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Date of birth : March 7, 1978
Nationality : French and Romanian

Educational background :

2004	**PhD degree at the University Paris VI.** Thesis : **Aspects of non-supersymmetric string theories or with broken supersymmetry.** Supervisors : **Emilian Dudas and Jihad Mourad** Paris
2001	**Master's degree in Theoretical Physics at École Normale Supérieure** Paris
2000	**"Maîtrise de Physique" at École Normale Supérieure** Paris
1996–1999	**Undergraduate of the Faculty of Physics** Bucharest, Romania

Positions

2005-2008	**Postdoctoral research position** University of Liverpool
2004-2005	**Research assistant** LPT, Orsay and CPHT, Ecole Polytechnique
2001-2004	**PhD Student. Supervisors : Emilian DUDAS, Jihad MOURAD** LPT, Orsay

Publications

2007	**"Heterotic models with vanishing one-loop cosmological constant and perturbatively broken supersymmetry",** G.Cleaver, A.E.Faraggi, E.Manno, C.Timirgaziu**, to appear soon**
2007	**"Orientifold's Landscape : Non-Factorisable Six-Tori",** S. Forste, C. Timirgaziu, I. Zavala**, arXiv :0707.0747[hep-th]** **JHEP 0710 :025 (2007)**
2006	**"Minimal Standard Heterotic String Models",** A.E. Faraggi, E. Manno, C. Timirgaziu**, hep-th/0610118** **Eur. Phys. J. C (2007)**
2006	**"Z_2 x Z_2 heterotic orbifold models of non factorisable six dimensional toroidal manifolds",** A.E. Faraggi, S. Forste, C. Timirgaziu**, hep-th/0605117** **JHEP 0608 :057 (2006)**
2005	**"Internal magnetic fields and supersymmetry in orientifolds",** E. Dudas, C. Timirgaziu**, hep-th/0502085** **Nucl. Phys. B 716, 65 (2005)**
2004	**"Non-tachyonic Scherk-Schwarz compactifications, cosmology and moduli stabilization",** E. Dudas, C. Timirgaziu**, hep-th/0401201** **JHEP 0403 :060 (2004)**
2003	**"On Cosmologically induced hierarchies in string theory",** E. Dudas, J. Mourad, C. Timirgaziu**, hep-th/0309057** **JCAP 0403 :005 (2004)**
2003	**"Time and space dependent backgrounds from non-supersymmetric strings",** E. Dudas, J. Mourad, C. Timirgaziu**, hep-th/0209176** **Nucl. Phys. B 660, 3 (2003)**

Proceedings

2003	**"On cosmologically induced hierarchies in string theory"**, E. Dudas, J. Mourad and C. Timirgaziu**, Prepared for 2nd International Conference on String Phenomenology 2003** Durham, UK
2003	**"Time and space dependent backgrounds from nonsupersymmetric strings"**, E. Dudas, J. Mourad and C. Timirgaziu**, Prepared for International Conference on 20 Years of SUGRA and Search for SUSY and Unification (SUGRA 20)** Boston, Massachusetts
2002	**"Time dependent background from nonsupersymmetric strings"**, C. Timirgaziu**, Prepared for NATO Advanced Study Institute and EC Summer School on Progress in String, Field and Particle Theory** Cargese, France
2002	**"Cordes, branes et dimensions supplémentaires"**, C. Timirgaziu**, Prepared for Journées des Jeunes Chercheurs** Aussois, France

Talks

2007	**"$Z_2 \times Z_2$ orbifolds and orientifolds of non factorisable tori"** Rome "Tor Vergata" **"Free fermionic models and orbifold compactifications"** IFIN, Bucharest **"Free fermionic models and orbifold compactifications"** String Phenomenology Rome **"Minimal Higgs spectrum in heterotic strings"** GDR SUSY, Montpellier **"Free fermionic models and orbifold compactifications"** IPNL, Lyon **"Free fermionic models and orbifold compactifications"** LMPT, Tours **"Free fermionic models and orbifold compactifications"** LPT, Orsay **"Free fermionic models and orbifold compactifications"** Ecole Polytechnique Palaiseau **"Heterotic Z2xZ2 Orbifolds of Non Factorisable Tori"** UK BSM, Liverpool **"Free fermionic models and orbifold constructions"** Durham, UK
2006	**"Brisure de susy et phénoménologie des théories des cordes"** Marseille, France **"Brisure de susy et phénoménologie des théories des cordes"** Annecy, France
2005	**"Magnetic fields and supersymmetry in orientifolds"** String Phenomenology Munich **"Supersymétrie et champs magnétiques dans les orientifolds"** GDR SUSY Grenoble
2004	**"Scherk-Schwarz compactifications and moduli stabilization"** EuroGDR SUSY Frascati **"Cosmology of string models with supersymmetry breaking"** Workshop, Paris
2003	**"Évolution cosmologique en théorie des cordes"** Rencontres des Particules, Paris **"Time dependent backgrounds from nonsupersymmetric strings"** IAP, Paris
2002	**"Cordes, branes et dimensions supplémentaires"** JJC Aussois, France

Posters

2005	**"String Phenomenology"** *pos ter,* Liverpool, UK

Conferences and Schools

2007	**String Phenomenology 2007** Rome, Italy **GDR Supersymétrie** Montpellier, France **UK BSM 2007** Liverpool, UK
2006	**Annual Theory Meeting** Durham, UK **RTN Winter School "Strings, Supergravity and Gauge Theories"** CERN
2005	**String Phenomenology 2005** Munich, Germany **GDR Supersymétrie** Grenoble, France **RTN Winter School "Strings, Supergravity and Gauge Theories"** Trieste, Italy
2004	**EuroGDR Supersymmetry** Frascati, Italy **Strings 04** Paris, France **International Workshop "String and Brane Cosmology"** Paris, France
2003	**International School of High Energy Physics** Heraklion, Grece **Rencontres des Particules** Paris, France
2002	**GDR Supersymétrie** Montpellier, France **Journées des Jeunes Chercheurs** Aussois, France **Summer School "Progress in String, Field and Particle Theory"** Cargese, France

Teaching

Teaching at the University Paris XI in 2003/2004 and 2004/2005

Programming skills

Fortran, Mathematica

Language skills

English, French, Romanian

Research activity

My research area is string phenomenology and I am interested in both the applications of string theory to cosmology and to particle physics.

During my Ph.D. my research focused on the applications of string theory to cosmology and, in particular, on the time-dependent backgrounds arising from non-supersymmetric strings. String theories with broken supersymmetry have scalar tadpoles and, as a consequence, Minkowski spacetime, with its maximal symmetry, is no longer the true vacuum, which must be determined. The maximally symmetric backgrounds can depend on time making these models very interesting for cosmology. In [1] we determined the classical background for a large class of nine dimensional orientifolds with supersymmetry broken by the Scherk-Schwarz mechanism. The time-dependent solutions can be reinterpreted in terms of Lorentzian orbifolds with a supersymmetric bulk and expanding boundaries. In [2] we exploited these time dependent backgrounds to find four dimensional cosmological solutions, by compactifying five dimensions parallel to the D8-branes present in the models. Time evolution results in three large space dimensions and slowly evolving internal dimensions. The metric induced on the visible brane describes a FRW universe. In the context of these four dimensional cosmological models, we addressed the issue of moduli stabilisation using potentials triggered by non-perturbative effects like gaugino condensation on D-branes and fluxes[3].

My thesis also involved orientifold model building with various supersymmetry breaking mechanisms, such as brane supersymmetry breaking and the Scherk-Schwarz mechanism. In [3] we obtained four dimensional chiral models without supersymmetry and no tachyons. These models admit the time-dependent solutions described previously. In [4] we constructed supersymmetric $Z_2 \times Z_2$ orientifolds with discrete torsion using internal magnetic fields dual to configurations of intersecting branes. In the context of these models we found new constraints, coming from the twisted RR tadpole conditions, necessary in order to get a consistent spectrum.

In the last two years my main activity was the study of semi-realistic classes of models.

In [5] we investigated the $Z_2 \times Z_2$ orbifolds of the $E_8 \times E_8$ heterotic string compactified on non factorisable 6d tori. Non factorisable tori have not been considered previously for the heterotic string, but they feature interesting phenomenological applications, due to the fact that the number of Standard Model generations, before introducing Wilson lines, is reduced compared with the factorisable case, providing an improved set-up for semi-realistic model building. We exemplified our findings with an orbifold of the $SO(6)^2$ root lattice, with discrete Wilson lines, which gives rise to a SO(10) gauge group and three generations, one per twisted sector.

In [6] we presented a mechanism that allows to obtain a minimal Higgs spectrum at the string scale, in the framework of three generation free fermionic models. The mechanism consists in using asymmetric boundary conditions for the worldsheet free fermions associated with the compact dimensions and we included this mechanism in a three generation semi-realistic model. An additional effect of the asymmetric boundary conditions is a drastic reduction of the supersymmetric moduli space. It seems that models in this class do not admit any flat directions at all, hence signaling a perturbative breaking of supersymmetry. This will make the subject of a future publication. The outcome of this study highlights the key role the asymmetric boundary conditions play in the free fermionic models and the importance of implementing asymmetric twists also in the bosonic language.

More recently[7] we studied $Z_2 \times Z_2$ orientifolds with intersecting branes in the set-up of non factorisable tori. We described a method to deal with this kind of configurations and discussed how the compactification lattice affects the tadpole cancellation conditions. This study shows that this class of models is ruled out phenomenologically, due to the even number of families of quarks and leptons present in the models.

[1] E. Dudas, J. Mourad and C.Timirgaziu, Nucl. Phys. B 660, 3 (2003) hep-th/0209176
[2] E. Dudas, J. Mourad and C. Timirgaziu hep-th/0309057 JCAP 0403 :005,2004
[3] E. Dudas, C. Timirgaziu, JHEP 0403 :060 (2004), hep-th/0401201
[4] E. Dudas, C. Timirgaziu, Nucl. Phys. B 716, 65 (2005), hep-th/0502085
[5] A.E. Faraggi, S. Forste, C. Timirgaziu, JHEP 0608 :057 (2006), hep-th/0605117
[6] A.E. Faraggi, E. Manno, C. Timirgaziu, Eur. Phys. J. C (2007), hep-th/0610118
[7] S. Forste, C. Timirgaziu, I. Zavala, JHEP 0710 :025 (2007), arXiv :0707.0747[hep-th]

Research projects

In the future I intend to continue to work on orbifold and orientifold compactifications in view of reproducing, as low energy limit of strings models, the Standard Model properties : the appropriate gauge group structure, the correct pattern of Yukawa couplings of quarks and leptons and the predictions for the Higgs sector.

One of my presents interest is the use of shifts in model building, both in the heterotic and type II pictures. Symmetric shifts have been considered and classified both for the the $Z_2 \times Z_2$ heterotic orbifolds [Donagi, Faraggi, 2004] and the $Z_2 \times Z_2$ orientifolds of type II [Blumenhagen, Plauschinn, 2006]. I intend to extend these classifications, to the case of non factorisable tori and, equally, to perform a classification of the asymmetric shifts. The phenomenologically relevant shifts will then be used for model building. This study is partially motivated by the fact that shifts are an important model building ingredient in the free fermionic models, a class of models which has proved a clear phenomenological interest and which is related to $Z_2 \times Z_2$ orbifolds of the SO(12) root lattice. In particular, asymmetric shifts are used in the free fermionic models to perform a doublet-triplet splitting in the Higgs states at the string scale, mechanism which could be reproduced in the bosonic language by implementing similar asymmetric shifts in orbifold model building.

Equally, inspired by the free fermionic models, I am pursuing with my collaborators the realisation of a higgs-matter splitting mechanism in orbifolds of the heterotic string, looking for an orbifold projection that will allow to obtain Higgs states uniquely from the untwisted sector and the matter states from the twisted sectors. Generally the spectra of orbifold contain a large number of Higgs like states. The mechanism under investigation will allow to project the Higgs states from the twisted sectors and to obtain simpler set-ups for determining the Yukawa couplings.

I also intend to continue the study of non factorisable tori, exploring their phenomenological applications. As a long term project it would be interesting to further elucidate the connection between the free fermionic constructions and the orbifold compactifications. While the second allow a more intuitive geometric picture, the former are more suitable for the classification of large classes of models, hence a map between these models could be a very useful tool for investigating phenomenological properties of string vacua.

One of my present projects is also the investigation of intersecting brane models in the case with discrete torsion and fractional branes, in the set-up of non factorisable tori. While bulk branes allow only even number of generations, fractional branes could potentially solve this problem. The discrete torsion case is equally interesting due to the presence of rigid cycles.

Another subject of interest for me is the introduction of asymmetric twists in orbifold and orientifold model building, a class of compactifications which has not been investigated in detail yet.

I am equally interested in pursuing the study of cosmological applications of time-dependent solutions obtained from non-supersymmetric strings. The issue of stability of these solutions and the fate of scalar tadpoles present in these models are still open questions. At the same time it is of great interest to improve the phenomenological properties of the orientifold models giving rise to the time-dependent solutions, in view of combining the model building constraints from particle physics and cosmology.

Other subjects of interest for me are the issues of moduli stabilisation, de Sitter solutions of string theory and the issue of axions in string theory.