Costas Kounnas memorial session

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ENS SUMMER INSTITUTE 2023

03/06/2023

COSTAS

Words are not enough

Laboratoire de Physique Théorique

A few things have changed… (including names)

Laboratoire de Physique Théorique

Nostalgie - Νοσταλγία

νόστος + άλγος

returning home ← νόστος

άλγος → pain

νόστος + άλγος

returning home — pain

The pain evoked by the desire to return to one's origin

Words that Costas felt very deeply

Famagusta in Cyprus

LPT-ENS

Costas truly loved and cared for LPT
and its people

“there is only one labo”

“exceptional”

Costas had his own classification of quality.
Not many people were “exceptional” for him.

Even fewer people did he truly respect and admire

and some that he truly revered: his supervisor

I have never seen anyone so proud of a laboratoire and so passionately supportive of it.

He knew he was in a very special place, and wanted others to care for it as much as he did.

COSTAS

A short time line of our interaction

- first met Costas in Paris in 2006
- PhD at ENS, 2007-2011
- 3+1 joint papers

COSTAS

An extraordinary man of many passions

- Cyprus, Greece, Family
- Physics
- Smoking :(
- …

COSTAS

The first encounter

- before Paris
- the “shy” Physicist
- the famous blackboard & laptop

COSTAS

SUPERvisor

- you know nothing, I will teach you!
- the lectures

COSTAS

SUPER man (?)

COSTAS

an exercise you must solve!

$$\vartheta_3^4(0|\tau) - \vartheta_4^4(0|\tau) - \vartheta_2^4(0|\tau) = 0$$

Jacobi's "abstrusa" (SUSY)

$$\tfrac{1}{2}\left(\frac{\vartheta_3(0|\tau)}{\eta(\tau)}\right)^{12} - \tfrac{1}{2}\left(\frac{\vartheta_4(0|\tau)}{\eta(\tau)}\right)^{12} - \tfrac{1}{2}\left(\frac{\vartheta_2(0|\tau)}{\eta(\tau)}\right)^{12} = 24$$

"MSDS"

$$V_{24} - S_{24} = 24$$

$$24 + \binom{24}{3} = 2^{11}$$

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The first paper

- you didn't prove it, I did !
- the "trivial" stuff
- brain(less) cosmology ?

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Nuclear Physics B 820 (2009) 237–268

NUCLEAR PHYSICS B

www.elsevier.com/locate/nuclphysb

Orbifold symmetry reductions of massive boson–fermion degeneracy ☆

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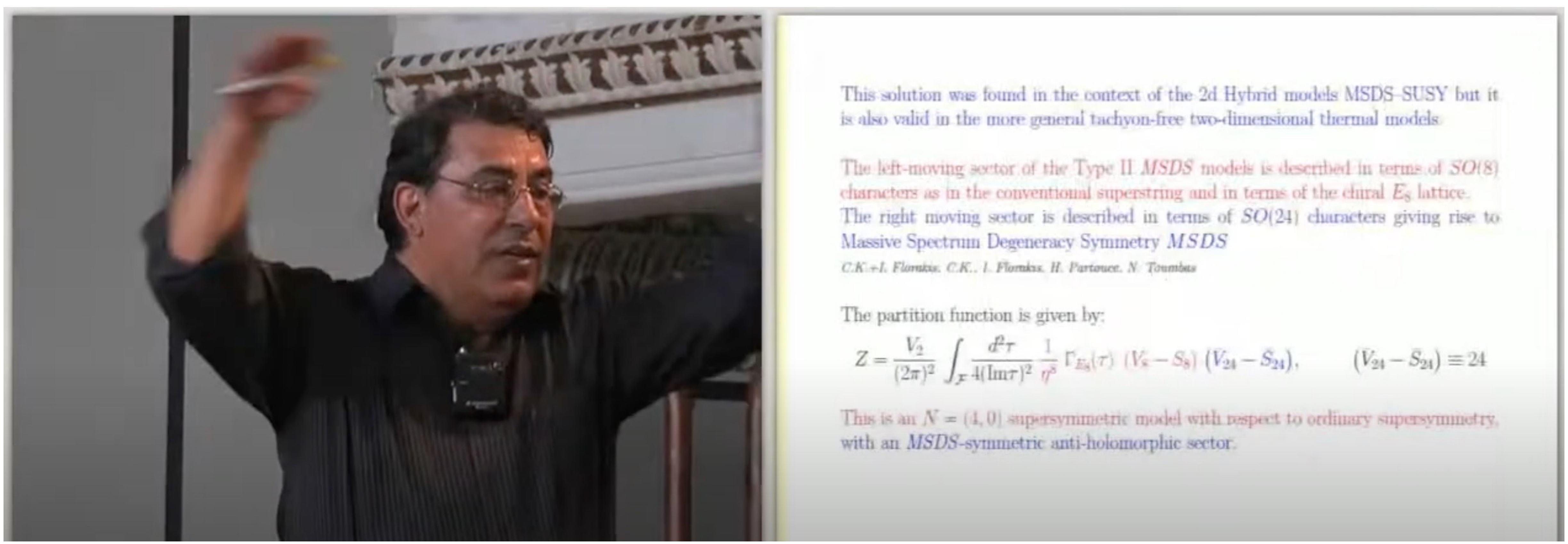
Received 25 February 2009; accepted 25 May 2009

Available online 28 May 2009

COSTAS

Later memories

- don’t tamper with my windings!
- the unique model that solves everything
- the smile



The last paper

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NUCLEAR PHYSICS B

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$\mathcal{N} = 2 \to 0$ super no-scale models and moduli quantum stability

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Received 11 January 2017; accepted 14 March 2017
Available online 18 March 2017
Editor: Stephan Stieberger

Abstract

We consider a class of heterotic $\mathcal{N} = 2 \to 0$ super no-scale $\mathbb{Z}_2$-orbifold models. An appropriate stringy Scherk–Schwarz supersymmetry breaking induces tree level masses to all massless bosons of the twisted hypermultiplets and therefore stabilizes all twisted moduli. At high supersymmetry breaking scale, the tachyons that occur in the $\mathcal{N} = 4 \to 0$ parent theories are projected out, and no Hagedorn-like instability takes place in the $\mathcal{N} = 2 \to 0$ models (for small enough marginal deformations). At low supersymmetry breaking scale, the stability of the untwisted moduli is studied at the quantum level by taking into account both untwisted and twisted contributions to the 1-loop effective potential. The latter depends on the specific branch of the gauge theory along which the background can be deformed. We derive its expression in terms of all classical marginal deformations in the pure Coulomb phase, and in some mixed Coulomb/Higgs phases. In this class of models, the super no-scale condition requires having at the massless level equal numbers of untwisted bosonic and twisted fermionic degrees of freedom. Finally, we show that $\mathcal{N} = 1 \to 0$ super no-scale models are obtained by implementing a second $\mathbb{Z}_2$ orbifold twist on $\mathcal{N} = 2 \to 0$ super no-scale $\mathbb{Z}_2$-orbifold models.

Lessons and inspiration for years to come