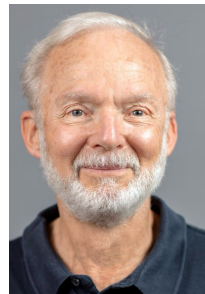


J.-B. at 4×20

(P. Di Francesco)



1. La Bible
2. La GFZ
3. Les Graphes...
4. ... et les Matrices
5. Le virus de Razumov-Stroganov
6. La Combinatoire

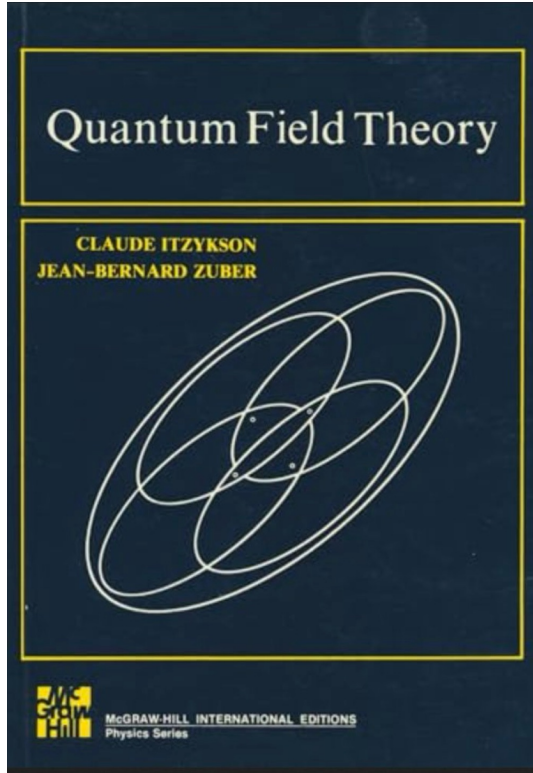




La Bible

1986: First contact

- The book was 10 years old
- a private course
- The beginning of an adventure



J.-B. as an adviser

- The teacher
- The mentor
- The friend

and more ...

J.-B.'s favorite exclamation :

Saperlotte !

Saperlotte !

saperlotte in english

"Saperlotte" translates in English to mild old-fashioned exclamations like "darn", "goodness", or "by Jove". 

Saperlotte!

saperlotte in english

"Saperlotte" translates in English to mild old-fashioned exclamations like "darn", "goodness", or "by Jove". 

Saperlipopette!

"Saperlipopette" is the longer, even more whimsical sibling of *saperlotte*. In English, it translates perfectly to highly theatrical, old-fashioned exclamations like **"goodness gracious," "holy cow," "gadzooks,"** or **"jumping Jehosaphat."**

Saperlipopette!
Je n'aurais pas
dû sortir sans
parapluie...





La GFT

- Belavin, Polyakov, Zamolodchikov 1984
- The "Saclay village" ca 1986-1989

C. Itzykson, M. Bauer, D. Bernard,

H. Sabor, V. Pasquier, J.-M. Luck

A. Capelli, I. Kostov, B. Duplantier, and many others... + visitors

- J.-B. and Claude are the backbone of this group

- A fun way of doing Physical mathematics

Quantum field theory and the two-dimensional Ising model*J. B. Zuber[†]*Lyman Laboratory of Physics, Harvard University, Cambridge, Massachusetts 02138*

C. Itzykson

DPHT CEN, Saclay, Gif-sur-Yvette, France

(Received 11 August 1975)

A relationship between the two-point correlation function of the Ising model in the critical region and the $\langle \sin \sqrt{\pi} \phi(0) \sin \sqrt{\pi} \phi(p) \rangle$ Green's function of a sine-Gordon field is constructed. This relationship is tested by means of a mass perturbation expansion with an infrared cutoff and shown to agree, at the leading-logarithm approximation and up to the second order, with the exact result of the Ising model.

my first serious reading of a research paper ...
a good investment!

Quantum field theory and the two-dimensional Ising model*

J. B. Zuber[†]

Lyman Laboratory of Physics, Harvard University, Cambridge, Massachusetts 02138

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Nuclear Physics B275 [FS17] (1986) 580–616
North-Holland, Amsterdam

Nuclear Physics B290 [FS20] (1987) 527–581
North-Holland, Amsterdam



TWO-DIMENSIONAL CONFORMAL INVARIANT THEORIES ON A TORUS

C. ITZYKSON and J.-B. ZUBER

Service de Physique Théorique, CEN-Saclay, 91191 Gif-sur-Yvette Cedex, France

Received 3 March 1986
(Revised 21 April 1986)

The study of unitary conformal invariant theories on a torus reveals two important properties: the partition function and correlation functions may be expressed in terms of free (gaussian) field modes, and the modular invariance dictates the operator content of the theory: for a generic value of the central charge $c = 1 - 6/m(m+1)$, there exist at least two distinct models depending whether $m = 0, 3 \bmod 4$ or $m = 1, 2 \bmod 4$. The case of non-unitary $c < 1$ theories is also briefly discussed.

CRITICAL ISING CORRELATION FUNCTIONS IN THE PLANE AND ON THE TORUS

P. DI FRANCESCO, H. SALEUR and J.B. ZUBER

Service de Physique Théorique, CEN-Saclay, 91191 Gif-sur-Yvette cedex, France

Received 29 June 1987

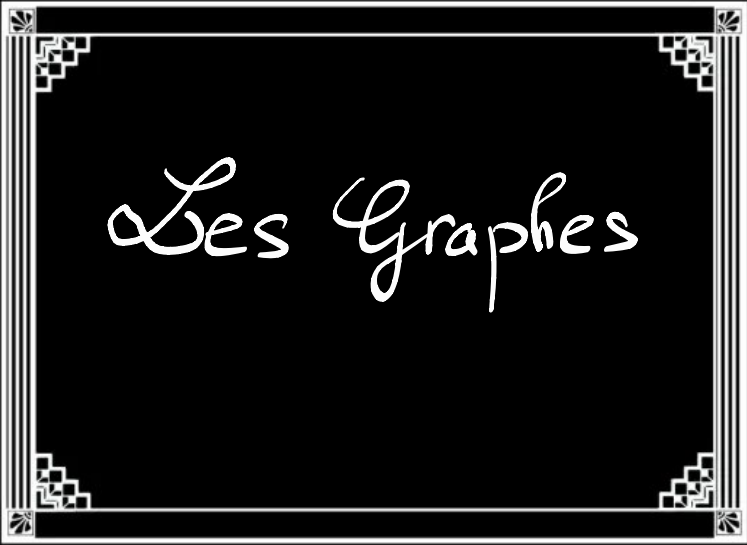
Explicit expressions are given for all correlation functions of spin, disorder and energy operators of the critical Ising model in the plane or on the torus. Formulae for insertions of energy-momentum tensors may also be written, giving access to correlation functions of secondary fields. Two alternative methods are used throughout the paper: bosonization of the fermion representation of the Ising model or use of the free field (orbifold) interpretation of the Ashkin-Teller model. Many identities result from the consistency between these alternative approaches.





Les Houches 1988

"Conformal Field Theories,
Coulomb Gas Picture and
Integrable Models " by
J.-B. Zuber



Les Graphes

Commun. math. Phys. 59, 35—51 (1978)

Communications in
**Mathematical
Physics**

© by Springer-Verlag 1978

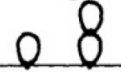
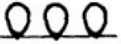
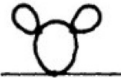
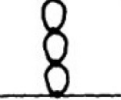
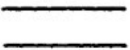
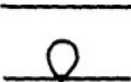
Planar Diagrams

E. Brézin, C. Itzykson, G. Parisi*, and J. B. Zuber

Service de Physique Théorique, Centre d'Études Nucléaires de Saclay, F-91190 Gif-sur-Yvette, France

Abstract. We investigate the planar approximation to field theory through the limit of a large internal symmetry group. This yields an alternative and powerful method to count planar diagrams. Results are presented for cubic and quartic vertices, some of which appear to be new. Quantum mechanics treated in this approximation is shown to be equivalent to a free Fermi gas system.

BIPZ: the fabulous 4 & the birth of matrix models

				
1	$8g$	$16g^2$	$64g^2$	$64g^2$
				
$2^7 g^3$	$2^8 g^3$	$2^{10} g^3$	$2^9 g^3$	$2^8 g^3$
				
$2^9 g^3$	$2^7 g^3$	$2^7 g^3$	$2^9 g^3$	
				
2	$4g$	$32g$	$32g^2$	$128g^2$

The Key to 2-Dimensional Quantum Gravity

More graphs (from CFT) 1990

Nuclear Physics B (Proc. Suppl.) 18B (1990) 313-326
North-Holland

3

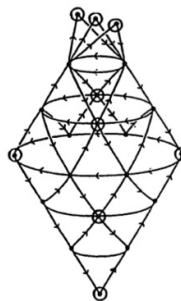
GRAPHS, ALGEBRAS, CONFORMAL FIELD THEORIES AND INTEGRABLE LATTICE MODELS

J.-B. ZUBER

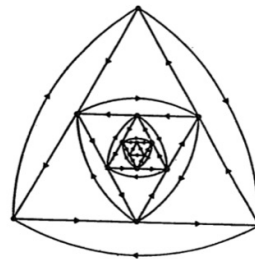
Service de Physique Théorique de Saclay,
(Laboratoire de l' Institut de Recherche Fondamentale du Commissariat à l'Energie Atomique)
F-91191 Gif-sur-Yvette cedex, France

Recent work on the construction of lattice integrable models corresponding to the $SU(N)$ coset conformal field theories is reviewed.

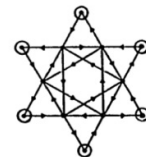
generalized McKay correspondence
for SL_3



$D^{(12)} \text{ I H}$



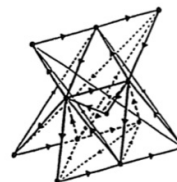
$D^{(12)*}$



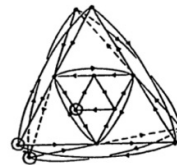
$E^{(8)} \text{ I H}$



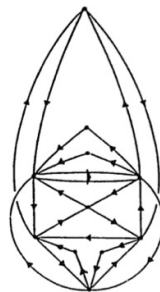
$E_1^{(12)} \text{ I H}$



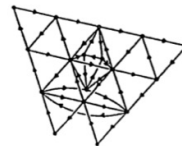
$E_2^{(12)}$



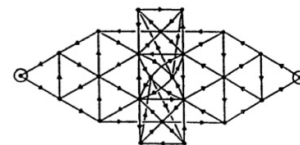
$E_3^{(12)}$



$E_4^{(12)}$



$E_5^{(12)}$



$E^{(24)} \text{ I H}$

FIGURE 2

1997

CONFORMAL FIELD THEORY AND GRAPHS *

V.B. Petkova¹ and J.-B. Zuber²

¹Institute for Nuclear Research and Nuclear Energy,
Tsarigradsko Chaussee 72, 1784 Sofia, Bulgaria

²CEA-Saclay, Service de Physique Théorique
F-91191 Gif sur Yvette Cedex, France

- fusion rules in CFT

- a long collaboration
w/ V. Petkova

→ Boundary conditions in CFT
+ Behrend + Pearce ...

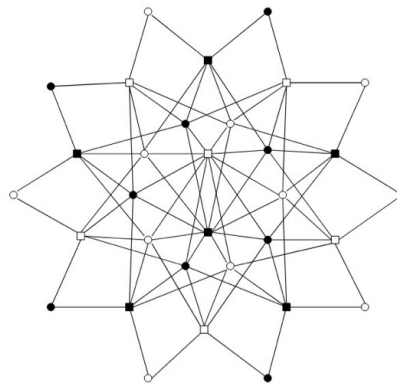


Fig. 1: The graph of G_1 corresponding to the conformal embedding $\widehat{sl}(4)_6 \subset \widehat{sl}(10)_1$. The points of 4-ality 0 and 2 (resp 1 and 3) are represented by open and black disks (resp squares). The involution $a \rightarrow a^\vee$ is the reflection in the horizontal diameter. The vertices denoted by a_j, b_j, c_j ($j = 0, 1, \dots, 9$), in (14) lie clockwise on three (inward going) concentric circles respectively, while d_0 and d_5 denote the selected (bottom and top respectively) vertices in the centre.

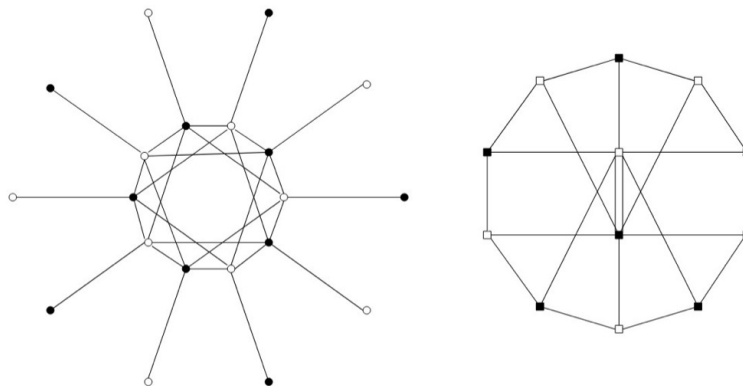


Fig. 2: Graph of G_2 for the same case.



... et les Matrices

The planar approximation. II

C. Itzykson and J.-B. Zuber

Division de la Physique, CEN-Saclay, Boite Postale No. 2, 91190 Gif-Sur-Yvette, France

(Received 18 July 1979; accepted for publication 11 October 1979)

The planar approximation is reconsidered. It is shown that a saddle point method is ineffective, due to the large number of degrees of freedom. The problem of eliminating angular variables is illustrated on a simple model coupling two $N \times N$ matrices.

$$I(\Lambda_1, \Lambda_2; \beta) = \beta^{-N(N-1)/2} \prod_{i=1}^{N-1} p! \frac{\det(e^{\beta \lambda_{1,i} \lambda_{2,j}})}{\Delta(\Lambda_1) \Delta(\Lambda_2)}. \quad (3.4)$$

The Key to solving the multi-matrix models
of 2 Dimensional Quantum Gravity

COMBINATORICS OF THE MODULAR GROUP II THE KONTSEVICH INTEGRALS

C. ITZYKSON and J.-B. ZUBER

Service de Physique Théorique de Saclay, F-91191 Gif-sur-Yvette cedex, France*

Received 27 January 1992

We study algebraic aspects of Kontsevich integrals as generating functions for intersection theory over moduli space and review the derivation of Virasoro and KdV constraints.

excursion into the
moduli space of punctured
curves and its intersection
theory

"Combinatorial geometry"
(Manin, Gromov, Witten, Kontsevich...)

Commun. Math. Phys. 151, 193–219 (1993)

Communications in
Mathematical
Physics
© Springer-Verlag 1993

Polynomial Averages in the Kontsevich Model

P. Di Francesco, C. Itzykson, and J.-B. Zuber

Service de Physique Théorique de Saclay, F-91191 Gif sur Yvette Cedex, France*

Received June 22, 1992

Abstract. We obtain in closed form averages of polynomials, taken over hermitian matrices with the Gaussian measure involved in the Kontsevich integral, and prove a conjecture of Witten enabling one to express analogous averages with the full (cubic potential) measure, as derivatives of the partition function with respect to traces of inverse odd powers of the external argument. The proofs are based on elementary algebraic identities involving a new set of invariant polynomials of the linear group, closely related to the general Schur functions.



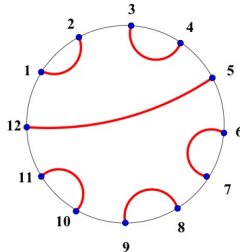
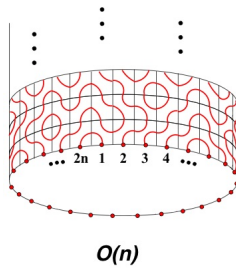
*Le virus
de Razumov-Stogonov*

2001: J.B. advertises his paper

Theoretical and Mathematical Physics, **138**(3): 333–337 (2004)

COMBINATORIAL NATURE OF THE GROUND-STATE VECTOR OF THE $O(1)$ LOOP MODEL

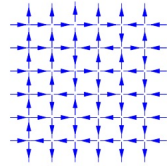
A. V. Razumov* and Yu. G. Stroganov*



Proba(matching)

=

*Number of Fully Packed Loops (FPL)
with same matching*

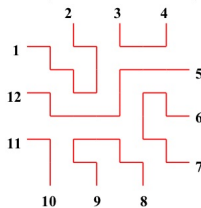


6 Vertex



$$\begin{pmatrix} 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & -1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & -1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

**Alternating Sign Matrices
(ASM)**



and adds more conjectures...

On the Counting of Fully Packed Loop Configurations:
Some new conjectures

J.-B. Zuber

C.E.A.-Saclay, Service de Physique Théorique de Saclay,
CEA/DSM/SPHT, Unité de recherche associée au CNRS
F-91191 Gif sur Yvette Cedex, France
`zuber@spht.saclay.cea.fr`

Submitted: Nov 25, 2003; Accepted: Jan 27, 2004; Published: Feb 14, 2004
MR Subject Classifications: Primary 05A19; Secondary 52C20, 82B20

more of us get "infected" by the RS virus ...

P. Zinn-Justin in particular L. Cantini, A. Sportiello



proof 2010



La Combinatoire

- It was there, looming all along
 - J-B. keeps returning to physics problems with a combinatorial mindset
 - higher genus maps
 - Representation theory
- + R. Coquereaux
- A Powerful inspiration, that shaped my entire scientific life!



La Fin



... ou le
Commencement?

what is Jean-Bernard Zuber going to work on next?

If you mean **Jean-Bernard Zuber**, the French theoretical physicist, his most recent work suggests he is continuing to investigate **random matrices, free probability, and enumerative combinatorics**.

In particular, a 2025 paper with Sylvain Lacroix studies **finite- N precursors of free cumulants**, including their $1/N^2$ corrections and connections to monotone Hurwitz numbers.  SciRate +1

A 2024 paper also explicitly leaves questions about **interpolating between ordinary and free cumulants** for future investigation.  ecajournal.haifa.ac.il

I couldn't find a public statement from Zuber specifying a particular *next* project, so these are the clearest indications rather than a confirmed future-work announcement.

Joyeux

Anniversaire

J-B. !