

Moriond-EW, 19 March '15

The Early Years of Moriond

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University and INFN Roma Tre
CERN

Purpose of this talk: how Moriond started and evolved

Deep in the history of Moriond: the first ~10 years

Recollections from the first years of Moriond, trying to revive what the atmosphere was, how the conference evolved from very small, very french and with a rather limited subject scope into a really great international Conference.

I will mention the important actors at the time, include pictures and memories. The physics is present in that I will recollect what the status of particle physics was in the '60's-'70's.

In particular I will recall the ideas and works that in retrospect became very important today and how and when they appeared in the early Moriond history.

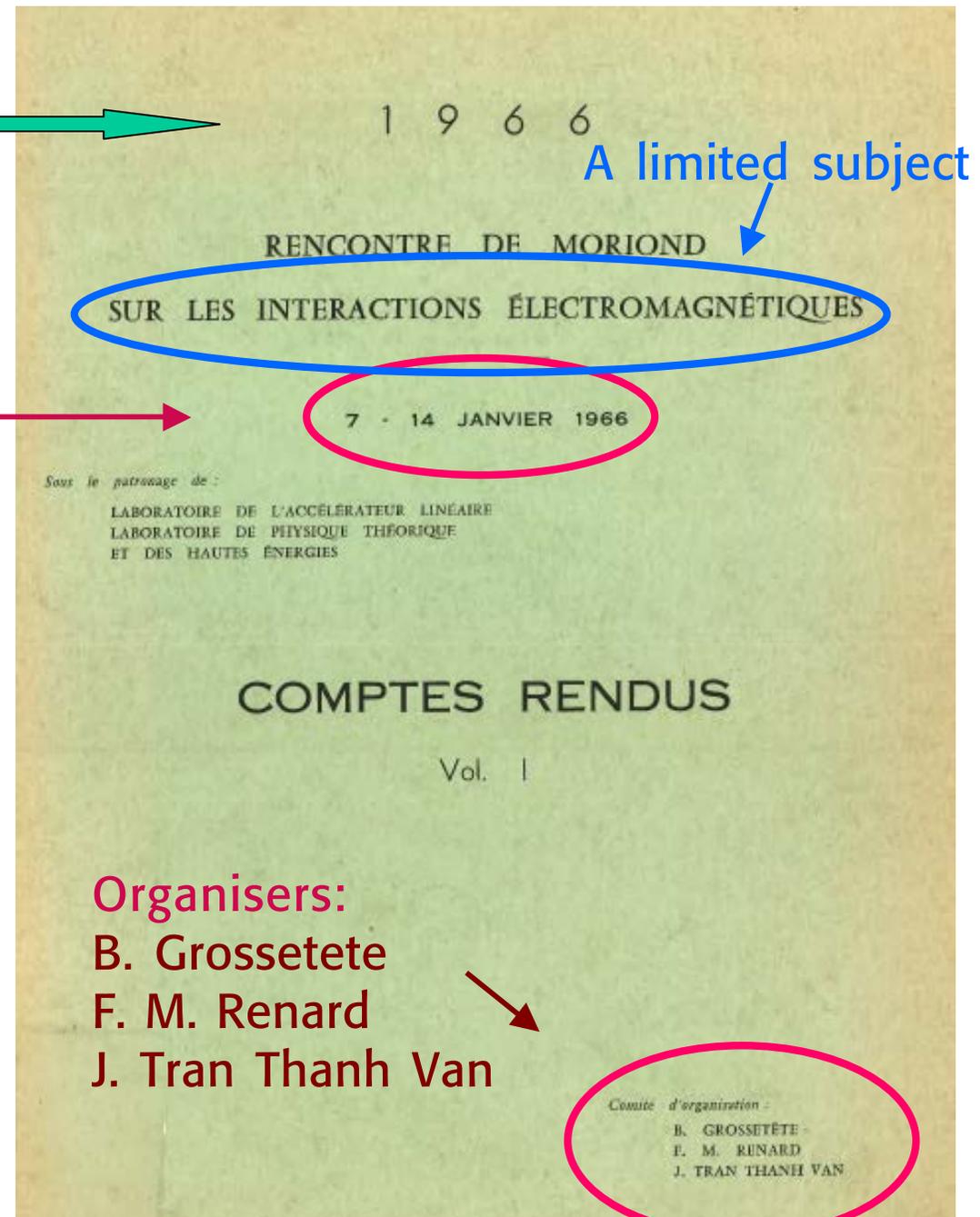


This is the 1st
Moriond book

Moriond
was conceived in 1965
and born in January 1966

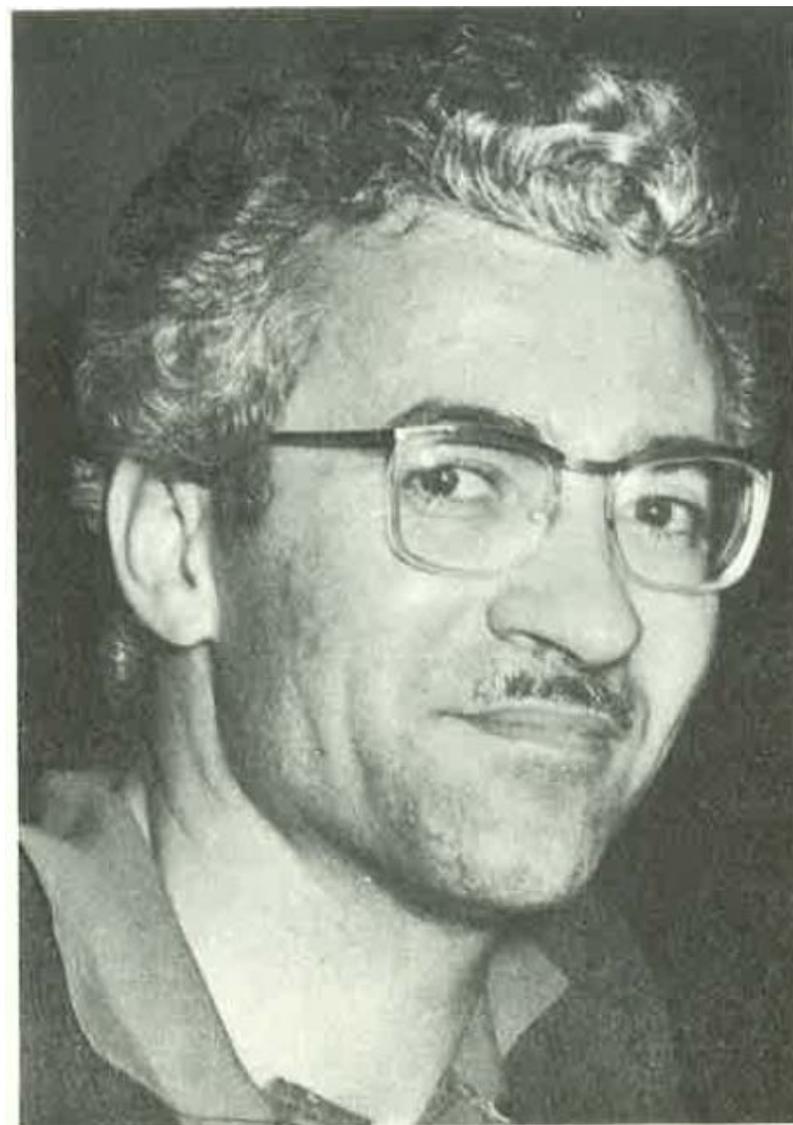
The present Conference
is the 50th of the series

As a physicist I was born
nearly at the same time:
thus I remember very well
what the physics context
was at the time





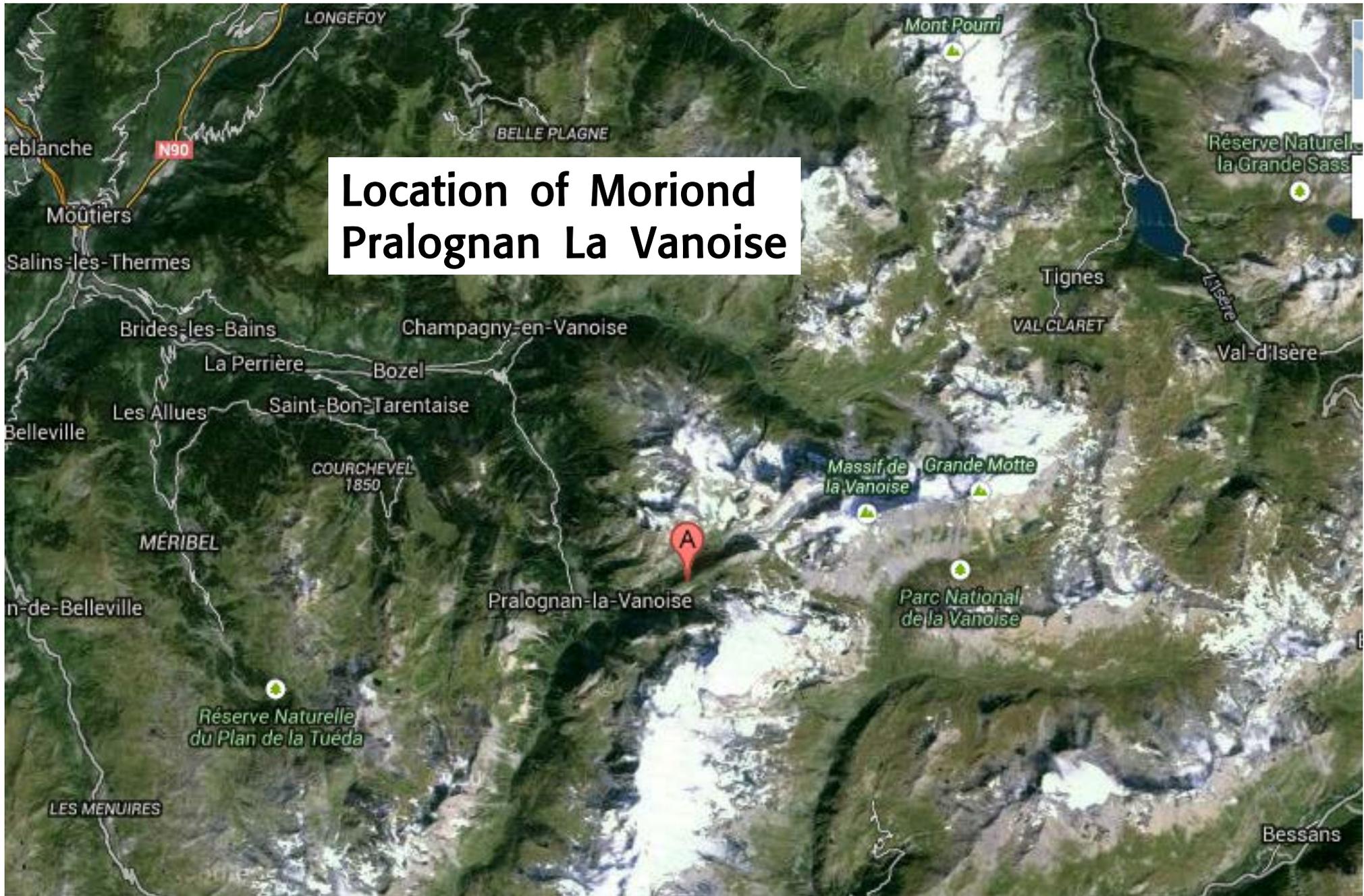
J. TRAN THANH VAN .



F. RENARD



Location of Moriond Pralognan La Vanoise



In '66 almost all speakers were french
 Proceedings mostly in french
 Only ~20 part. mainly from Orsay, Ec. Polytechnique....

I - PHOTOPRODUCTION ET ELECTROPRODUCTION

M. GOURDIN	Some applications of the Algebra of Current to Electromagnetic Interactions
J. PEREZ-Y-JORBA	Spectromètre à triple focalisation de la Salle du GeV à Orsay
J. PEREZ-Y-JORBA	Photoproduction des ν^+ et des ν^- à Orsay
P. LEHMANN	Double Photoproduction sur le Proton
J. LEFRANÇOIS	Photoproduction du π^0 sur le Proton
J. PEREZ-Y-JORBA	Mesure de la Polarisation du Proton de Recu dans la Photoproduction du π_0 sur le Proton entre 500 et 950 MeV
J. LEFRANÇOIS	Photoproduction de K^+ sur le Deutérium
P. LEHMANN	Photoproduction Cohérente des Mésons ν^0 sur D_2 et He^4
G. MENNESSIER	Le Renversement du Temps en Photoproduction
J.P. LOUBATON	Pion Electroproduction

II - PROBLEMES AVEC LE DEUTERON

J. TRAN THANH VAN	Sur la Fonction d'Onde du Deutéron
D. SCHIFF	Photodésintégration du Deutéron et Rôle du N dans des Réactions comportant le Deutéron
B. GROSSETÊTE	Diffusion Electron Deutéron
Y. RENARD	Diffusion Elastique Electron Deutéron
F.M. RENARD	Etat des Connaissances Actuelles sur la Diffusion Inélastique Electron Deutéron

III - EXPERIENCES SUR LES ANNEAUX DE COLLISIONS

J. HAISSINSKI	Expériences auprès des Anneaux de Collisions à Electrons et Positrons
---------------	---

IV - ECHANGE DE PLUSIEURS PHOTONS

M. GOURDIN	Quelques Aspects Théoriques de l'Echange de Plusieurs Photons
B. GROSSETÊTE	Expériences Positrons

V - SUJETS THEORIQUES DIVERS

F.M. RENARD	Interaction dans l'Etat Final à deux Particules
J. MICHELI	Vertex Electromagnétiques Elastiques et Inélastiques
G. MENNESSIER	Les Nouvelles Résonances Pion Nucléon
F. GUERIN	Structure Hyperfine de l'Hydrogène
C. DE CALAN	Corrections Radiatives

VI - SUJETS EXPERIMENTAUX DIVERS

G. WEBER	Experiments at DESY
C. SCHAEFER	Experiments at Frascati
P. BOUNIN	Possibilités d'Expériences avec une cible de Protons Polarisés
P. BOUNIN	Expérience de Coïncidences sur un Accélérateur d'Electrons

only 2 from abroad



A gathering of friends and colleagues to discuss
 ⊕ topics of mutual current interest

One page of the 1966 program

4-5 one-hour talks per day + discussion

Mercredi 12 janvier	8h30 - 9h30	B. Grossetête	Diffusion électron-deutéron
	9h45 - 10h45	F. Renard	Théorie relativiste de la diffusion inélastique électron-deutéron.
	16h30 - 17h30	Schaerf	Expériences à Frascati.
	17h45 - 18h30	Y. Renard	Diffusion élastique e - d et facteur de forme du neutron.
	18h45 - 19h30	J. P. Loubaton	Electroproduction des pions.

Jeudi 13 janvier	8h30 - 9h30	J. Michéli	Revue sur les facteurs de forme.
	9h45 - 10h45	J. Haissinsky	Expériences avec les anneaux de collision d'électrons.
	16h30 - 17h30	C. De Calan	Sur les corrections radiatives dans les expériences en coïncidence.
	17h45 - 18h45	P. Bounin	Problèmes posés par les expériences en coïncidence auprès des accélérateurs linéaires.
	18h45 - 19h30		Discussions.



Particle physics in mid-sixties

Only a few bits of the present SM were known.

And few theorists were familiar with a unified EW theory, e.g. $SU(2) \times U(1)$ or $O(3)$, Nambu - Goldstone, BEH....

- QED: the reference field theory was essentially complete
- Weak Interactions: Effective Fermi theory, V-A,
Conserved Vector Current: 
charged vector weak currents with $\Delta s=0$ in the same $SU(2)_{\text{isospin}}$ multiplet as the isovector em current
Universality, Cabibbo theory, algebra of currents
CP violation ('64) ???
- Strong interactions: No field theory, but S-matrix approach,
Regge poles \rightarrow duality, Veneziano Model ('68);
symmetries [$SU(3)$, $SU(6)$] \rightarrow constituent quarks,
colour, parton model, confinement puzzle....



Some outstanding EW papers in the '60's

Theory of Fermi interaction

R.P. Feynman, Murray Gell-Mann (Caltech). 1958.
Published in *Phys.Rev.* **109** (1958) 193-198

V-A, CVC

The axial vector current in beta decay

Murray Gell-Mann, M Levy. 1960.
Published in *Nuovo Cim.* **16** (1960) 705

PCAC, $SU(2)_V \times SU(2)_A$

Symmetries of baryons and mesons

Murray Gell-Mann (Caltech). 1962.
Published in *Phys.Rev.* **125** (1962) 1067-1084

$SU(3)_{\text{flavour}}$

Y. Neeman, *NP* **26** (1961) 222

The Eightfold Way: A Theory of strong interaction symmetry

Murray Gell-Mann (Caltech). Mar 1961. 49 pp.
CTSL-20, TID-12608

Unitary Symmetry and Leptonic Decays

Nicola Cabibbo (CERN). Jun 1963. 3 pp.
Published in *Phys.Rev.Lett.* **10** (1963) 531-533

Cabibbo Theory

A Schematic Model of Baryons and Mesons

Murray Gell-Mann (Caltech). 1964.
Published in *Phys.Lett.* **8** (1964) 214-215

quarks

An $SU(3)$ model for strong interaction symmetry and its breaking. Version 1

G. Zweig (CERN). Jan 17, 1964.
CERN-TH-401



Other great papers were also around but not widely known

Partial Symmetries of Weak Interactions

S.L. Glashow (Copenhagen U.). 1961.
Published in Nucl.Phys. 22 (1961) 579-588

A Model of Leptons

Steven Weinberg (MIT, LNS). Nov 1967. 3 pp.
Published in Phys.Rev.Lett. 19 (1967) 1264-1266

Weak and Electromagnetic Interactions

Abdus Salam (Imperial Coll., London & ICTP, Trieste). May 1968. 11 pp.
Published in Conf.Proc. C680519 (1968) 367-377

Unified weak and electromagnetic interactions without neutral currents

Howard Georgi, Sheldon L. Glashow (Harvard U.). 1972.
Published in Phys.Rev.Lett. 28 (1972) 1494

Dynamical Model Of Elementary Particles Based On An Analogy With Superconductivity. I

Yoichiro Nambu, G. Jona-Lasinio (Chicago U., EFI). 1961.
Published in Phys.Rev. 124 (1961) 246-254

Field Theories with Superconductor Solutions

J. Goldstone (CERN). 1961.
Published in Nuovo Cim. 19 (1961) 154-164

Broken symmetries, massless particles and gauge fields

Peter W. Higgs (Edinburgh U.). Sep 1964. 2 pp.
Published in Phys.Lett. 12 (1964) 132-133

Broken Symmetries and the Masses of Gauge Bosons

Peter W. Higgs (Edinburgh U.). Oct 1964. 2 pp.
Published in Phys.Rev.Lett. 13 (1964) 508-509

Broken Symmetry and the Mass of Gauge Vector Mesons

F. Englert, R. Brout (Brussels U.). 1964. 3 pp.
Published in Phys.Rev.Lett. 13 (1964) 321-323

SU(2)xU(1)

O(3)

$\begin{pmatrix} e^- \\ \nu_e \\ E^+ \end{pmatrix}$

Spont. symm. breaking

BEH



Moriond 1966

Among th. papers, for example,
M. Gourdin
presented a review of
sum rules derived from
the algebra of currents
of great interest then
and still now

e.g.
Adler sum rule
Cabibbo Radicati sum rule

GOURDIN

SOME APPLICATIONS OF THE ALGEBRA OF CURRENT TO ELECTROMAGNETIC INTERACTIONS A - SUM RULES FOR ELECTROPRODUCTION

M. Gourdin '66

I - INTRODUCTION

Sum rules involving electroproduction reactions on protons

$$e + p \rightarrow e + \Gamma$$

- where Γ is any arbitrary unobserved composite system - can be obtained using the method first described by Adler⁽¹⁾ for high energy neutrino reactions. This possibility, pointed out by Bouchiat⁽²⁾, is interesting, in electroproduction because in the one photon exchange approximation, electroproduction and photoproduction processes are simply related as shown in Fig. 1

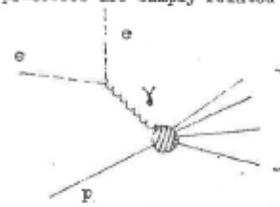
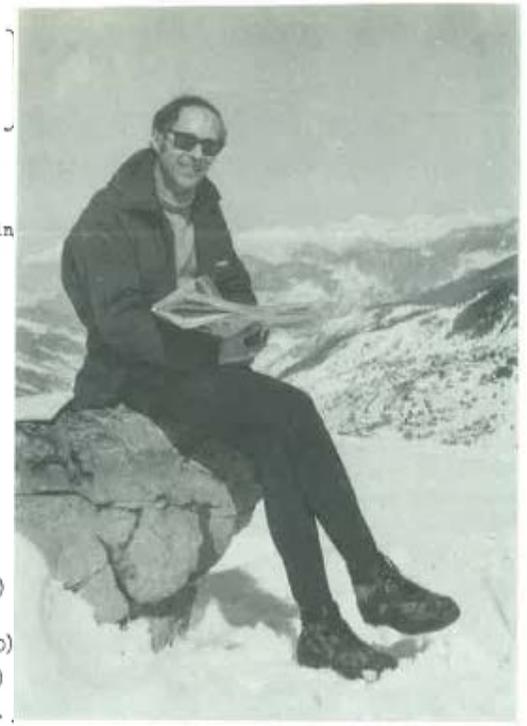


Fig. 1

The inelastic form factors describin

REFERENCES

- (1) S.L. Adler, preprint CERN, TH 598 (1965)
- (2) C. Bouchiat, private communication
- (3) M. Gourdin, Nuovo Cimento 21, 1094 (1961)
Nuovo Cimento 37, 208 (1965)
- (4) M.N. Rosenbluth, Phys. Rev. 79, 615 (1950)
- (5) M. Gourdin, Nuovo Cimento, 36, 129 (1965)
- (6) R.F. Dashen and M. Gell Mann, Phys. Lett.
- (7) N. Cabibbo and L. Radicati, preprint CERN
- (8) A deuteron target for instance cannot be u



M. Gourdin



1967

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Karlsruhe, Institut für Experimentelle Kernphysik

W. Schmidt

Frascati

V. Silvestrini

Many interesting Th papers

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Evidence for the 2 pi Decay of the K^0 Meson

J.H. Christenson, J.W. Cronin, V.L. Fitch, R. Turlay (Princeton U.). Jul 1964. 3 pp.
Published in *Phys.Rev.Lett.* **13** (1964) 138-140

CP Violation is now
a main topic at Moriond

1967

Experiments at
 e^+e^- and pp
machines

The Rencontre becomes
more international and
with a wider and deeper
scope.

More papers in English

CP Violation

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TOME 1

Regge poles were a hot issue

I - EXPOSE D'INTRODUCTION

- - M. JACOB, Les Problèmes Actuels de la Physique des Hautes Energies.

II - INTERACTIONS ELECTROMAGNETIQUES

- J. BUON, Les Expériences de Physique Auprès des Anneaux de Collisions d'Electrons.
- TRAN N. TRUONG, Electromagnetic Form Factor of π Meson.
- - M. LE BELLAC, Photoproduction et Pôles de Regge.
- B. GROSSETÊTE, Projet d'Expérience à Orsay avec un Faisceau de Photons d'Annihilation.
- - F.M. RENARD, Symétries Internes en Interactions Electromagnétiques.
- - V. SILVESTRINI, A Review of Tests of Quantum Electrodynamics.
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1968 (continued)

More and more the talks are focussed on the hottest problems

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CP violation
and
Regge Poles
Algebra of currents

} Gell-Mann,
the leading theorist,
was pushing both

Light-Cone Current Algebra,
 π^0 Decay, and e^+e^- Annihilation

W. A. BARDEEN
H. FRITZSCH
M. GELL-MANN **1973**

ELEMENTARY PARTICLES OF CONVENTIONAL FIELD THEORY AS REGGE POLES

M. Gell-Mann
California Institute of Technology, Pasadena, California

and

M. L. Goldberger
Palmer Physical Laboratory, Princeton University, Princeton, New Jersey
(Received August 29, 1962)

1962

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Moriond: success based on an original format

- Focus on phenomenology
- Emphasis on direct communication between experimentalists and theorists
- Much space devoted to informal discussions
- Visibility offered to young researchers

At the time there were great schools in Europe like Erice, Les Houches, Schladming... and big conferences like Rochester, but the Moriond format was original and unique.



From 1970 Moriond goes to Meribel (later to Flaine, La Plagne, Les Arcs,....., La Thuile)

The number of participants becomes larger.
[A session on biology is also present,
founded by Kim Tran Thanh Van,
[later also sessions on cosmology]

In 1971 the title “sur les interactions electromagnetiques” is dropped and becomes more general like “High Energy Phenomenology” and changes from year to year according to the then hottest subjects (by now all papers in english).

⊕ Main format becomes two sessions in 2 weeks (EW and Strong)

Le Journal de Physique Colloques

Vol. 32 No. C3 (Octobre 1971)

RENCONTRE DE MORIOND
Phénoménologie des Interactions Faibles et Electromagnétiques

The '71 Proceedings are available electronically!

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- • **CABIBBO THEORY** p. C3-17
C. JARLSKOG
Abstract | PDF file (598.9 KB)
- **EXPÉRIENCES FUTURES DE DÉSINTÉGRATION LEPTONIQUE D'HYPÉRONS** p. C3-27
G. SAUVAGE
Abstract | PDF file (354.6 KB)
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Abstract | PDF file (899.1 KB)
- **ÉTUDE EXPÉRIMENTALE DE LA DÉSINTÉGRATION $K^+ \rightarrow n^+ n^- e^+ \nu$** p. C3-45
P. BASILE
Abstract | PDF file (430.0 KB)
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- • **III. - DIFFUSION INÉLASTIQUE DES LEPTONS**
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O. NACHTMANN
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- **NEUTRINO EXPERIMENTS IN GARGAMELLE** p. C3-105
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- • **NEUTRINO IDENTITY** p. C3-109
S. L. GLASHOW
Abstract | PDF file (177.8 KB)
- **QUARKS, LEPTONS AND WEAK INTERACTIONS** p. C3-113
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- **EXPERIMENTAL TEST OF THE PARTIALLY CONSERVED AXIAL VECTOR CURRENT HYPOTHESIS** p. C3-117
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- **THE MUD EXPERIMENT** p. C3-123
J.-M. GAILLARD
Abstract | PDF file (90.64 KB)
- • **IV. - CONCLUSION**
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C. G. CALLAN
Abstract | PDF file (252.5 KB)

Main topics

CP violation.

Cabibbo theory.

Speculations on the fundamental structure of weak interactions.

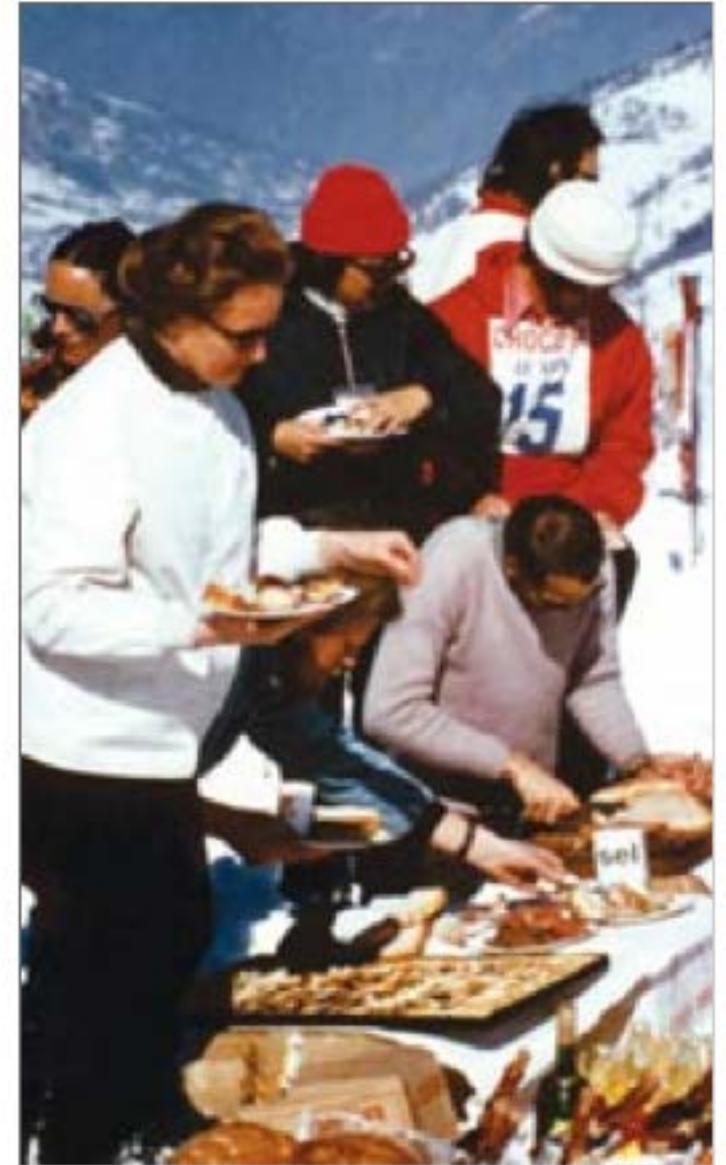
K-Meson decay.

Deep inelastic processes.

Hotel le Lac Bleu, Meribel



Mr Raiberti,
owner of
the Hotel, with
R. Peccei '72



Meribel '74



Pictures from the 1972 Moriond

J. Tran Thanh Van



L. Caneschi

R. Peccei

Al Martin and G. Kane



A. Dar



The great Moriond Secretaries of the time



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The great Moriond Secretaries of the time



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[The present
Secretaries
are also great:
Vera de Sa-Varanda
Isabelle Cossin
Sarodia Vydelingum]



In the early'70's the SM theory took its final form

Weak Interactions with Lepton-Hadron Symmetry

S.L. Glashow, J. Iliopoulos, L. Maiani (Harvard U.). 1970.
Published in *Phys.Rev. D2* (1970) 1285-1292

Regularization and Renormalization of Gauge Fields

Gerard 't Hooft, M.J.G. Veltman (Utrecht U.). 1972.
Published in *Nucl.Phys. B44* (1972) 189-213

EW

An Anomaly Free Version of Weinberg's Model

C. Bouchiat, J. Iliopoulos, P. Meyer (Orsay, LPT). 1972.
Published in *Phys.Lett. B38* (1972) 519-523

Advantages of the Color Octet Gluon Picture

H. Fritzsch, Murray Gell-Mann, H. Leutwyler (Caltech). 1973.
Published in *Phys.Lett. B47* (1973) 365-368

QCD

And also Grand Unification was conceived

Unity of All Elementary Particle Forces

H. Georgi, S.L. Glashow (Harvard U.). Feb 1974. 4 pp.
Published in *Phys.Rev.Lett. 32* (1974) 438-441

Unified Lepton-Hadron Symmetry and a Gauge Theory of the Basic Interactions

Jogesh C. Pati (Maryland U.), Abdus Salam (ICTP, Trieste). Aug 1973. 12 pp.
Published in *Phys.Rev. D8* (1973) 1240-1251

GUT's

Lepton Number as the Fourth Color

Jogesh C. Pati (Maryland U.), Abdus Salam (ICTP, Trieste & Imperial Coll., London). Jan 1974. 35 pp.
Published in *Phys.Rev. D10* (1974) 275-289, Erratum-ibid. *D11* (1975) 703-703



The late '60's - beginning of '70's mark the birth of QCD

On the theory side:

Parton
model

Bjorken
Paschos
Feynman

.....

Quarks

Gell-Mann
Zweig
Greenberg

.....

QCD
field theory

Fritzsch-
Gell-Mann-
Leutwyler

.....

Asymptotic
freedom

't Hooft

.....

Light Cone
Operator Exp.

Wilson
Brandt-
Preparata

.....

Ren. Group.

Gell-Mann-Low
Callan-
Symanzik
Gross-Wilczek
Politzer

.....



Crucial contributions came from decisive experiments

SLAC experiments on DIS

VOLUME 23, NUMBER 16

PHYSICAL REVIEW LETTERS

20 OCTOBER 1969

OBSERVED BEHAVIOR OF HIGHLY INELASTIC ELECTRON-PROTON SCATTERING

M. Breidenbach, J. I. Friedman, and H. W. Kendall

Department of Physics and Laboratory for Nuclear Science,*
Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

and

E. D. Bloom, D. H. Coward, H. DeStaebler, J. Drees, L. W. Mo, and R. E. Taylor
Stanford Linear Accelerator Center,† Stanford, California 94305

(Received 22 August 1969)

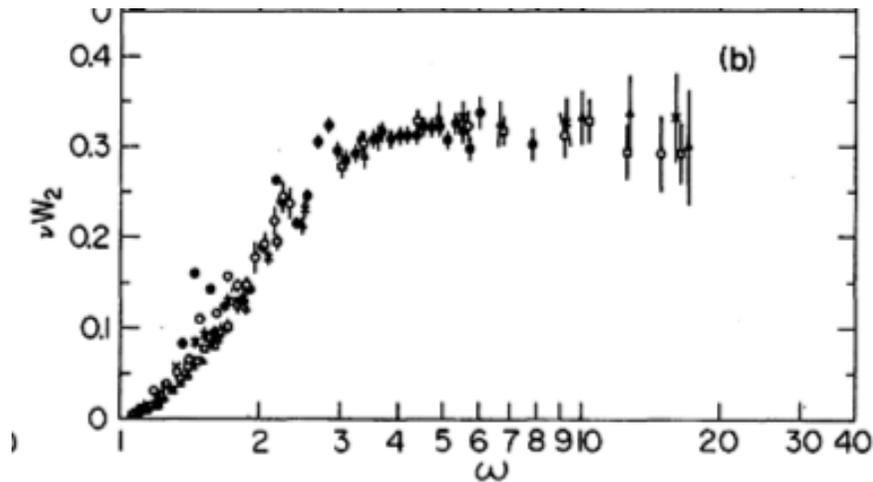
Results of electron-proton inelastic scattering at 6° and 10° are discussed, and values of the structure function W_2 are estimated. If the interaction is dominated by transverse virtual photons, νW_2 can be expressed as a function of $\omega = 2M\nu/q^2$ within experimental errors for $q^2 > 1$ $(\text{GeV}/c)^2$ and $\omega > 4$, where ν is the invariant energy transfer and q^2 is the invariant momentum transfer of the electron. Various theoretical models and sum rules are briefly discussed.

e+ e- annihilation below and around the charm
(still to be discovered) threshold



Novosibirsk
Frascati
CEA

1969: first evidence of approximate Bjorken scaling



$$\nu W_2(\nu, x) \rightarrow F_2(x) \quad \omega = 1/x$$

$$\sigma_L/\sigma_T \rightarrow 0: \text{ spin } 1/2 \text{ ch. partons}$$

1972: e+e- data still confusing

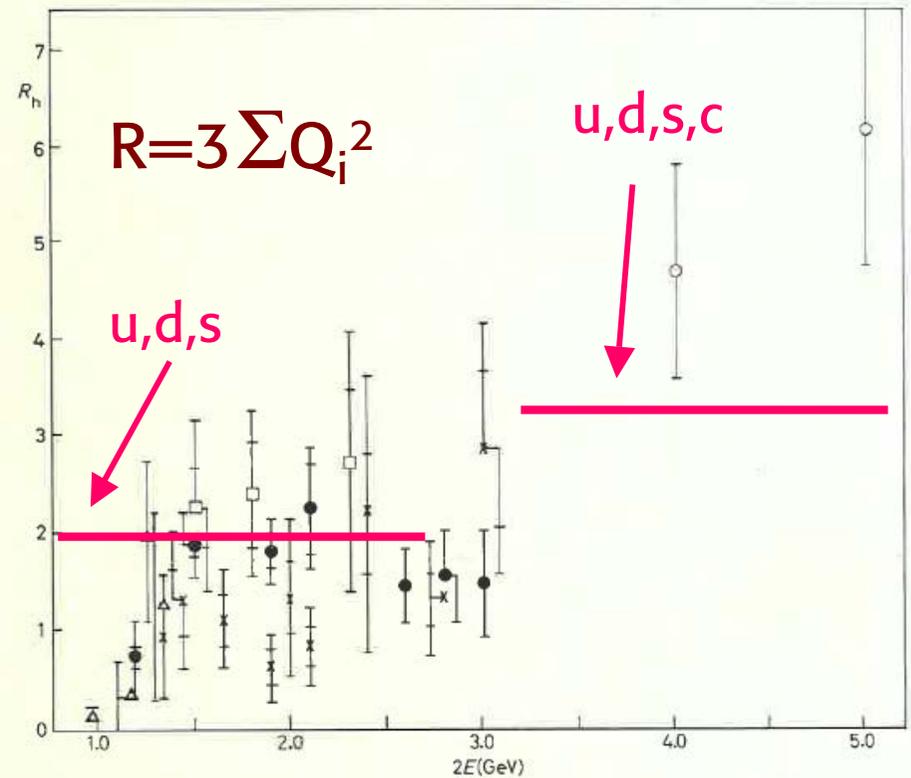


Fig. 7. - A compilation of available data on deep inelastic e^+e^- annihilation into hadrons. E is the centre-of-mass energy per beam. If scaling is true R_n should be asymptotically a constant: $R_n = \sigma(e^+e^- \rightarrow \text{multihadrons})/\sigma(e^+e^- \rightarrow \mu^+\mu^-)$; Δ Novosibirsk, \bullet Frascati $\mu\pi$ group, \times Frascati $\gamma\gamma$ group, \square Frascati boson group, \circ CEA.



The general acceptance of QCD starts with the Nobel winner papers by **Gross & Wilczek** and by **Politzer** in **1973**

Ultraviolet Behavior of Non-Abelian Gauge Theories*

David J. Gross† and Frank Wilczek

Joseph Henry Laboratories, Princeton University, Princeton, New Jersey 08540

(Received 27 April 1973)

It is shown that a wide class of non-Abelian gauge theories have, up to calculable logarithmic corrections, free-field-theory asymptotic behavior. It is suggested that Bjorken scaling may be obtained from strong-interaction dynamics based on non-Abelian gauge symmetry.

Reliable Perturbative Results for Strong Interactions?*

H. David Politzer

Jefferson Physical Laboratories, Harvard University, Cambridge, Massachusetts 02138

(Received 3 May 1973)

An explicit calculation shows perturbation theory to be arbitrarily good for the deep Euclidean Green's functions of any Yang-Mills theory and of many Yang-Mills theories with fermions. Under the hypothesis that spontaneous symmetry breakdown is of dynamical origin, these symmetric Green's functions are the asymptotic forms of the physically significant spontaneously broken solution, whose coupling could be strong.



1973

The SM is by now very well represented in Moriond

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many exp. and th. talks on e^+e^- and DIS

my first Moriond

Iliopoulos



search of neutral currents

gauge theories

Iliopoulos and Gourdin gave a full account of the SM including the Higgs sector



Discovery of neutral currents at Gargamelle ('73)



OBSERVATION OF NEUTRINO-LIKE INTERACTIONS WITHOUT MUON OR ELECTRON IN THE GARGAMELLE NEUTRINO EXPERIMENT

F.J. HASERT, S. KABE, W. KRENZ, J. Von KROGH, D. LANSKE, J. MORFIN, K. SCHULTZE and H. WEERTS

III. Physikalisches Institut der Technischen Hochschule, Aachen, Germany

G.H. BERTRAND-COREMANS, J. SACTON, W. Van DONINCK and P. VILAIN*¹
Interuniversity Institute for High Energies, U.I.B., V.U.B. Brussels, Belgium

U. CAMERINI*², D.C. CUNDY, R. BALDI, I. DANILCHENKO*³, W.F. FRY*², D. HAIDT, S. NATALI*⁴, P. MUSSET, B. OSCULATI, R. PALMER*⁴, J.B.M. PATTISON, D.H. PERKINS*⁶, A. PULLIA, A. ROUSSET, W. VENUS*⁷ and H. WACHSMUTH
CERN, Geneva, Switzerland

V. BRISSON, B. DEGRANGE, M. HAGUENAUER, L. KLUBERG, U. NGUYEN-KHAC and P. PETIAU

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E. BELOTTI, S. BONETTI, D. CAVALLI, C. CONTA*⁸, E. FIORINI and M. ROLLIER
Istituto di Fisica dell'Università, Milano and I.N.F.N. Milano, Italy

B. AUBERT, D. BLUM, L.M. CHOUNET, P. HEUSSE, A. LAGARRIGUE, A.M. LUTZ, A. ORKIN-LECOURTOIS and J.P. VIALLE
Laboratoire de l'Accélérateur Linéaire, Orsay, France

F.W. BULLOCK, M.J. ESTEN, T.W. JONES, J. MCKENZIE, A.G. MICHETTE*⁹, G. MYATT* and W.G. SCOTT*^{6,*9}
University College, London, England

Received 25 July 1973

Events induced by neutral particles and producing hadrons, but no muon or electron, have been observed in the CERN neutrino experiment. These events behave as expected if they arise from neutral current induced processes. The rates relative to the corresponding charged current processes are evaluated.

CERN becomes a world-leading laboratory

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G. FARRAR, P. DARRULAT AND G. JARLSKOG



G. ALTARELLI AND U. BECKER

REMARKS ON e^+e^- ANNIHILATION

C.H. Llewellyn Smith
CERN, Geneva, Switzerland*)





PHILIPPE SALIN 1938-1974



Theoretical Ideas About One Particle Inclusive Reactions Induced By Leptons

Guido Altarelli (Rome U.). 1973.

Published in In *Meribel-les-allues 1973, Proceedings, Eight Rencontre De Moriond, Vol.1*, Orsay 1974, 101-123

On Weak Decays of Charmed Hadrons

Guido Altarelli (Rome U.). May 1975. 12 pp.

INFN-ROME-616

Conference: C75-03-02.16 (Moriond Conf. 1975:183), p.183

Scale Breaking from Asymptotic Freedom and Neutrino Scattering

Guido Altarelli (Rome U. & INFN, Rome). Apr 1976. 20 pp.

INFN-ROME-76-6

Conference: C76-02-29.5 (Flaine Storage Ring 1976:0395), p.0395

Deep Inelastic Processes in Quantum Chromodynamics

Guido Altarelli (Rome U. & INFN, Rome). 1978.

Published in In *Moriond 1978, Proceedings, Gauge Theories and Leptons, Vol.II*, Dreux 1978, 395-431

Qcd In The Leading Logarithmic Approximation And Beyond

Guido Altarelli (Rome U.). 1979.

Published in In *Les Arcs 1979, Proceedings, Current Hadron Interactions, Vol.II*, 575-590

Opening Talk: Importance Of Lepton Pair Production. (talk)

Guido Altarelli (Rome U.). 1981.

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Qcd Aspects In P Anti-p Collider Physics

Guido Altarelli (Rome U.). 1984.

Published in In *La Plagne 1983, Proceedings, Antiproton Proton Physics and The W Discovery*, 559-566

Virtual Effects Of Susy Particles

Guido Altarelli (Rome U.). 1984.

Published in In *La Plagne 1983, Proceedings, Beyond The Standard Model*, 329-338

Phenomenological Supersymmetry

Guido Altarelli (CERN). May 1984. 21 pp.

CERN-TH-3886

Presented at Conference: [C84-02-26.1](#) (Moriond 1984: Leptonic:237)

Searching For The Higgs Boson At Future Colliders

Guido Altarelli (Rome U. & CERN). 1987.

Published in IN *LES ARCS 1987, PROCEEDINGS, THE STANDARD MODEL, THE SUPERNOVA 1987A, VOL. 1* 135-158.

After '73 I attended
many more Moriond



etc.....

Following the November '74 revolution charm dominates the '75 edition

Proceedings of the
TENTH RENCONTRE DE MORIOND
Méribel-lès-Allues (France) March 2-14, 1975

VOL. II

CHARM, COLOR
AND THE Ψ

edited by



Exp
J/ Ψ

All charm talks here!

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Theoretical Ideas About One Particle Inclusive Reactions Induced By Leptons

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etc.....

CHARMED QUARKS AND ASYMPTOTIC FREEDOM IN NEUTRINO SCATTERING

G. ALTARELLI, R. PETRONZIO

Istituto di Fisica, Roma, Italy

Istituto Nazionale di Fisica Nucleare, Sezione di Roma, Italy

and

G. PARISI

Istituto Nazionale di Fisica Nucleare, Frascati, Italy

Received 24 March 1976

Asymptotic freedom and charm production are both important ingredients for a theoretical analysis of neutrino cross sections. We study in detail the Q^2 dependence of integrated quantities like cross sections, y -distributions and $\langle x \rangle$ values. Deviations from scaling are quite substantial in the present energy range.

This paper contributed to downgrading the “ y -anomaly” from a signal of new physics (right-handed charged currents) down to a charm threshold + QCD-logs effect

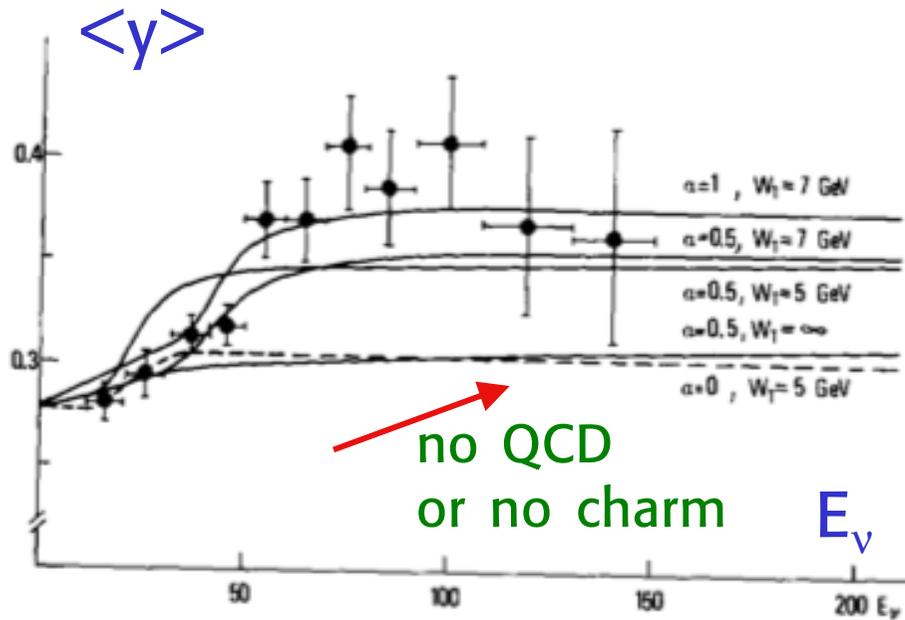
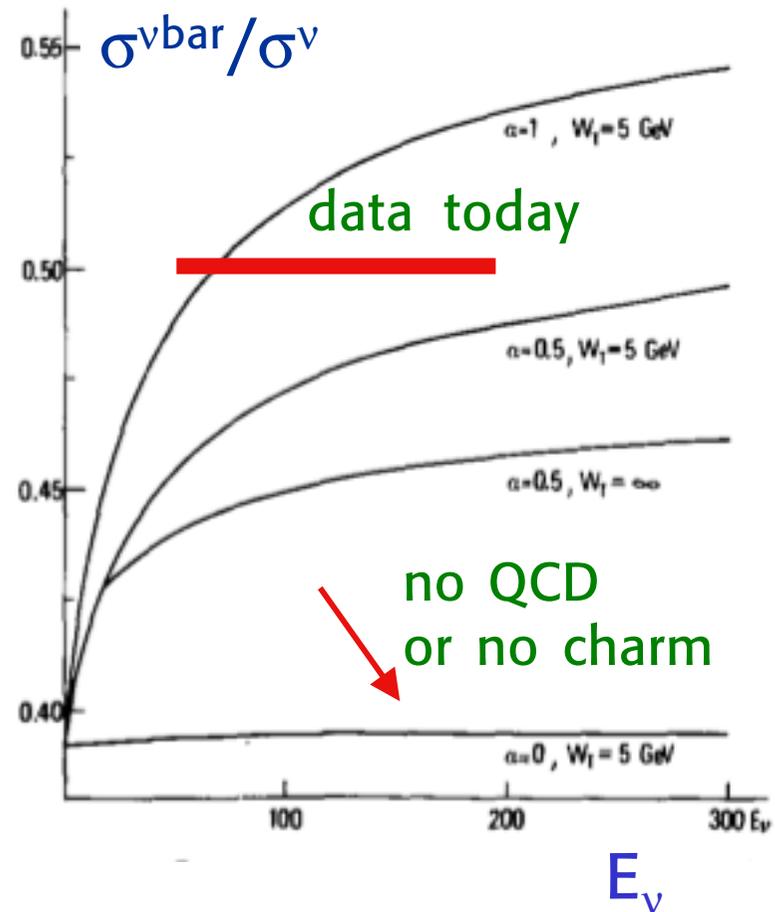


Fig. 3. Average value of y for antineutrinos for different values of $\alpha \equiv \alpha_s(\mu^2)$ and W_T , the effective invariant mass for charm threshold. $\alpha = 0$ corresponds to Q^2 independent parton distributions. $W_T \rightarrow \infty$ corresponds to neglecting effects from charm production. Both effects seem to be needed to reproduce the data. $\alpha = 0.5$ is the value suggested in the text, while $\alpha = 1$ is reported for comparison.



QCD improved parton model

AN INTRODUCTION TO SCALING VIOLATIONS

G. PARISI
Laboratori Nazionali di Frascati
Frascati (Italy)



Abstract: The theory of scaling violations in deep inelastic scattering is presented using the parton model language ; intuitive physical arguments are used as far as possible. In the comparison between theory and experiments particular attention is payed to the consequences of the opening of the threshold for charm production.

DEEP INELASTIC PROCESSES IN QUANTUM CHROMODYNAMICS

G. ALTARELLI
Istituto di Fisica - Università di Roma
Istituto Nazionale di Fisica Nucleare
Sezione di Roma. _



An interesting side initiative:
a volume dedicated to
pedagogical talks by great
authors

Proceedings of the
TWELFTH RENCONTRE DE MORIOND,
Flaine - Haute-Savoie (France) March 6-March 18, 1977

VOL III

COLOR SYMMETRY AND QUARK CONFINEMENT

edited by

TRAN THANH VAN

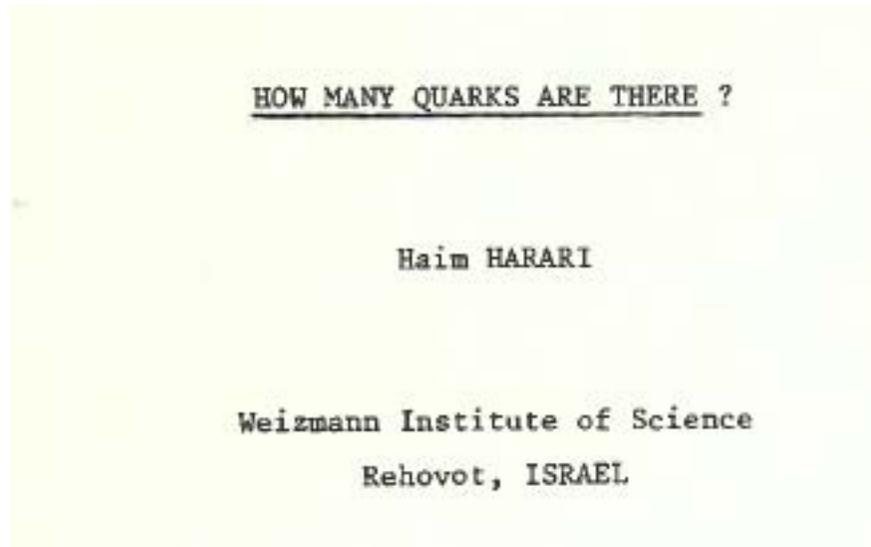
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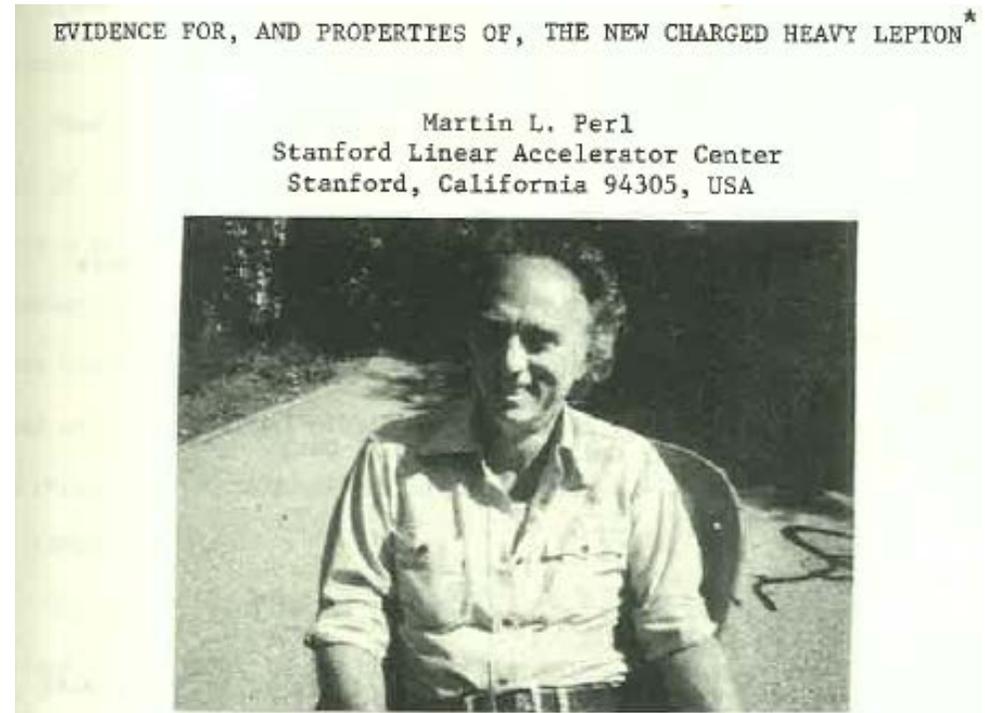


The third generation

1976



1977



the τ lepton

CP Violation in the Renormalizable Theory of Weak Interaction

Makoto Kobayashi, Toshihide Maskawa (Kyoto U.). Feb 1973. 6 pp.

Published in *Prog.Theor.Phys.* 49 (1973) 652-657

the CKM matrix



M. Greco was often
in Moriond

Later become a promoter
of another winter
Conference
and both now are in
La Thuile



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1978

A great session with many important theorists

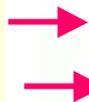
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By then Moriond had definitely become one of the major particle physics Conference

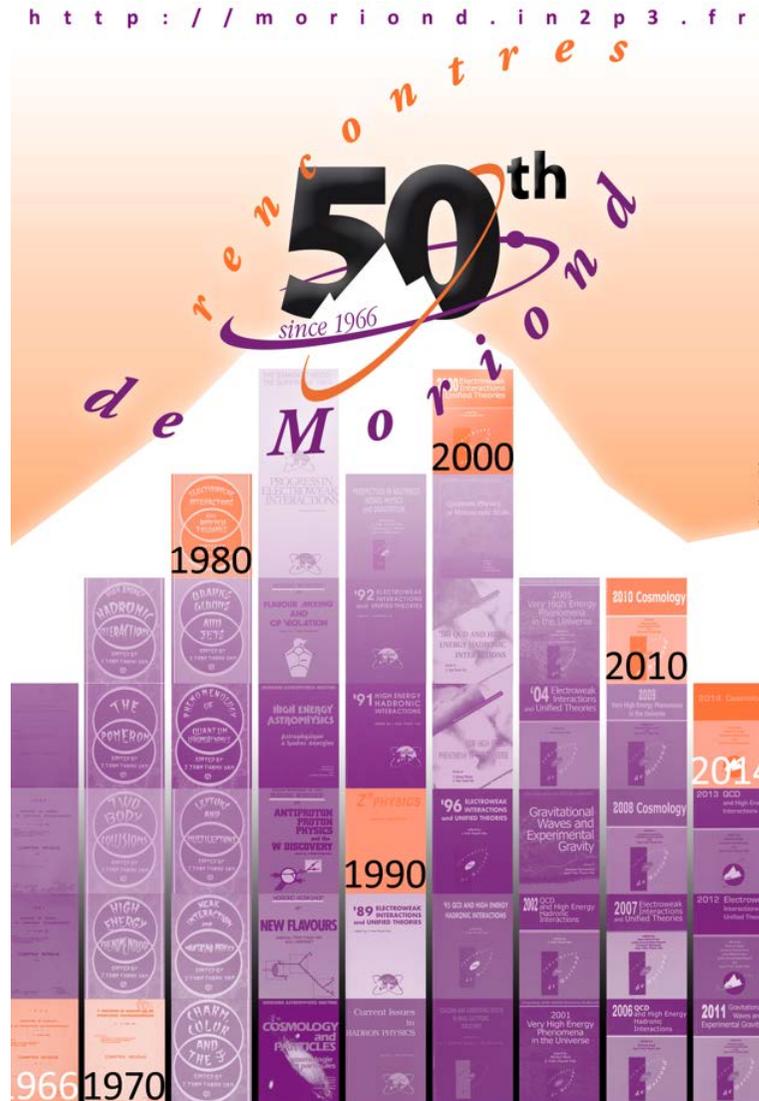


In time practically all good particle physicists have participated in Moriond and together they contributed to make it great

Happy Birthday Moriond!!

Other important rings in the Moriond chain:

Rencontres de Blois
Rencontres du Vietnam



We all are admiring and grateful to Tran!!