A personal tribute to Manolis: a polymathematical physicist

John Ellis
King’s College London
& CERN

Manolis before CERN

- Mathematical physics
- Pomeron phenomenology

LETTERE AL NUOVO CIMENTO VOL. 17, N. 1

On the Structure of the Inclusive Pomeron.

N. G. ANTONIOU, E. FLORATOS and P. POULOPOULOS

Department of Theoretical Physics, University of Athens
Panepistimiopolis, Kouponia - Athens, Greece

(ricevuto il 7 Luglio 1976)

J. Phys. A: Math. Gen., Vol. 9, No. 8, 1976. Printed in Great Britain. © 1976

Generalized Funk–Hecke theorem and non-local O(1, f) symmetric potentials

E G Floratos† and E Kyriakopoulos‡

† Theoretical Physics Department of Athens University, Panepistimioupolis, Athens, Greece
‡ Nuclear Research Centre 'Democritos', Aghia Paraskevi Attikis, and National Technical University of Athens, Athens, Greece

Received 15 December 1975

Abstract. Introducing generalized Mehler and Fourier transforms, we extend the Funk–Hecke theorem to the case of non-compact O(1, f) groups, and we give the exact expressions for the energy spectrum and the wavefunctions of the Schrödinger equation with non-local O(1, f) symmetric potentials in the scattering region.

Bethe–Salpeter spinor equation at $P_\mu = 0$ and SO(5) spinor spherical harmonics*

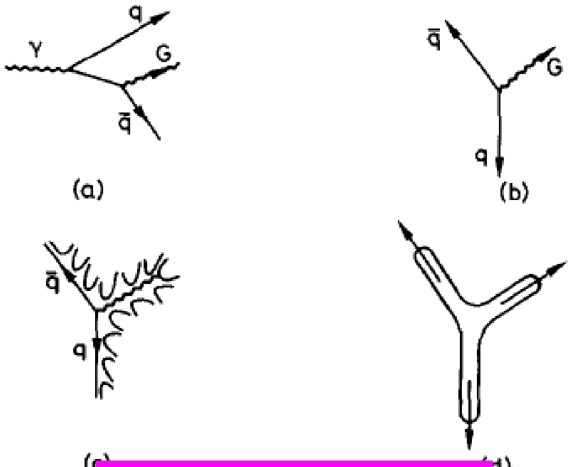
E. G. Floratos

Laboratory of Theoretical Physics, Department of Physics, Athens University, Panepistimiopolis, Athens, T.T. 621, Greece
(Received 3 July 1975)

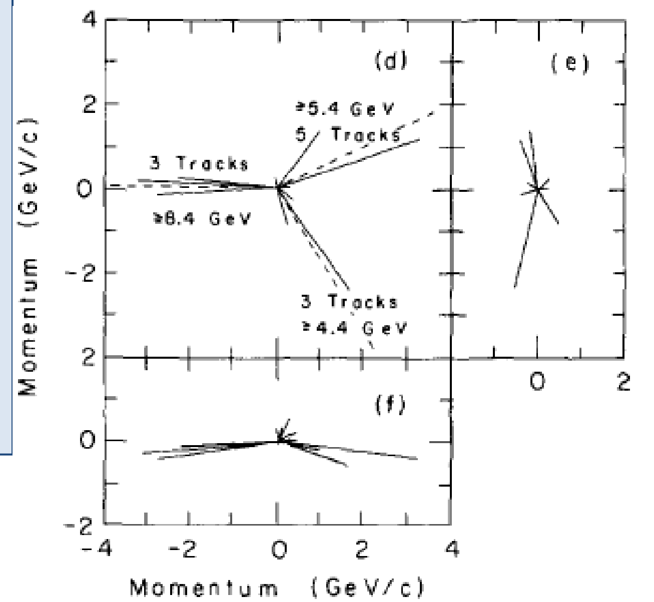
We study the B–S equation, in the ladder approximation, for the zero energy bound states of a spinor and a scalar particle interacting via the exchange of a massless scalar particle. Constructing and using a complete set of SO(5) spinor spherical harmonics, we find the SO(5) degenerate spectrum of the coupling constant and the bound state amplitudes up to a normalization constant. It turns out that the SO(5) symmetry is broken by these amplitudes in a peculiar way.

When Manolis arrived at CERN

- Applications of perturbative QCD
  - Deep-inelastic scattering, …
- 3-jet events in e^+e^- annihilation suggested in 1976
- Put on firm basis by Sterman & Weinberg in 1977
  - Jet physics
- (Discovery of gluon in 1979)



JE, Gaillard & G.Ross



Manolis and Gluon Jets

- Gluon bremsstrahlung in $e^+ e^-$ annihilation would give rise to 3-jet events
- Detailed study of event shapes

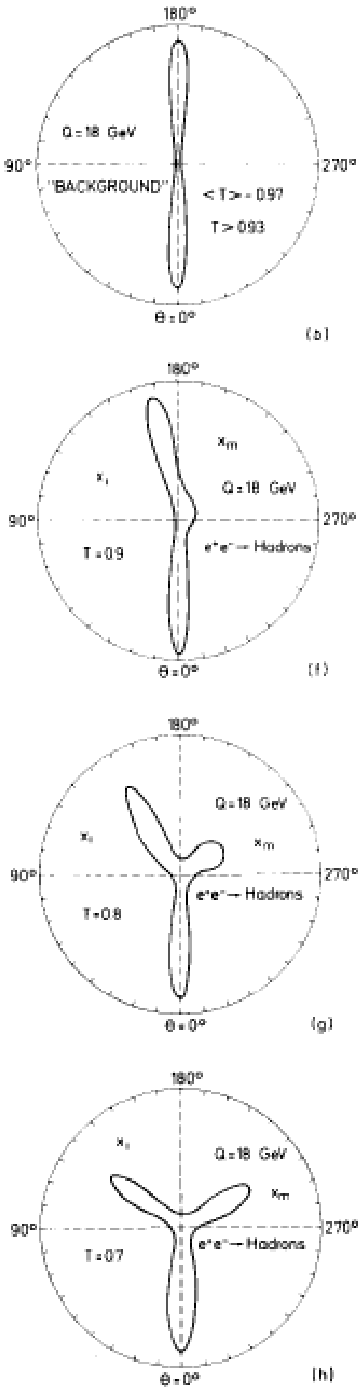
Nuclear Physics B138 (1978) 387–429

QCD PREDICTIONS FOR HADRONIC FINAL STATES IN e^+e^- ANNIHILATION

A. DE RÚJULA *, J. ELLIS, E.G. FLORATOS and M.K. GAILLARD **
CERN, Geneva, Switzerland

Received 6 March 1978

- In some cases even `Mercedes stars’



Manolis and Gluon Jets

- Experimental confirmation via event shapes

VOLUME 43, NUMBER 12 PHYSICAL REVIEW LETTERS 17 SEPTEMBER 1979

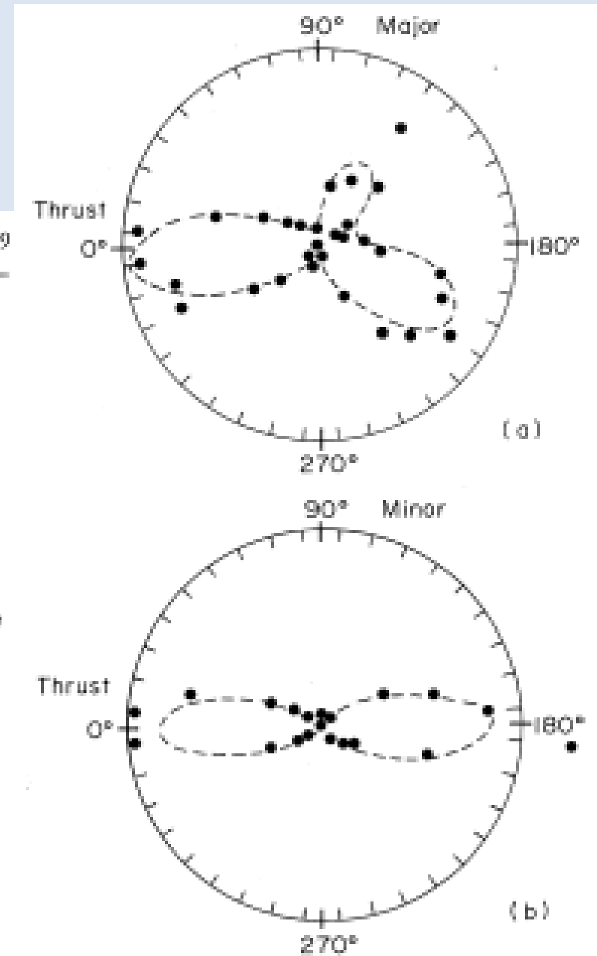
Discovery of Three-Jet Events and a Test of Quantum Chromodynamics at PETRA

D. P. Barber, U. Becker, H. Benda, A. Boehm, J. G. Branson, J. Bron, D. Buikman, J. Burger, C. C. Chang, H. S. Chen, M. Chen, C. P. Cheng, Y. S. Chu, R. Clare, P. Duinker, G. Y. Fang, H. Fesefeldt, D. Fong, M. Fukushima, J. C. Guo, A. Hariri, G. Herten, M. C. Ho, H. K. Hsu, T. T. Hsu, R. W. Kadel, W. Krenz, J. Li, Q. Z. Li, M. Lu, D. Luckey, D. A. Ma, C. M. Ma, G. G. G. Massaro, T. Matsuda, H. Newman, J. Paradiso, F. P. Poschmann, J. P. Revol, M. Rohde, H. Rykaczewski, K. Sinram, H. W. Tang, L. G. Tang, Samuel C. C. Ting, K. L. Tung, F. Vannucci, X. R. Wang, P. S. Wei, M. White, G. H. Wu, T. W. Wu, J. P. Xi, P. C. Yang, X. H. Yu, N. L. Zhang, and R. Y. Zhu

III. Physikalisches Institut Technische Hochschule, Aachen, West Germany, and Deutsches Elektronen-Synchrotron (DESY), Hamburg, West Germany, and Laboratory for Nuclear Science, Massachusetts Institute of Technology, Cambridge, Massachusetts, and National Instituut voor Kernfysica en Hoge-Energiefysica (NIKHEF), Sectie H, Amsterdam, The Netherlands, and Institute of High Energy Physics, Chinese Academy of Science, Peking, People's Republic of China

(Received 31 August 1979)

We report the analysis of the spatial energy distribution of data for $e^+e^- \to$ hadrons obtained with the MARK-J detector at PETRA. We define the quantity "oblateness" to describe the flat shape of the energy configuration and the three-jet structure which is unambiguously observed for the first time. Our data can be explained by quantum chromodynamic predictions for the production of quark-antiquark pairs accompanied by hard noncollinear gluons.



Manolis at CERN: Higher-Order QCD in Deep-Inelastic Scattering

HIGHER-ORDER EFFECTS IN ASYMPTOTICALLY FREE GAUGE THEORIES: THE ANOMALOUS DIMENSIONS OF WILSON OPERATORS

E.G. FLORATOS, D.A. ROSS and C.T. SACHRAJDA
CERN, Geneva

Received 6 June 1977

We calculate the anomalous dimensions of the lowest twist, flavour non-singlet operators in the Wilson expansion to two loops. The calculation is performed using dimensional regularization and the minimal subtraction renormalization scheme. The physical relevance of our results in deep inelastic scattering is discussed.

Volume 80B, number 3 PHYSICS LETTERS 1 January 1979

DETAILED DESCRIPTION OF THE VIOLATIONS OF BJORKEN SCALING IN QCD (INCLUDING HIGHER-ORDER CORRECTIONS)

E.G. FLORATOS [1], D.A. ROSS [2] and C.T. SACHRAJDA
CERN, Geneva, Switzerland

Received 27 October 1978

We present a compendium of formulae and parameters required to study the violations of Bjorken scaling, up to and including the subleading (i.e. $O(\alpha_s)$) corrections.

Nuclear Physics B131 (1977) 308–326

ASYMPTOTIC FREEDOM BEYOND THE LEADING ORDER

A.J. BURAS *, E.G. FLORATOS, D.A. ROSS and C.T. SACHRAJDA
CERN, Geneva

Received 25 July 1977

We make a quantitative analysis of the full $\bar{g}^2$ interaction corrections to the leading Q^2 dependence of νW_2 at $x \geqslant 0.4$, as given by an asymptotically free gauge theory. It turns out that due to partial cancellations between various contributions the $\bar{g}^2$ corrections are small. The best fit with the SLAC ep data after including the $\bar{g}^2$ corrections is almost identical to that without these corrections, the only effect being a change in Λ, the one free parameter, which sets the scale of the theory. On the other hand the effect of including target mass corrections is to improve the agreement of the prediction for νW_2^{ep} with data for large values of x. We study the implications of $\bar{g}^2$ and target mass corrections for $R = \sigma_L/\sigma_T$ and conclude, in agreement with other authors, that although both types of corrections are vital they do not account for values of R for $x \geqslant 0.5$ as measured at SLAC.

HIGHER-ORDER EFFECTS IN ASYMPTOTICALLY FREE GAUGE THEORIES (II). Flavour singlet Wilson operators and coefficient functions

E.G. FLORATOS *, D.A. ROSS ** and C.T. SACHRAJDA
CERN, Geneva, Switzerland

Received 17 November 1978

We complete the calculation of all parameters needed to discuss deep inelastic scattering in QCD to subleading order by calculating the anomalous dimensions of the twist-two flavour singlet operators in the Wilson expansion to two loops and the coefficient functions to order $\bar{g}^2$. The calculation is performed in the dimensional regularization scheme with the minimal subtraction renormalization prescription. The application of the results to deep inelastic scattering is discussed.

CHEEP thrills Manolis

- The first paper on perturbative QCD jets in ep collisions
- First high-energy ep physics study for CHEEP
- Led to HERA

IL NUOVO CIMENTO   VOL. 43 A, N. 2   21 Gennaio 1978

Virtual Photoproduction of Hadrons at Large p_T as a Probe for Gluon Bremsstrahlung.

E. G. FLORATOS
CERN - Geneva

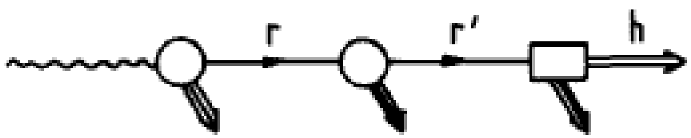
(ricevuto il 10 Agosto 1977)

Summary. — In a $SU_{3,\text{colour}} \times SU_{3,\text{flavour}}$ invariant interaction of quarks and gluons, where the colour degree of freedom is locally gauged, we calculate first-order corrections of the naive parton model for the one-hadron inclusive virtual photoproduction. We study the high-p_T distribution of hadrons and we determine the kinematical region in which the prediction of the model dominates over the fall-off $\sim \exp[-bp_T^2]$ which seems to be supported by the low-p_T available experimental data.

THEORETICAL REMARKS ABOUT e-p COLLISIONS

Summary, prepared by J. Ellis,
of work by a theoretical group including:
J. Bartels, A.J. Buras, N. Cabibbo*), F.E. Close**), B.L. Combridge,
A. De Rújula, J. Ellis, E.G. Floratos, K.J.F. Gaemers, M.K. Gaillard†),
C. Jarlskog††), P. Kessler×), J. Kripfganz, C.H. Llewellyn Smith××),
M. Moshe, J. Parisi×), J. Reignier+), D.A. Ross, C.T. Sachrajda,
B. Schrempp and F. Schrempp

Manolis and Jet Fragmentation



- Series of papers on perturbative QCD evolution of particle spectra in jets

Higher Order QCD Effects in Inclusive Annihilation and Deep Inelastic Scattering
E.G. Floratos, C. Kounnas (Ecole Normale Superieure), R. Lacaze (Saclay). Mar 1981. 73 pp.
Published in **Nucl.Phys. B192 (1981) 417**
LPTENS-81-3
DOI: 10.1016/0550-3213(81)90434-X
References | BibTeX | LaTeX(US) | LaTeX(EU) | Harvmac | EndNote
KEK scanned document ; Science Direct
Detailed record - Cited by 276 records 250+

Space and Timelike Cut Vertices in QCD Beyond the Leading Order. 1. Nonsinglet Sector
E.G. Floratos, R. Lacaze (Saclay), C. Kounnas (Ecole Polytechnique). Dec 1980. 10 pp.
Published in **Phys.Lett. B98 (1981) 89**
SACLAY-DPh-T 80/77
DOI: 10.1016/0370-2693(81)90374-9
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ADS Abstract Service; Science Direct
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Space and Timelike Cut Vertices in {QCD} Beyond the Leading Order. 2. The Singlet Sector
E.G. Floratos, R. Lacaze (Saclay), C. Kounnas (Ecole Polytechnique). Jun 1980. 11 pp.
Published in **Phys.Lett. B98 (1981) 285**
SACLAY-DPh-T 80/83
DOI: 10.1016/0370-2693(81)90016-2
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ADS Abstract Service; Science Direct
Detailed record - Cited by 98 records 50+

Higher Order Corrections in the Cut Vertex Formalism
L. Baulieu (Ecole Normale Superieure), E.G. Floratos (Saclay), C. Kounnas (Ecole Polytechnique). Apr 1980. 43 pp.
Published in **Phys.Rev. D23 (1981) 2464**
PRINT-80-0546 (ECOLE-POLY)
DOI: 10.1103/PhysRevD.23.2464
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ADS Abstract Service; Phys. Rev. D Server
Detailed record - Cited by 5 records

Parton Model Interpretation of the Cut Vertex Formalism
L. Baulieu (Ecole Normale Superieure), E.G. Floratos (Saclay), C. Kounnas (Ecole Polytechnique). Oct 1979. 24 pp.
Published in **Nucl.Phys. B166 (1980) 321**
SACLAY-DPh-T 79/138
DOI: 10.1016/0550-3213(80)90230-8
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Science Direct
Detailed record - Cited by 50 records 50+

Crossing Relations for Deep Inelastic and Annihilation Processes
L. Baulieu (Ecole Normale Superieure), E.G. Floratos (Saclay), C. Kounnas (Ecole Polytechnique). Aug 1979. 13 pp.
Published in **Phys.Lett. B89 (1979) 84**
LPTENS 79/16
DOI: 10.1016/0370-2693(79)90081-9
References | BibTeX | LaTeX(US) | LaTeX(EU) | Harvmac | EndNote
KEK scanned document ; ADS Abstract Service; Science Direct
Detailed record - Cited by 7 records

Manolis and Jet Fragmentation

- Calculations ....

E.G. Floratos et al. / QCD effects 451

$$-\frac{4}{9}\frac{151N^4+236N^3+88N^2+3N+18}{N^3(N+1)^3}+8\eta\frac{2N^2+2N+1}{N^3(N+1)^3}\Bigg]$$

$$+C_FT_R\left[-\tfrac{160}{9}S_1(N)+\tfrac{32}{3}S_2(N)+\frac{4}{3}+\frac{16}{9}\frac{11N^2+5N-3}{N^2(N+1)^2}\right], \qquad (B.18)$$

$$\gamma_{qq}^{(1)N}=\gamma_{NS}^{(1)N}(1)-16C_FT_R\frac{5N^5+32N^4+49N^3+38N^2+28N+8}{(N-1)N^3(N+1)^3(N+2)^2}, \qquad (B.19)$$

$$\gamma_{qg}^{(1)N} \doteq -8C_AT_R\Bigg[\left(-2S_1^2(N)+2S_2(N)-2S_2'(\tfrac{1}{2}N)\right)\frac{N^2+N+2}{N(N+1)(N+2)}+\frac{8S_1(N)(2N+3)}{(N+1)^2(N+2)^2}$$

$$+2\frac{N^9+6N^8+15N^7+25N^6+36N^5+85N^4+128N^3+104N^2+64N+16}{(N-1)N^3(N+1)^3(N+2)^3}\Bigg]$$

$$-8C_FT_R\Bigg[\left(2S_1^2(N)-2S_2(N)+5\right)\frac{N^2+N+2}{N(N+1)(N+2)}-\frac{4S_1(N)}{N^2}$$

$$+\frac{11N^4+26N^3+15N^2+8N+4}{N^3(N+1)^3(N+2)}\Bigg], \qquad (B.20)$$

$$\gamma_{gq}^{(1)N}=-4C_F^2\Bigg[\left(-2S_1^2(N)+10S_1(N)-2S_2(N)\right)\frac{N^2+N+2}{(N-1)N(N+1)}-\frac{4S_1(N)}{(N+1)^2}$$

$$-\frac{12N^6+30N^5+43N^4+28N^3-N^2-12N-4}{(N-1)N^3(N+1)^3}\Bigg]$$

$$-8C_FC_A\Bigg[\left(S_1^2(N)+S_2(N)-S_2'(\tfrac{1}{2}N)\right)\frac{N^2+N+2}{(N-1)N(N+1)}$$

$$-S_1(N)\frac{17N^4+41N^2-22N-12}{3(N-1)^2N^2(N+1)}$$

$$+\left(\frac{109N^9+621N^8+1400N^7+1678N^6+695N^5-1031N^4-1304N^3-152N^2+432N+144}{9(N-1)^2N^3(N+1)^3(N+2)^2}\right)$$

$$-\tfrac{32}{3}C_FT_R\left[\left(S_1(N)-\tfrac{8}{3}\right)\frac{N^2+N+2}{(N-1)N(N+1)}+\frac{1}{(N+1)^2}\right], \qquad (B.21)$$

$$\gamma_{gg}^{(1)N}=C_AT_R\left[-\tfrac{160}{9}S_1(N)+\frac{32}{3}+\frac{16}{9}\frac{38N^4+76N^3+94N^2+56N+12}{(N-1)N^2(N+1)^2(N+2)}\right]$$

$$+C_FT_R\left[8+16\frac{2N^6+4N^5+N^4-10N^3-5N^2-4N-4}{(N-1)N^3(N+1)^3(N+2)}\right]$$

$$+C_A^2\Bigg[\tfrac{536}{9}S_1(N)+64S_1(N)\frac{2N^5+5N^4+8N^3+7N^2-2N-2}{(N-1)^2N^2(N+1)^2(N+2)^2}-\frac{64}{3}$$

Nuclear Physics B192 (1981) 417–462

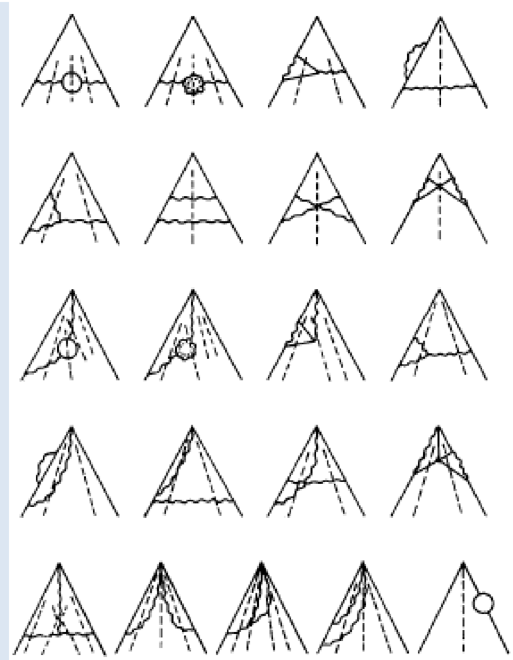
HIGHER ORDER QCD EFFECTS IN INCLUSIVE ANNIHILATION AND DEEP INELASTIC SCATTERING

E.G. FLORATOS and C. KOUNNAS
Laboratoire de Physique Théorique de l'Ecole Normale Supérieure, Paris, France★

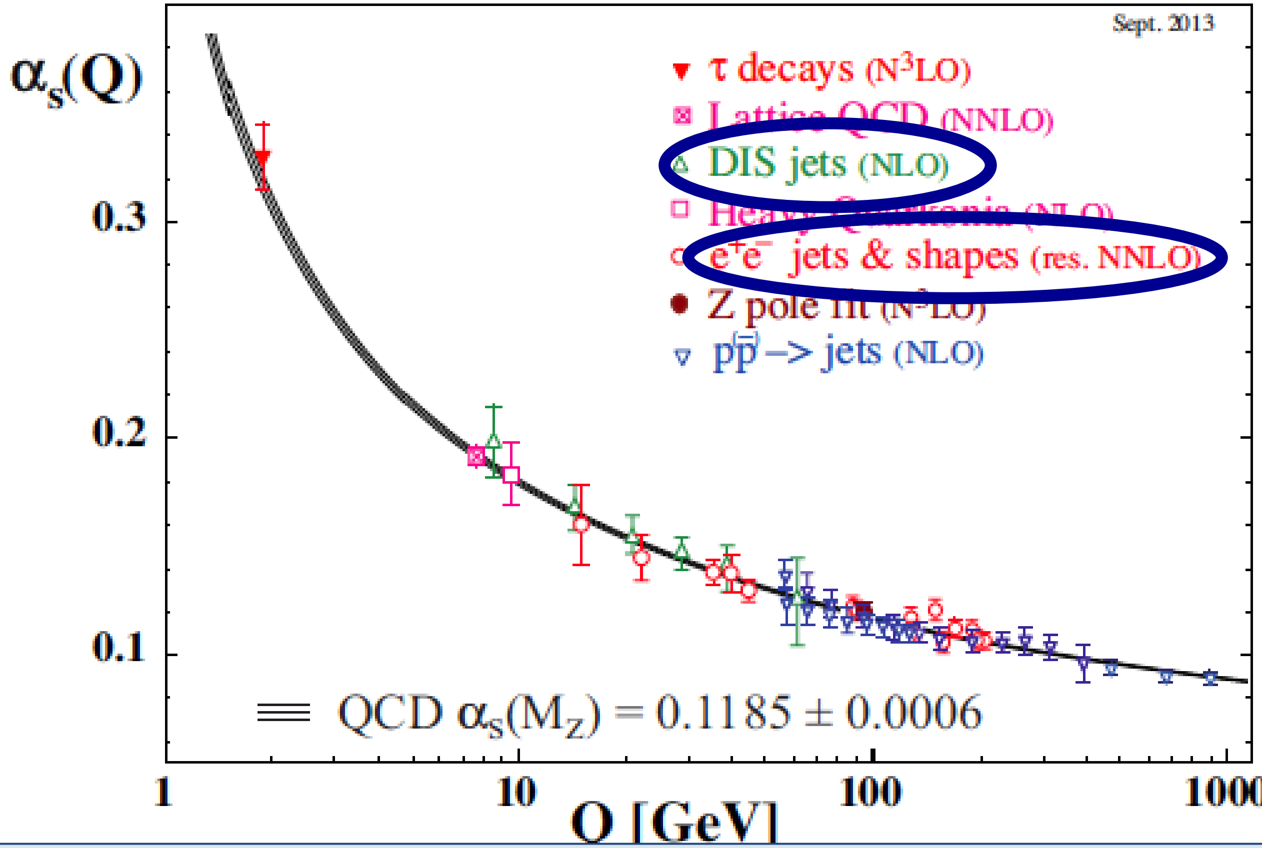
R. LACAZE
DPhT, CEN Saclay★★*, France*

Received 6 April 1981

We present a parton model interpretation of the predictions of quantum chromodynamics in the process $e^+e^- \to$ hadron + anything. We give the complete list of parameters needed for the study of the scaling violations of fragmentation functions up to the next-to-leading logarithmic approximation. This includes flavour non-singlet and flavour singlet anomalous dimensions up to order α^2 and coefficient functions up to order α. We also present results for the deep inelastic scattering $e^-h \to e^-$ + anything. We find that in e^+e^- annihilation the ratio of scaling violations of second order to first order is in general bigger than the corresponding ratio for deep inelastic scattering. The Gribov–Lipatov relation is thus violated in second order. We also find that a modified Drell–Yan analytic continuation relation holds between the deep inelastic and annihilation structure functions for quarks and gluons. In x space we give detailed numerical evaluation of the QCD effects for non-singlet and singlet densities, in the space-like and time-like regions.



Manolis' Legacy: QCD Today



- Important contributions from processes pioneered by Manolis
- $\alpha_s(m_Z) = 0.1185 \pm 0.0006$

Later Papers with Manolis

- Low-energy effective field theory for superstring phenomenology

$$\mathscr{G}_c = \sum_{\alpha} \mathscr{G}^{(\alpha)} + \ln |W_c|^2$$

$$\mathscr{G}^{(\alpha)} = \ln(1 - C^{(\alpha)} \cdot C^{\dagger(\alpha)})$$

$$W_c = 2\,\mathrm{Tr}'\ \Phi_0[C, C]$$

Volume 191, number 1,2 PHYSICS LETTERS B 4 June 1987

THE LOW-ENERGY EFFECTIVE FIELD THEORY FROM FOUR-DIMENSIONAL SUPERSTRINGS

I. ANTONIADIS [1,2], John ELLIS, E. FLORATOS [1], D.V. NANOPOULOS [3] and T. TOMARAS [1]

CERN, CH-1211 Geneva 23, Switzerland

Received 25 February 1987

We derive the low-energy effective supergravity field theory obtained from a fermionic formulation of four-dimensional superstrings. It contains a single dilaton supermultiplet parametrizing an $SU(1,1)/U(1)$ manifold, three self-conjugate sets of matter supermultiplets parametrizing $SO(m,2)/SO(m)\times SO(2)$ manifolds, and chiral matter supermultiplets parametrizing a product of $SU(M,1)/SU(M)\times U(1)$ manifolds. We derive the Yukawa couplings of the theory and identify some of the self-conjugate matter fields as Higgses. We also discuss the possible pattern of supersymmetry breaking.

- Wormhole phenomenology

$$m_u/m_d = 44/130\ ??$$

Volume 225, number 1,2 PHYSICS LETTERS B 13 July 1989

WORMHOLE EFFECTS ON THE MASSES OF SPIN-0 BOSONS AND SPIN-$\frac{1}{2}$ FERMIONS

John ELLIS, E. FLORATOS

CERN, CH-1211 Geneva 23, Switzerland

and

D.V. NANOPOULOS

Center for Theoretical Physics, Physics Department, Texas A&M University, College Station, TX 77843, USA

Received 25 April 1989

We give a unified derivation of the large-volume corrections to the gravitational action due to spin-0 bosons and spin-$\frac{1}{2}$ fermions. We use these results to give a critical discussion of previous analyses of wormhole effects on the pion and neutrino masses. We formulate plausible hypotheses leading to the prediction $m_u/m_d = 44/130$ for the ratio of up and down quark masses.

Inflationary Models in Light of Planck

- Planck CMB observations consistent with inflation
- Tilted scalar perturbation spe n):

$$n_s = 0.9585 \pm 0.070$$

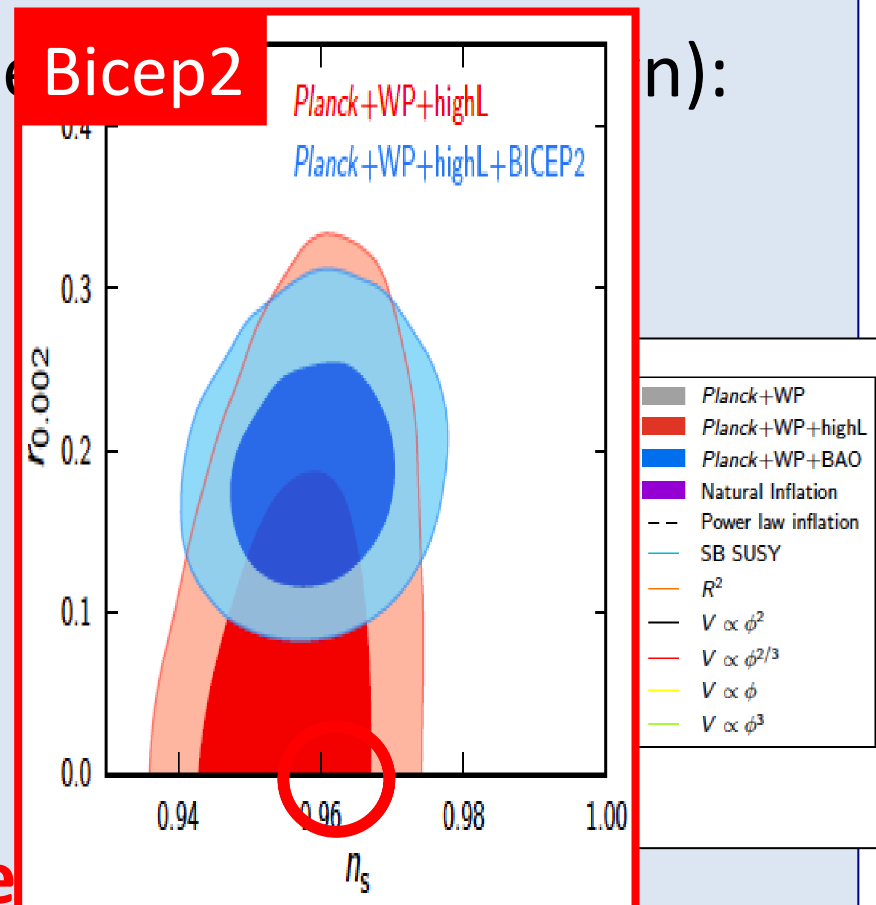
- **BUT** strengthen limit on

tensor perturbations: $r < 0.10$

- Challenge for simple

  inflationary models

- **Starobinsky R^2 to rescue?**
- **Higgs/Supersymmetry/supe**



Starobinsky Model

- Non-minimal general relativity (singularity-free cosmology): $S = \frac{1}{2}\int d^4x\sqrt{-g}(R + R^2/6M^2)$
- **No scalar!?**

Starobinsky, 1980

- Inflationary interpretation, calculation of perturbations:

Mukhanov & Chibisov, 1981

$$\delta S_b = \frac{1}{2}\int d^4x \left[\phi'^2 - \nabla_a\phi\nabla^a\phi + \left(\frac{a''}{a} + M^2a^2\right)\phi^2\right]$$

- **Conformally equivalent to scalar field model:**

$$S = \frac{1}{2}\int d^4x\sqrt{-\tilde{g}}\left[\tilde{R} + (\partial_\mu\varphi')^2 - \frac{3}{2}M^2(1 - e^{-\sqrt{2/3}\varphi'})^2\right]$$

Stelle; Whitt, 1984

Inflation cries out for Supersymmetry (& Supergravity)

- Stabilize ‘elementary’ scalar inflaton
  (needs mass << m_P and/or small coupling)
- **Supersymmetry**
- The only good symmetry is a local symmetry
  (cf, gauge symmetry in Standard Model)
- **Local supersymmetry = supergravity**
- Early Universe cosmology needs gravity
- **Supersymmetry + gravity = supergravity**

No-Scale Supergravity Inflation

- **Supersymmetry + gravity = Supergravity**
- Include conventional matter?
- Potentials in generic supergravity models have 'holes' with depths ~ – M_P^4
- Exception: **no-scale supergravity**
- Appears in compactifications of string
- Flat directions, scalar potential ~ global model + controlled corrections

JE, Nanopoulos & Olive, arXiv:1305.1247, 1307.3537

No-Scale Supergravity Inflation

- Simplest SU(2,1)/U(1) example:
- Kähler potential: $K = -3\ln(T + T^* - |\phi|^2/3)$
- Wess-Zumino superpotential: $W = \frac{\mu}{2}\Phi^2 - \frac{\lambda}{3}\Phi^3$
- Assume modulus *T = c/2* fixed by 'string dynamics'
- Effective Lagrangian for inflaton:

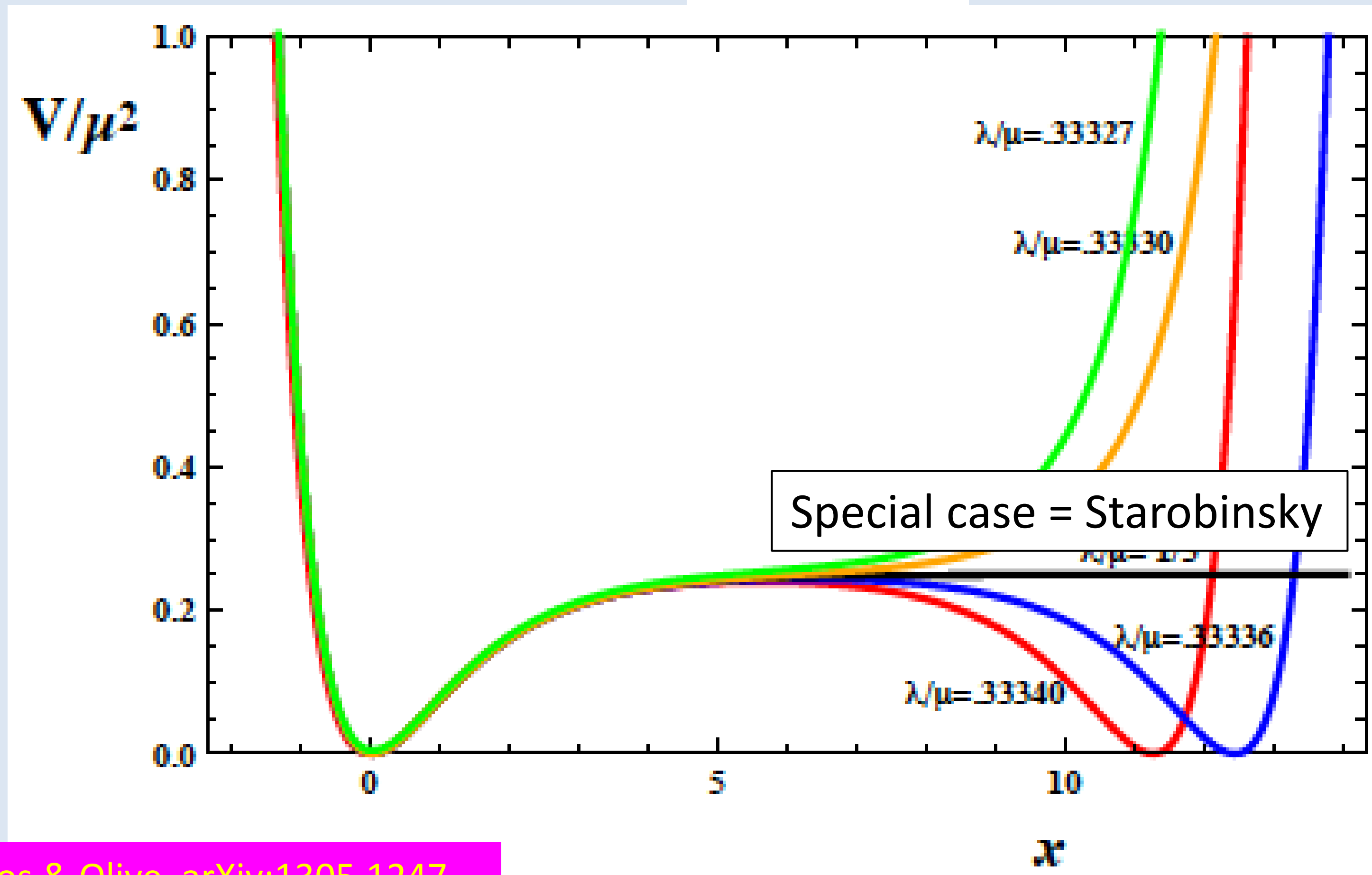
$$\mathcal{L}_{eff} = \frac{c}{(c - |\phi|^2/3)^2}|\partial_\mu \phi|^2 - \frac{\hat{V}}{(c - |\phi|^2/3)^2} \qquad \hat{V} \equiv \left|\frac{\partial W}{\partial \phi}\right|^2$$

- Modifications to globally supersymmetric case
- Good inflation possible …

JE, Nanopoulos & Olive, arXiv:1305.1247

No-Scale Supergravity Inflation

- Inflationary potential for $\lambda \simeq \mu/3$



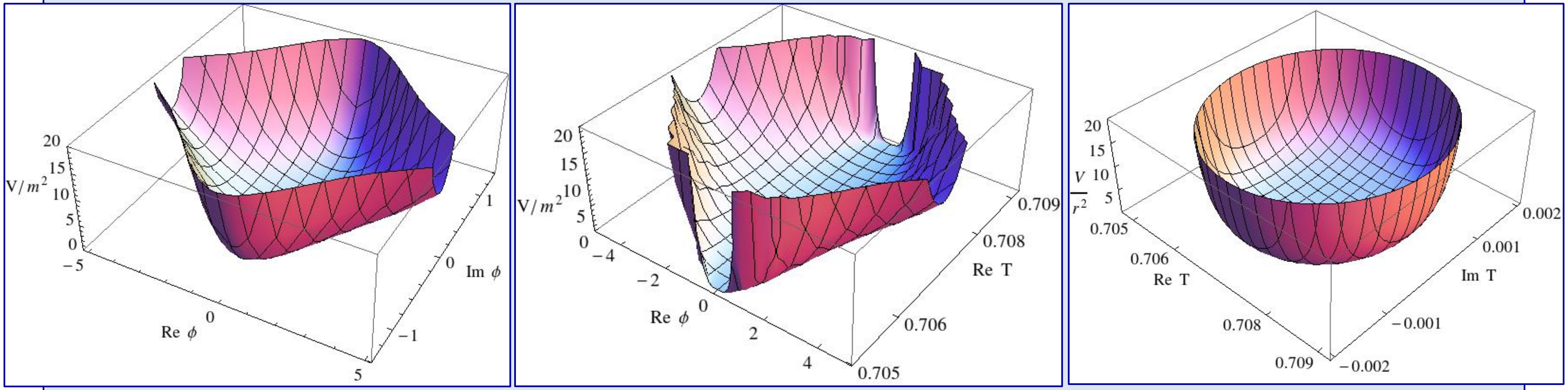
JE, Nanopoulos & Olive, arXiv:1305.1247

No-Scale Supergravity Inflation in Light of BICEP2

- Possible to accommodate quadratic potential

$$K = -3\ln(T+T^*) + |\phi|^2 \qquad W = e^{\frac{-\phi^2}{2}}\left(\mu - \frac{m}{2}\phi^2\right)$$

- Can stabilize T, Im φ while Re φ inflates



JE, García, Nanopoulos & Olive, arXiv:1403.7518

A No-Scale Inflationary Model to Fit Them All

JE, García, Nanopoulos & Olive, arXiv:1405.0271

- A no-scale supergravity model of inflation that interpolates between Planck and BICEP2:

$$K = -3\ln(T+\bar{T}) + \frac{|\phi|^2}{(T+\bar{T})^3} \qquad W = \sqrt{\frac{3}{4}}\frac{m}{a}\phi(T-a) \qquad V = \frac{3m^2}{4a^2}|T-a|^2$$

Motivated by orbifold compactification

- Identify inflaton with components of modulus T:

$$T = a\left(e^{-\sqrt{\frac{2}{3}}\rho} + i\sqrt{\frac{2}{3}}\sigma\right)$$

- Effective Lagrangian:

Starobinsky

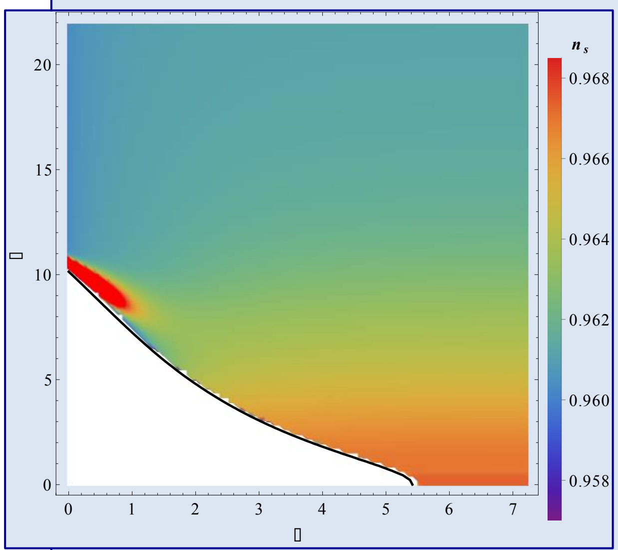
Quadratic

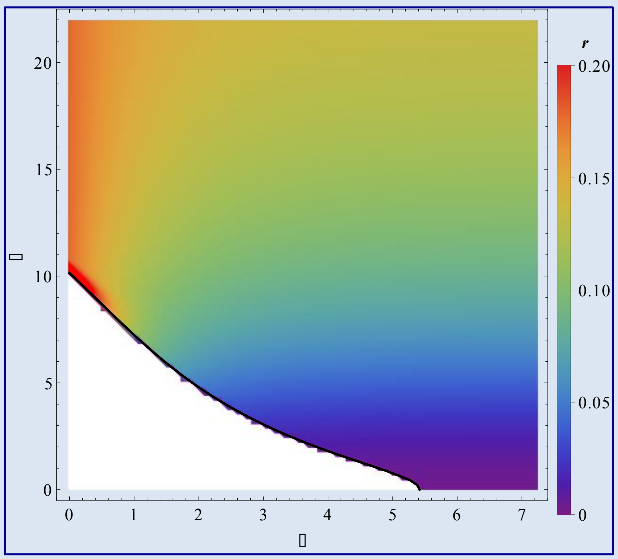
$$\mathcal{L} = \frac{1}{2}\partial_\mu\rho\partial^\mu\rho + \frac{1}{2}e^{2\sqrt{\frac{2}{3}}\rho}\partial_\mu\sigma\partial^\mu\sigma - \frac{3}{4}m^2\left(1-e^{-\sqrt{\frac{2}{3}}\rho}\right)^2 - \frac{1}{2}m^2\sigma^2$$

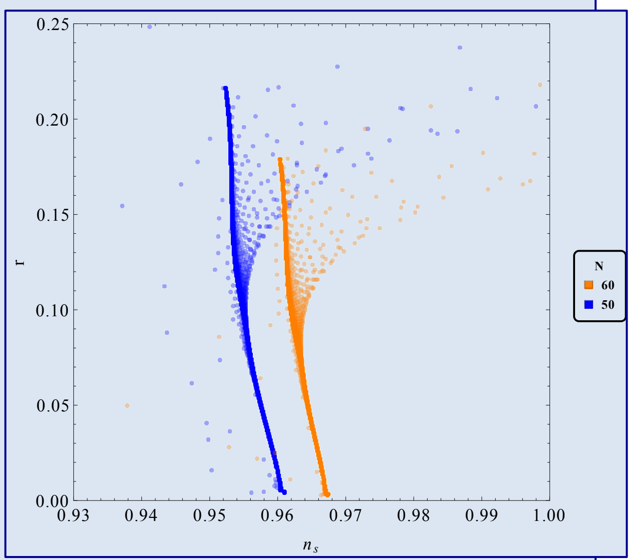
A No-Scale Inflationary Model to Fit Them All

JE, García, Nanopoulos & Olive, arXiv:1405.0271

- Predictions for general initial conditions
- n_s, r as functions of initial values





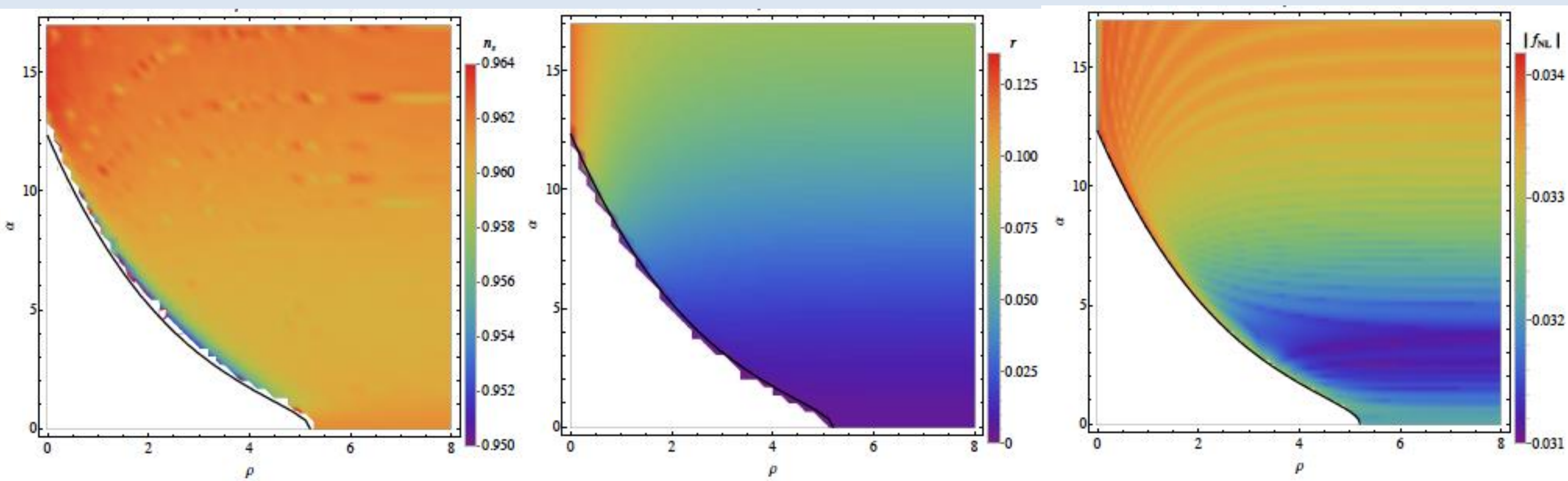


- Time will tell what Nature has chosen!

Two-Field Analysis of No-Scale Inflationary Model

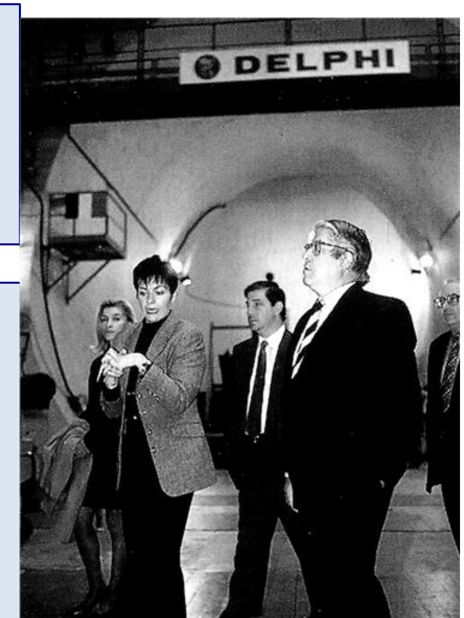
JE, García, Nanopoulos & Olive, arXiv:1409.8197

- Isocurvature effects on curvature perturbations may suppress tensor/scalar ratio r
- n_s, r, non-Gaussianity dependences on initial values



Manolis the Council Delegate

- Distinguished Greek visitors to CERN

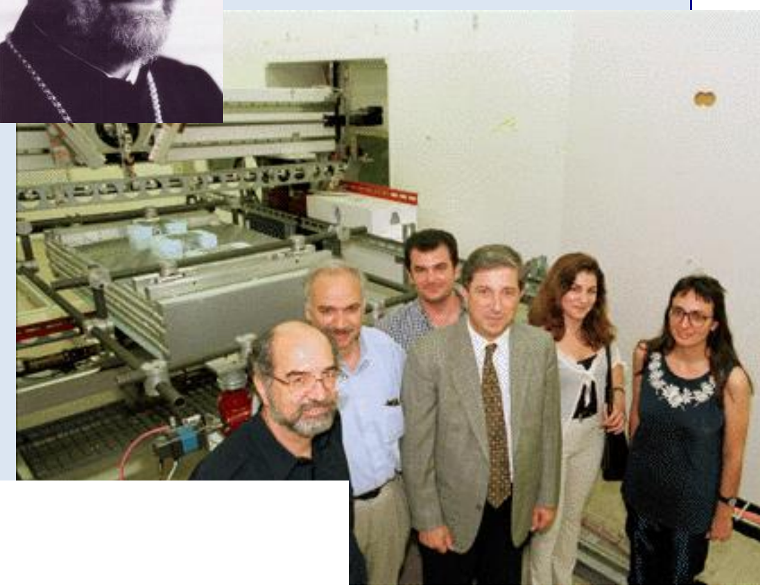


Greece's first industrial exhibition at CERN

14 Oct 1997

Greece, one of CERN[1]'s founding Member States, inaugurated its first Industrial Exhibition at the Meyrin site on Tuesday, 14 October. After a meeting with CERN's Director General, Professor Christopher Llewellyn Smith, Professor Emmanuel Frangoulis, the General Secretary of the Greek Ministry of Industry, accompanied by Prof Emmanuel Floratos, Greek delegate to CERN council visited the DELPHI experiment on the LEP collider, guided by Andromachi Tsirou, a Greek physicist. The delegation then returned to the Main Building for the Inauguration of the Greece at CERN exhibition where they were joined by His Eminence the Metropolitan Damaskinos of Switzerland. In his inaugural speech Professor Llewellyn Smith, welcoming the

- Resources for Greek experimenters
- Tough choices



Professor Luciano Maiani chosen as next Director General of CERN

19 Dec 1997

CERN[1] Council announced at its meeting on 19 December 1997, the election of Prof. Luciano Maiani as the next Director General of the Organisation. Prof. Maiani will take office as from 1 January 1999, replacing Prof. Llewellyn Smith who will have completed his 5 year mandate.

38 years after we first met …

… looking forward to the next 38 years