

The Man Who Knew More

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For Eugène Cremmer

Title from: "The man who knew too much", Hitchcock, 1956



8.B.4 Nuclear Physics B2 (1967) 409-423. North-Holland Publ. Comp., Amsterdam

RELATIVISTIC TREATMENT OF MUON CAPTURE
IN DEUTERIUM

APPLICATION TO THE DETERMINATION OF
NEUTRON-NEUTRON SCATTERING LENGTH
AND EFFECTIVE RANGE

E. CREMMER*
*Laboratoire de Physique Théorique et Hautes Energies**
Orsay, France*

Received 16 June 1967

Current-current weak
interaction

Final-state interaction, form
factors, dispersion relations. . .

Calculations on Univac 1107

One-photon exchange

Vector-meson dominance

Univac again

8.B.6 Nuclear Physics B10 (1969) 179-189, North-Holland Publ. Comp., Amsterdam

A CALCULATION FOR THE $e^+e^- \rightarrow \pi^0\gamma$ REACTION

E. CREMMER and M. GOURDIN
Laboratoire de Physique Théorique et Hautes Energies, Orsay, France

Received 20 January 1969

E.C., 2008: *Personal recollections about the birth of String Theory*

"

These works allowed me to deepen my knowledge in particle physics as well as to learn mastering difficult calculations.

However, I was more attracted by more formal research (that we would like being able to say more fundamental !)

"

Then: *[in Orsay, CERN (71-73), ENS (75...)]*

Dual models, and string theory (in view of strong interactions), 1970 sqq.

[Difficulties ($D = 26, 10$, spectrum,...), asymptotic freedom (73) inducing shift towards gauge theories and the Standard Model, (renormalisability shown)]

Compactification (Scherk, 76, 77) *[supergravity, FFvN, 76]*

Strings for gravitation ? *[Scherk, Schwarz, 74, 79]*

Published works with J. Scherk, J.-L. Gervais, A. Neveu, ...

32 supercharges in maximal dimension $D = 11$, simple, elegant, but hard ...

SUPERGRAVITY THEORY IN 11 DIMENSIONS

E. CREMMER, B. JULIA and J. SCHERK

Laboratoire de Physique Théorique de l'Ecole Normale Supérieure¹, Paris, France

Received 4 April 1978

We present the action and transformation laws of supergravity in 11 dimensions which is expected to be closely related to the $O(8)$ theory in 4 dimensions after dimensional reduction.

\Rightarrow M -theory

\Rightarrow IIA -
theory in
 $D = 10$

32 supercharges in our dimension $D = 4$

THE $N = 8$ SUPERGRAVITY THEORY. I. THE LAGRANGIAN

E. CREMMER and B. JULIA

Laboratoire de Physique Théorique de l'Ecole Normale Supérieure¹, 75231 Paris Cedex 05, France

Received 25 September 1978

The $SO(8)$ supergravity action is constructed in closed form. A local $SU(8)$ group as well as the exceptional group E_7 are invariances of the equations of motion and of a new first order lagrangian.

Non linear $E_{7,7}$
on scalars,
e-m. duality
on vectors

1978: $\mathcal{N} = 4$ supergravity

16 supercharges, $D = 4$ (to be coupled to $\mathcal{N} = 4$ SYM)

SU(4) INVARIANT SUPERGRAVITY THEORY

E. CREMMER and J. SCHERK

*Laboratoire de Physique Théorique de l'Ecole Normale Supérieure, Paris, France*¹

and

S. FERRARA

CERN, Geneva, Switzerland

Received 27 December 1977

We present a new supergravity theory which is invariant under four separate local supersymmetry transformations. The action is invariant under global SU(4) transformations realized on the fields without use of the equations of motion. In addition, the equations of motion are invariant under a non-compact global SU(1, 1) group. The equations of motion of this theory are shown to be equivalent to those of the previously derived SO(4) theory through a redefinition of the field variables involving duality transformations on the vector fields.

Chamseddine 1980: $D = 10, \mathcal{N} = 1 \implies D = 4, \mathcal{N} = 4$
with $SO(6, 6) \times SU(1, 1)/SO(6) \times U(1)$

1983: $\mathcal{N} = 1$ completed

YANG-MILLS THEORIES WITH LOCAL SUPERSYMMETRY: Lagrangian, transformation laws and super-Higgs effect

E. CREMMER

Laboratoire de Physique Théorique, Ecole Normale Supérieure, Paris, France

S. FERRARA

CERN, Geneva, Switzerland

L. GIRARDELLO

*Istituto di Fisica dell'Università, Milano,
INFN, Sezione di Milano, Italy*

A. VAN PROEYEN¹

CERN, Geneva, Switzerland

Received 26 July 1982

Generic coupling of gauge and matter supermultiplets to supergravity

With BFS (below), the core of susy SM (MSSM, NMSSM, ...)

Then: supersymmetry phenomenology

Barbieri, Ferrara, Savoy, Gauge models with spontaneously broken supersymmetry, August 3, 1982

Competitors: Arnowitt, Chamseddine and Nath and, marginally Bagger, Witten.

Precursors: CJSvNFG (1978), CJSFGvN (1979), CF'G (1982), ...

Towards no-scale models and BSM phenomenology

CERN-corridor
noise:

Needed: susy
broken AND zero
cosmological
constant.

NATURALLY VANISHING COSMOLOGICAL CONSTANT IN $N = 1$ SUPERGRAVITY

E. CREMMER

Ecole Normale Supérieure, Paris, France

and

S. FERRARA, C. KOUNNAS and D.V. NANOPOULOS

CERN, Geneva, Switzerland

Received 5 September 1983

Why not: identically zero vacuum energy, $V \equiv 0$ AND broken supersymmetry.

Arbitrary $m_{3/2}$ (from a constant superpotential), including small values.

E.C. had the answer in a drawer at ENS ... Needed a phone call.

Then: various classes of no-scale models, useful for MSSM modelization, essential in string compactifications where sliding scalars are everywhere (moduli). Hence the moduli stabilization problem.

1984: $\mathcal{N} = 2$ no-scale and the cubic prepotential

VECTOR MULTIPLETS COUPLED TO $N=2$ SUPERGRAVITY: SUPERHIGGS EFFECT, FLAT POTENTIALS AND GEOMETRIC STRUCTURE

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Received 24 September 1984

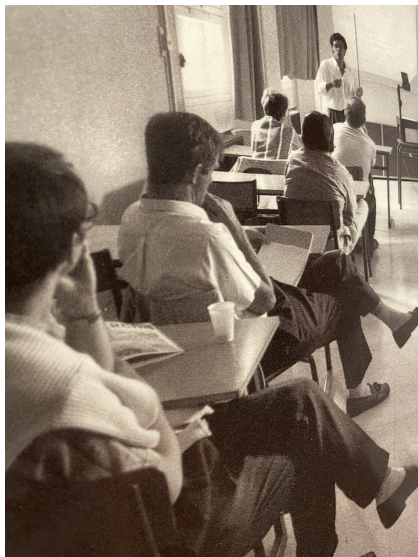
The "Dutch group" develops the $\mathcal{N} = 2$ superconformal calculus.

DFK play with simple $\mathcal{N} = 2$ models and flat, no-scale potentials

⇒ a seven-author paper !

Mostly worked out at ENS, and a "group-meeting" at ICTP during the annual susy meeting...

And for me a postdoc and very many long and short visits to ENS, and as many occasions to speak to the man who knows more ...



[L'Ecole Normale Supérieure, Les chemins de la liberté, Nicole Masson, Découvertes Gallimard 221, 1994, ph.: Philippe Dubois]