UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DIPARTIMENTO INTERUNIVERSITARIO DI FISICA

General information		
Academic subject	Interacting Quantum Fields	
Degree course	Physics	
Academic Year	1	
European Credit Transfer and Accumulation System (ECTS)	6	
Language	English	
Academic calendar (starting and ending date)	First week of March - Last week of May	
Attendance	Preferred, Not compulsory	

Professor/ Lecturer	
Name and Surname	Antonio Marrone
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Department and address	
Virtual headquarters (Microsoft Teams code)	
Tutoring (time and day)	On request

Syllabus	
Learning Objectives	Understanding the concept of interactions between fields
Course prerequisites	Free Quantum Field Theory and Mathematics knowledge
Contents	The S-Matrix expansion - Wick's Theorem – Feynman diagrams in configuration space - Feynman diagrams in momentum space - Feynman rules for QED – QED processes in lowest order – Bhabha scattering – Compton scattering – Scattering by an external field – Bremsstrahlung – The infrared divergence – The second-order radiative corrections – The photon self-energy – The electron self-energy – External line renormalization – The vertex modification – Regularization - Applications
Books and bibliography	Field Quantization, Walter Greiner, Joachim Reinhardt, D.A. Bromley, Springer F. Mandl, G. Shaw, Quantum Field Theory, Wiley; 2 edition J.D.Bjorken, S.D. Drell, Relativistic Quantum Fields, Mcgraw-Hill College
Additional materials	Notes from the teacher

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
		55	120
ECTS			
		6	

Teaching strategy	
	Lessons on the blackboard

Expected learning outcomes	
Knowledge and understanding on:	Understanding the concept of interactions between fields
Applying knowledge and understanding on:	Implementation of a symmetry in physical models
Soft skills	• *Making informed judgments and choices* Ability to proceed autonomously in the study of quantum field theories • *Communicating knowledge and understanding* Ability to express the acquired knowledge properly • *Capacities to continue learning*

	Ability to study independently from texts and scientific literature

Assessment and feedback	
Methods of assessment	Oral test (100%)
Evaluation criteria	Adequate comprehension and global knowledge of concepts and arguments described throughout the course.
Criteria for assessment and attribution of the final mark	
Additional information	