



Course unit English denomination	String Theory
Teacher in charge (if defined)	Fabio Apruzzi Gianluca Inverso
Teaching Hours	24
Number of ECTS credits allocated	3
Course period	February-June 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (50% minimum of presence) ☐ No
Course unit contents	1. String Theory in target space and effective actions 2. Global and local supersymmetry in D=4 3. Pure supergravity 4. Matter couplings in N=1, D=4 supergravity 5. Supergravity with a cosmological constant 6. Extended supergravities 7. Supergravity in 11 dimensions, maximal and half-maximal supergravities in 10 dimensions 8. Maximally symmetric vacua and compactification: KK-reductions and lower-dimensional effective field theories (EFTs) 9. From supergravity theories to rigid supersymmetric QFTs: decoupling gravity from the EFT 10. Brane solutions and brane engineering 11. Gauge theories from string geometry and from brane systems 12. Strong coupling effects from string geometry and from brane systems
Learning goals	The aim of this course is to develop an understanding of the basic principles of string theory, supersymmetry and supergravity, and their applications. Students will acquire the tools to perform supersymmetry calculations, in the construction of string theory effective actions, understand the basics of flux compactifications, the relation between brane systems and gauge theories, and the study of non-perturbative effects and dualities within these frameworks.
Teaching methods	Lectures
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☐ Yes ☒ No
Prerequisites (not mandatory)	General Relativity, Quantum Field Theory
Examination methods (in applicable)	Presentation on a topic relevant to the course and to the student's research project
Suggested readings	Polchinsky "String Theory"; Green-Schwarz-Witten "Superstring Theory"; Freedman-Van Proeyen "Supergravity",



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Dall'Agata-Zagermann "Supergravity, From First Principles to Modern Applications"

Additional
information
