Costas KOUNNAS

Memorial Conference

Corfu, Sept 4 2022

John Iliopoulos

ENS Paris

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- ▶ He came to Paris to the ENS Graduate School in Sept. 1975. He was highly recommended to me by Fokion Hadjioannou.

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- He was Director of the ENS Lab between 2010 and 2014.

- He has published almost 200 papers. I will mention very few, with emphasis on his early works which other speakers may not cover.

Early works in QCD

I suggested to Costas (together with Laurent Baulieu) as a first thesis topic, to find a field theory derivation of the AP-DGL equations.

EQUIVALENCE OF THE "WILSON EXPANSION" AND A GENERALIZED PARTON MODEL

L. BAULIEU and C. KOUNNAS

Laboratoire de Physique Théorique de l'Ecole Normale Supérieure Paris, France *

For a target made with constituents which interact *via* an asymptotically free theory, it is possible to define some parton densities in the deep inelastic region and at any order of the running coupling constant. These densities depend only on the structure of the target and their Q^2 dependence is governed by master equations. At first order the result of Altarelli and Parisi is recovered. The scattering of any current off the target is described by a convolution of these parton densities with some charge densities, depending on the couplings of the current to the partons. All those results are equivalent to those of the Wilson operator formalism. Some explicit examples are given.

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Early works in QCD

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- ▶ He published more than a dozen papers in this field and for some years he was giving the QCD course at the ENS Graduate School as well as lectures at summer schools.

- ▶ He established relations with the Saclay members of the CDHS collaboration and was instrumental in the analysis of the neutrino-nucleon deep inelastic scattering data.

Early works in QCD

A Direct Method for Computing {QCD} Predictions for Deep Inelastic Structure Functions

L. Baulieu (Ecole Normale Superieure), C. Kounnas (Ecole Polytechnique) (Dec, 1978)

Published in: *Nucl.Phys.B* 155 (1979) 429-446

A Proof of the Factorization of Mass Singularities in the Bjorken Limit #188

Ignatios Antoniadis (Ecole Normale Superieure), L. Baulieu (Ecole Normale Superieure), C. Kounnas (Ecole Polytechnique) (Sep, 1979)

Published in: *Nucl.Phys.B* 168 (1980) 394-408

Factorization Properties and Their Probabilistic Interpretation in Polarized Electroproduction and Annihilation Processes

Ignatios Antoniadis (Ecole Normale Superieure), C. Kounnas (Ecole Polytechnique) (May, 1980)

Published in: *Phys.Rev.D* 24 (1981) 505

Parton Model Interpretation of the Cut Vertex Formalism #187

L. Baulieu (Ecole Normale Superieure), E.G. Floratos (Saclay), C. Kounnas (Ecole Polytechnique) (Oct, 1979)

Published in: *Nucl.Phys.B* 166 (1980) 321-339

Space and Timelike Cut Vertices in QCD Beyond the Leading Order. 1. Nonsinglet Sector

E.G. Floratos (Saclay), R. Lacaze (Saclay), C. Kounnas (Ecole Polytechnique) (Dec, 1980)

Published in: *Phys.Lett.B* 98 (1981) 89-95

Space and Timelike Cut Vertices in {QCD} Beyond the Leading Order. 2. The Singlet Sector

E.G. Floratos (Saclay), R. Lacaze (Saclay), C. Kounnas (Ecole Polytechnique) (Jun, 1980)

Published in: *Phys.Lett.B* 98 (1981) 285-290

Last work with a phenomenological content:

Violation of time reversal invariance and CPLEAR measurements

Luis Alvarez-Gaume (CERN), Costas Kounnas (CERN), Smaragda Lola (CERN), Panagiotis Pavlopoulos (Basel U. and CERN) (Dec, 1998)

Published in: *Phys.Lett.B* 458 (1999) 347-354 • e-Print: hep-ph/9812326 [hep-ph]

Grand Unified Theories

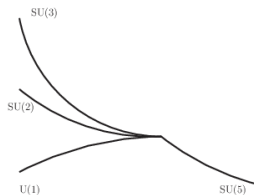**EXACT ONE LOOP CALCULATION OF M(x) AND sin**2-theta-w IN SU(5)**   #182

Ignatios Antoniadis (Ecole Polytechnique), C. Roiesnel (Ecole Polytechnique), C. Kounnas (Ecole Normale Superieure) (Mar, 1981)

Symmetry Breaking Effects in Grand Unified Theories   #179

Ignatios Antoniadis (Ecole Polytechnique), C. Kounnas (Ecole Normale Superieure), C. Roiesnel (Ecole Polytechnique) (Oct, 1981)
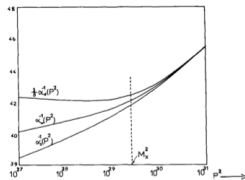
Fig. 8. Plot of the effective coupling constants α_{3}^{-1}, α_{2}^{-1}, α_{1}^{-1} in the M_X energy region $p^2 = 10^{27} - 10^{31}$ (GeV)^2.

Supersymmetry - Supergravity

Dozens of papers covering all aspects of the field, from the mathematical properties to specific applications.

Light Gluinos in Deep Inelastic Scattering

Ignatios Antoniadis (Ecole Polytechnique), C. Kounnas (CERN), R. Lacaze (Saclay) (Jun, 1982)

Published in: *Nucl.Phys.B* 211 (1983) 216-238

Short Distance Structure of Hadrons in Supersymmetric {QCD}

C. Kounnas (CERN), D.A. Ross (Southampton U.) (Oct, 1982)

Published in: *Nucl.Phys.B* 214 (1983) 317-349

The Higgs Sector in {SUSY} {GUTs}

#174

C. Kounnas (CERN), A.B. Lahanas (CERN), Dimitri V. Nanopoulos (CERN), K. Tamvakis (CERN) (Jul, 1982)

Published in: *Phys.Lett.B* 118 (1982) 91-98

SUPERSYMMETRIC QCD AND STRUCTURE FUNCTIONS.

C. Kounnas (CERN) (1983)

Contribution to: Annecy Meeting on Supersymmetry and Supergravity at LAPP

Supersymmetry - Supergravity

Natural Triplet - Doublet Splitting From Supergravity

C. Kounnas (CERN), Dimitri V. Nanopoulos (CERN), M. Quiros (CERN), M. Srednicki (CERN) (Mar, 1983)

Published in: *Phys.Lett.B* 127 (1983) 82-84

Phenomenological SU(1,1) Supergravity

John R. Ellis (CERN), C. Kounnas (CERN), Dimitri V. Nanopoulos (CERN) (Nov, 1983)

Published in: *Nucl.Phys.B* 241 (1984) 406-428

Low-Energy Behavior of Realistic Locally Supersymmetric Grand Unified Theories

C. Kounnas (CERN), A.B. Lahanas (CERN), Dimitri V. Nanopoulos (CERN), M. Quiros (Madrid, Inst. Estructura Materia) (Jul, 1983)

Published in: *Nucl.Phys.B* 236 (1984) 438-466

Supersymmetry - Supergravity

Naturally Vanishing Cosmological Constant in N=1 Supergravity

E. Cremmer (Ecole Normale Superieure), S. Ferrara (CERN), C. Kounnas (CERN), Dimitri V. Nanopoulos (CERN) (Jul, 1983)

Published in: *Phys.Lett.B* 133 (1983) 61

The first idea of what became known as "The no-scale supergravity".

No Scale Supersymmetric Guts

John R. Ellis (CERN), C. Kounnas (CERN), Dimitri V. Nanopoulos (CERN) (Feb, 1984)

Published in: *Nucl.Phys.B* 247 (1984) 373-395

No Scale Supergravity Models with a Planck Mass Gravitino   #157

John R. Ellis (CERN), C. Kounnas (Ecole Normale Superieure), Dimitri V. Nanopoulos (CERN) (Mar, 1984)

Published in: *Phys.Lett.B* 143 (1984) 410-414

Supersymmetry - Supergravity

Vector Multiplets Coupled to N=2 Supergravity: SuperHiggs Effect, Flat Potentials and Geometric Structure

E. Cremmer (Ecole Normale Superieure), C. Kounnas (Ecole Normale Superieure), Antoine Van Proeyen (Ecole Normale Superieure), J.P. Derendinger (CERN), S. Ferrara (CERN) et al. (Jul, 1984)

Published in: *Nucl.Phys.B* 250 (1985) 385-426

A MAXIMALLY SYMMETRIC NO SCALE INFLATIONARY UNIVERSE

C. Kounnas (Ecole Normale Superieure), M. Quiros (Ecole Normale Superieure) (Aug, 1984)

Published in: *Phys.Lett.B* 151 (1985) 189-194

String theory

Costas' main research field since 1985.

Supersymmetry Among Free Fermions and Superstrings #146

Ignatios Antoniadis (SLAC), Constantin Bachas (SLAC), C. Kounnas (UC, Berkeley and LBL, Berkeley), Paul Windey (UC, Berkeley and LBL, Berkeley) (Sep, 1985)

Published in: *Phys.Lett.B* 171 (1986) 51-56

General Dimensional Reduction of Ten-Dimensional Supergravity and Superstring #142

Sergio Ferrara (UCLA), Costas Kounnas (UC, Berkeley and LBL, Berkeley), Massimo Porrati (UCLA) (Apr, 1986)

Published in: *Phys.Lett.B* 181 (1986) 263 • Contribution to: ICHEP 86

Four-Dimensional Superstrings #141

Ignatios Antoniadis (CERN), C.P. Bachas (Ecole Polytechnique), C. Kounnas (LBL, Berkeley) (Dec, 1986)

Published in: *Nucl.Phys.B* 289 (1987) 87

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- In our field we are lucky because occasionally we have the opportunity to meet some rare characters.

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- Costas was certainly one of them, but he was also, like the others, an example of Gibbon's dictum:

  "The power of instruction is seldom of much efficacy, except in those happy dispositions where it is almost superfluous."
  Edward Gibbon (1737-1794)

Recently, Luis Alvarez-Gaumé asked me to write something in a collection of memories for Costas. I copy:

If I had to find a single word to describe Costas I would choose "thirst". He was thirsty for everything. Physics first, naturally. His enthusiasm knew no limits. Every new project he was working at was always better than any previous one, to be surpassed only by the next project. But also thirst for life. He wanted to try everything and enjoy everything starting with eating and drinking. He was always in a great hurry, as if he knew that time would be short and the happy days were counted.

A few pictures

Dinner at the occasion of Jean-Loup Gervais' retirement and Eugene Cremmer's 60th birthday, Paris 2002

A few pictures

In my place, Christmas 2004.

A few pictures

In my place, Christmas 2005.

A few pictures

A night visit to the Rungis market, 25/11/2006.

A few pictures

In my place, Christmas 2006.

A few pictures

Dinner in my place with other joyful Greeks, 30/01/2010.

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▶ Costas was no exception. In these pictures I see Costas I want always to remember:

- ▶ To a certain extent, each one of us uses physics as a way to escape from the real world.

- ▶ We enter the world of Quantum Mechanics and Quantum Gravity in order to forget the problems of our everyday life.

- ▶ Costas was no exception. In these pictures I see Costas I want always to remember:

- ▶ Enjoying life, still in full possession of all his powers.