

INTERNATIONAL SCHOOL OF SUBNUCLEAR PHYSICS

XVI Course: THE NEW ASPECTS OF SUBNUCLEAR PHYSICS

ERICE - TRAPANI-SICILY: 31 JULY - 11 AUGUST 1978

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PROGRAMME AND LECTURERS

OPENING LECTURE: F.P. WIGNER, Princeton, NJ, USA

1. SUPERSYMMETRIES

Fermi-like supersymmetry started from the existence of supergauge transformations in dual models. The great hope was to be able to classify hadronic states and their interactions in a more general version than relativistic SUGRA, connecting bosons and fermions in a way which was free of the theoretical contradictions typical of the relativistic versions of SUGRA. Now people speak of the "gluino", "glino" and a new series of other particles with a new quantum number $R = \pm 1$, the old well known ones all having $R = 0$. The new aspect is that all this could be of direct experimental interest.

Theoretical:

• S. FERRARA, CERN, Geneva, Switzerland

Phenomenological:

• G. FARRAR, Caltech, Pasadena, CA, USA

2. QUANTUM CHROMODYNAMICS

A colour really exists, it explains a great deal, including the missing factor of 9 in the calculation of the α_s lifetime and the factor of 3 needed for the hadronic cross-section in e^+e^- collisions. It also provides a theoretical basis for understanding the symmetry of the baryon decuplet, the scaling and scaling violations in deep inelastic lepton-hadron scattering, and the continual non-observation of free quarks. It started as a pure theory of strong interactions with three "charges" and "non-neutral" gluons, but has now grown to cover additional topics including real confinement (is it colour that counts?), symmetry breaking (heavy quarks would spin more slowly), quark hyperfine interactions (the Δ -N mass difference, the 21 cm line of hydrogen), charm spectroscopy (what happens with the pseudoscalars?), possible new ψ onium ψ states such as the Υ and the problem of exotic particles (four-, five- and six-quark states), not to mention the "old" hadron spectroscopy.

Theoretical:

• D. POLITZER, Caltech, Pasadena, CA, USA

Phenomenological:

• N. ISOUR, Oxford University, Oxford, UK

3. POINTLIKE EFFECTS IN STRONG INTERACTIONS

The high cross-sections observed at large transverse momentum in 1972 were the first indication of hadronic processes where hadrons behave as an assembly of pointlike constituents. While evidence at first was not very compelling, many of the effects predicted by the quark-parton model (such as the production of hadronic jets at wide angles) are now well established. The focal point remains the description of particle production at large transverse momentum in terms of hard scattering between hadron constituents, and the correlation of this picture with quantum chromodynamics.

• M. JACOB, CERN, Geneva, Switzerland

4. ELECTRON-POSITRON PHYSICS

This subject has now been in the forefront of subnuclear physics for several years. Topics covered in the lectures will include the hadronic cross-section, new ψ onium ψ states, open flavour particles, further investigations of the new heavy lepton and the Υ states, jets and the various inclusive final states.

• G. WOLF, DESY, Hamburg, Germany (FRG)

5. NEUTRINO PHYSICS

So far no evidence has been found for the intermediate bosons, W^\pm and Z^0 , expected to mediate weak interactions. A new problem has recently shown up in the observation of a purely leptonic weak cross-section which is much higher than expected. This is especially surprising after the many successes of the Weinberg-Salam model. Other topical points include the energy dependence of the ratio of neutrino and antineutrino cross-sections, the production of new flavours, multiflavour final states, and the general structure of both the charged and neutral hadronic and leptonic weak currents.

• K. WINTER, CERN, Geneva, Switzerland

SPECIALIZED SEMINARS

Recent results from SPEAR

• L. BARBARO GALTIERI, Lawrence Berkeley Laboratory, Berkeley, CA, USA

Recent results from Gargamelle

• P. MUSSET, CERN, Geneva, Switzerland

Order and disorder in many-body gauge theories

• K. HUANG, MIT, Cambridge, MA, USA

The latest news on the electric dipole moment of the neutron

• N. RAMSEY, Harvard University, Cambridge, MA, USA

Is confinement the ultimate truth?

• W. THIRRING, Vienna University, Vienna, Austria

Successes and failures in mathematical physics

• W. THIRRING, Vienna University, Vienna, Austria

What can a particle physicist learn from life?

• H. KLEINERT, Free University Berlin, Germany (FRG)

Status of PETRA

• G.A. VOSS, DESY, Hamburg, Germany (FRG)

HIGHLIGHTS IN OTHER FIELDS

Status of the brain-mind problem

• J.C. ECCLES, Contra, Locarno, Switzerland

Large computer networks and the problem of territorial defence

• L. DADDA, Politecnico University, Milan, Italy

CLOSING LECTURE: A. ZICHICHI, CERN, Geneva, Switzerland

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THE GLORIOUS DAYS OF PHYSICS

My life as a physicist

• H.B.G. CASIMIR, Eindhoven, The Netherlands

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THE ROLE OF ECFA IN EUROPE

• M. VIVARGENT, LAPP, Annecy-le-Vieux, France

PURPOSE OF THE SCHOOL

In spite of the spectacular results obtained in recent times, Subnuclear Physics is far from reaching the asymptotic limit of a field without a future. This is testified by the large number of problems which open up at a rate at least comparable with that of new results. The programme will cover the latest theoretical and experimental developments in particle physics, presented by some of the foremost experts in the appropriate fields.

SPECIAL SCHOLARSHIPS

The following special Scholarships have been established in honour of, and named after, the late Physicists:

PATRICK M. S. BLACKETT	JAMES CHADWICK	AMOS DE-SHALIT
GUNNAR KALLÉN	ANDRÉ LAGARRIGUE	GIULIO RACAH

These Scholarships cover registration fees and full board and lodging in Erice

POETIC TOUCH

According to a legend, Erice, son of Venus, founded a small town on top of a mountain (150 metres above sea level) more than three thousand years ago.

Homer (~1000 B.C.), Theocritus (~300 B.C.), Pindarus (~500 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others, have celebrated this magnificent spot in Sicily in their Poems. Among the sights there, the Castle of Venus and the Cyclopean Walls can be admired. Other masterpieces of ancient Greek civilization, such as Motya, Segesta and Selinunte, are to be found in the neighbourhood. On the Aegadian Islands, which can be reached by cable car plus hydrofoil boat in about two hours, there are prehistoric murals in the famous grotto of Levanzo, the Grotte Marine of Marettimo, and the recently discovered prehistoric grottoes of Favignana. There are splendid beaches, the farthest about 40 minutes' drive from Erice, at San Vito Lo Capo, Scopello, Corraio, and wild beaches around Monte Cefalù.

Please note:

- It is regretted that, owing to the limited number of places available in the lecture hall, it will not be possible to allow any person not selected by the Committee of the School to follow the course.
- NSF travel grants are restricted to USA citizens. Applications for these should be made as soon as possible through the Director of the School.

GENERAL INFORMATION

Persons wishing to attend the Course should write to the Secretary of the School:

• **MISS MARIA ZAINI**
International School of Subnuclear Physics
CH-1211 Genève 23 - Switzerland

They should specify:

- (i) date and place of birth together with their present nationality;
 - (ii) degree and other academic qualifications;
 - (iii) list of publications;
 - (iv) present position and place of work;
- and include:
- (v) a letter of recommendation from their research group leader or from a professor of physics.

The subscription fee is 1,000 Swiss francs. Thanks to the generosity of the sponsoring Institutions, partial support can be given to some deserving students who need financial help. This must be specified and justified in the application letter.

• **PLEASE NOTE** that the special Scholarships as well as any other form of financial support will be awarded in consultation with the Board of Lecturers at the end of the Course, in order to allow a more direct judgement of all the applicants.

Closing date for application: 1 July 1978

No special application form is required

A letter will be sent to successful applicants by July 20. Students experiencing difficulties with travel documentation and needing to know before July 20, whether or not their applications have been accepted, may obtain an earlier special decision by submitting a justified request.

Students must be in Erice on July 31 not later than 5 p.m. Please note that the Calendar Holidays and the School Holidays are totally uncorrelated. More detailed information, including the timetable of the lectures, will be sent to successful applicants together with the letter of acceptance.

A. ZICHICHI - DIRECTOR

SPECIAL ANNOUNCEMENT

Information about the Schools and the activities of the CENTRE can be found in the official Journal of the CENTRE:



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