription for Final Exam necessary, [web-interface](#)

Literature

- K. Kleinknecht, Detectors for Particle Radiation, Cambridge University Press, 2nd edition (2008)
- W.R. Leo, Techniques for Nuclear and Particle Physics Experiments, Springer Verlag
- C. Grupen, Teilchendetektoren, BI Wissenschaftsverlag
- H. Kolanoski and Norbert Wermes, Detektoren für Teilchen, Springer Verlag, to appear in November 2015, 960 pages