

Module title		Abbreviation
String Theory 1		11-STRG1-171-m01
Module coordinator		Module offered by
Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
<p>Classical and quantum theory of the relativistic bosonic string, in particular the Nambu-Goto action and Polyakov action; quantisation of the closed bosonic string and emergent graviton; quantum Lorentz invariance and critical dimension; quantisation of the open bosonic string, D-Branes, Gauge Fields and Yang-Mills theories; relativistic conformal field theory, string path integral, BRST quantisation, string interactions, effective actions and gravity.</p>		
Intended learning outcomes		
<p>The students are familiar with classical and quantum theory of relativistic bosonic strings. They know the classical actions for relativistic bosonic strings, the Nambu-Goto action and Polyakov action, they have quantised the bosonic string and understand the emergence of the massless graviton in the spectrum of the closed string. They have calculated Lorentz anomaly on quantum level to deduce the critical dimension of the bosonic string. They understand the boundary conditions for the open string and its connection to D-branes. They have knowledge of open string quantisation and of the spectrum of massless gauge fields, as well as of Yang-Mills fields for coincident branes. They are familiar with relativistic conformal field theory, the string path integral, its BRST quantisation and the calculation of string interactions. They understand the low-energy effective actions in target space and the emergence of Einstein gravity.</p>		
Courses (type, number of weekly contact hours, language – if other than German)		
V (4) + R (2) Module taught in: German or English		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
<p>a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes).</p> <p>If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.</p> <p>Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: German and/or English</p>		
Allocation of places		
--		
Additional information		
--		
Workload		
240 h		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
--		
Module appears in		
Master's degree (1 major) Physics (2016)		

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Master's degree (1 major) Physics (2020)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Master's degree (1 major) Mathematical Physics (2020)
Master's degree (1 major) Mathematical Physics (2022)