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KU-LEUVEN

(Katholieke Universiteit Leuven)

Mboyo Esole

The Institute of Theoretical Physics

- The ITF has five faculty members
 - Frans Cerulus
 - Frederik Denef
 - Raymond Gastmans
 - Walter Troost
 - Antoine Van Proeyen
- seven Phd students and five Postdocs

Relation to other Universities

- RTN network (32 European Institution)
'Constituents, Fundamental Forces and Symmetries of the Universe'
- Belgium Inter-University Attraction Pole
'Fundamental Interactions: at the Boundary of Theory, Phenomenology and Experiment.'
- Common seminars with: ULB, VUB, Solvay, Mons

Overview of Research

- Supersymmetry, mostly in the context of string theory and supergravity
- Leuven plays a leading role in special geometry and other aspects of supergravity
- Recently, we are exploring the links between supergravity, string theory and cosmology

Present research



Supergravity

- General formalism:
 - Special geometry
 - Quaternionic geometry
- Specific solutions:
 - domain walls
 - Cosmic strings
 - Black holes
- Stability issues
- Supergravity and cosmology



String theory

- Black Holes in string theory
- Different aspects of D-branes physics
- Tools for model builders: tadpole conditions, F-theory, flux vacua, etc

Supergravity

J. De Ryth, P. Smyth, Jan Rosseel, D. Van den Bleeken,
A. Van Proeyen, B. Vercoocke

- Symplectic structure of N=1 supergravity with anomalies and Chern-Simons terms (**0705.4216**)
A. De Ryth, J. Rosseel, T. Schmidt, A. Van Proeyen, M. Zagermann
- KK supersymmetry breaking for braneworlds in type IIB (**0704.3343**), JL. Lehnert, P. Smyth, K. Stelle
- Pseudo-supersymmetry and a tale of alternate realities (**0704.3559**) , EA Bergshoeff, J. Hartong, J. Rosseel, D. Van den Bleeken
- Special geometry for arbitrary signatures (**0612210**)
M.A. Lledó, O. Maciá, A. Van Proeyen , V.S. Varadarajan

Flux compactification, F-theory

A. Collinucci, F. Denef, M. Esole, L. Martucci

- D-brane deconstruction
(P. Aluffi, F. Denef, A. Collinucci, M. Esole), To appear
- From ten to four and back again: how to generalize the geometry
(archiv:**0707.1038**), P. Koerber, L. Martucci
- D-brane networks in flux vacua, generalized cycles and calibrations (hep-th/**0703129**) J. Evslin, L. Martucci
- Physics of String Flux Compactifications (hep-th/0701050)
F. Denef, M. Douglas, S. Kachru

Black Holes

F. Denef, B. Vercoocke, D. Van den Bleeken, A. Van Proeyen

- Effective action for the equation of motion of charged black holes (archiv:0708.2829)
A. Van Proeyen and Bert Vercoocke
- Black Hole Deconstruction (hep-th/0703252)
F. Denef, D. Gaiotto, A. Strominger, D. Van den Bleeken, X. Yi
- Split states, entropy enigmas, holes and halos (hep-th/0702146)
D. Denef, G. Moore
- How many black holes fit on the head of a pin?
(archiv:0705.2564) F. Denef, G. Moore
(Fourth prize in the Gravity Research Foundation Essay competition 2007)