Course title	Collider physics
Subtitle (if any)	
Abbreviation	M-WE3
Code	4PHY94031V, 4PHY94032V
Language	English
Regular cycle	annually at least one course from M-WE
Duration	1 semester
Responsible lecturer	Prof. Dr. G. Bell
Teaching format	Lecture: 3 hours/week, tutorial: 1 hour/week
Work load	180 h (60 h lectures and tutorials, 120 h self-study)
Credit points	6
Prerequisites for participation	M-T3, M-T4
Teaching goals	The students learn the basic concepts of theoretical collider physics. In particular, they understand how to interpret ultraviolet and infrared divergences that arise in perturbative QCD calculations, and they learn how to define jets in a lepton and a hadron collider environment. Elementary scattering processes at the Large Hadron Collider are also discussed.
Course description	Basic principles of Quantum Chromodynamics, renormalisation e^+e^- scattering, infrared divergences Jet algorithms, event-shape variables Operator product expansion Deep-inelastic scattering, parton model Parton distribution functions, DGLAP equations Proton-proton scattering, Drell-Yan production Soft-Collinear Effective Theory
Assessment method	Written or oral exam
Prerequisite for the award of credit points	Passed exam
Usability of the module	M-WD4, M-WE4, M-WF2, M-WF3
Teaching style	Lecture with blackboard, exercises for self-study.
Literature	Peskin, Schröder: Introduction to Quantum Field Theory Schwartz: Quantum Field Theory and the Standard Model Ellis, Stirling, Webber: QCD and collider physics Dissertori, Knowles, Schmelling: QCD Becher, Broggio, Ferroglia: Introduction to Soft-Collinear Effective Theory