Universitat de València - Departament de Física Teòrica
Instituto de Física Corpuscular (IFIC) UVEG-CSIC

An introduction to M-theory

Prof. P. K. Townsend,

Department of Applied Mathematics and Theoretical Physics (DAMTP), Cambridge University

Theoretical Physics Department Seminar Room
Bldg. D, 4th floor, room 4426, *Facultad de Física*, Valencia Univ. *Burjassot Campus*

Tuesdays and Thursdays from Jan 22nd until Feb 28th 2008, 15.00-16.30

M-theory is a promising approach to quantum gravity that both unifies perturbative superstring theories via 'dualities' and provides a new framework for Quantum Field Theory through the dynamics of branes. This course will focus on the dynamics of branes and applications to field theory, both classical and quantum. It will be shown how the consideration of supersymmetric field theories as fluctuations of branes leads directly to M-theory. The quantization of strings and membranes will be discussed and the quantum supermembrane interpretation of the M(atrix) model formulation of M-theory will be explained. Branes have long range gravitational fields, like any other form of matter, and hence appear as solutions to the effective supergravity theories that provide low-energy approximations to M-theory. An overview of the these supergravity solutions will be given, concentrating on what is needed for a further understanding of gauge theories on branes, and the adS/CFT correspondence.

Synopsis:

Classical Strings and Branes
Field Theory from Branes
Solitons as Minimal Surfaces
Supersymmetic Branes
Supersymmetric Field Theories from Branes
M-Theory and Dualities
Supergravity Branes
Quantum strings and membranes
Gauge Theories from intersecting branes
AdS/CFT

As background material for the course, there will be three 90m. lectures on spinors in arbitrary dimensions, supersymmetry, superspace etc. on Wednesday Jan. 16, at 15.30, and on Thursday Jan. 17, at 11.30 and 15.30, at the Theor. Phys. Seminar. There will be no lectures on Feb. 5 and 7.

Note. This Master course is part of the *Programa de doctorado de calidad del Depto. de Física Teórica de la Univ. de Valencia.,* sponsored by the *Min. de Educación y Ciencia.*

J.A. de Azcárraga