THE PONTIFICAL ACADEMY OF SCIENCES

Plenary Session on

*Science and Sustainability.*

*Impacts of Scientific Knowledge and Technology on Human Society and its Environment*

Vatican City, 25 – 29 November 2016

# THE PROJECT FOR MANKIND *FOR A SUSTAINABLE DEVELOPMENT OF THE WORLD*


## ANTONINO ZICHICHI

*University of Bologna and INFN, Bologna, Italy*

*CERN, Geneva, Switzerland*

*Enrico Fermi Centre, Rome, Italy*

*World Federation of Scientists, Beijing, Geneva, Moscow, New York*


Friday, 25 November 2016 – 09:30, Casina Pio IV, Vatican City

# THE PROJECT FOR MANKIND
## *FOR A SUSTAINABLE DEVELOPMENT OF THE WORLD*
## ANTONINO ZICHICHI

### CONTENTS

**(1985)** Geneva (Reagan & Gorbachev)

**1939 $\Rightarrow$ 1989** $\Rightarrow$ **50 years**

$6 \times 10^4 \times 10^6$ tons $\Rightarrow 6 \times 10^{10} \Rightarrow$ ton (tnt) equivalent

60,000 H Bombs $\Rightarrow 6 \times 10^9 \Rightarrow$ 10 tons (tnt) procapite

**1989 ⟹ 2000 ⟹ 72 Planetary Emergencies**

**Saint John Paul II ⟹ 8 October 2000**

**H.H. Pope Francis ⟹ 9 October 2016**

⟹ + 50 years

?

# ATTENTION PLEASE

$6 \times 10^4 \times$ H Bombs $\Longrightarrow$ **STATIC**

72 Planetary Emergencies $\Longrightarrow$ **DYNAMICS**

**One example: Smog $\Longrightarrow$ in one year**
**467,000 in Europe (EEA)**

# I – INTRODUCTION

Few weeks ago – October 15 – I was invited to give a lecture at the Polish Parliament on the ‘New Manhattan Project’.

We should all be grateful to our colleagues and friends in Poland who succeeded to realize a great alliance between Faith and Science.

In fact in a full day of work
that the Polish Parliament devoted the
study of the Planetary Emergencies
there were also the results of
a very large series of
experimental research done
in order to know how it is possible to
avoid the destruction of
the forests in the Earth.

This destruction
is one of the strong components
in the
'Cry' of the Earth
and what our
Polish colleagues and friends
did on October 15 was based on
the great alliance between
Faith and Science.

# *Sustainable Development in the context of Laudato Si' Encyclical*

*Sejm of the Republic of Poland*
*Warsaw, October 15th, 2016*

This is an example of what all Parliaments in this Sun's satellite should do in order to overcome the 'Cry of the Earth'.

Pope Francis
has focused the attention
of Modern Culture on
the ‘Cry of the Earth’.

# Here are his words:

*"(...) Today, however, we have to realize that a true ecological approach always becomes a social approach; it must integrate questions of justice in debates on the environment, so as to hear both the cry of the earth and the cry of the poor (...)"*

**The CRY of the EARTH**

**The CRY of the POOR**

The Project for Mankind
is the answer that the
scientific community
has elaborated in order to take care
of the ‘Cry of the Earth’
and of the ‘Cry of the Poor’
as shown
in Figure 1 and in Figure 2.

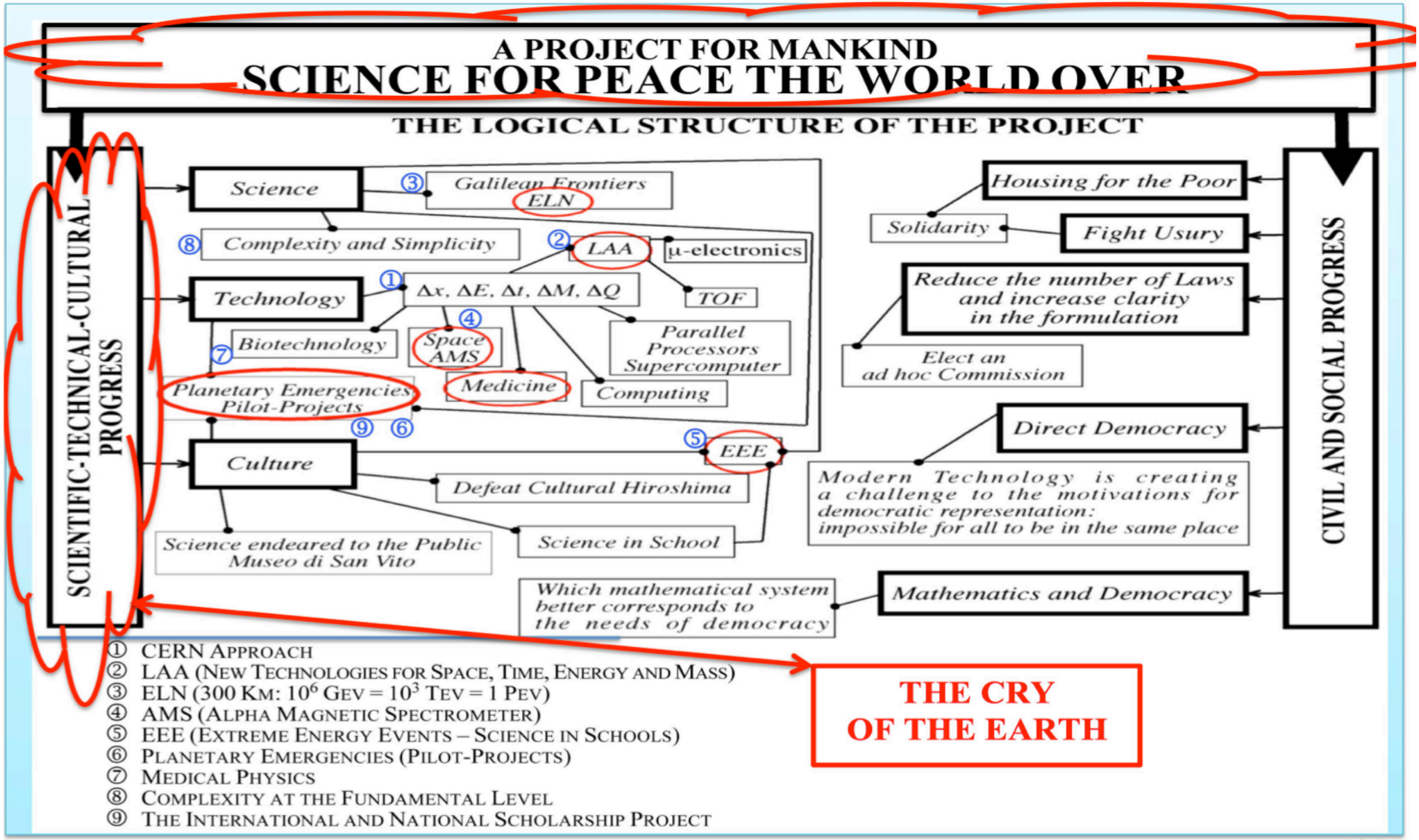



**Figure 1**

One component of the 'Cry of the Earth' are the 72 Planetary Emergencies presented in Chapter 8.

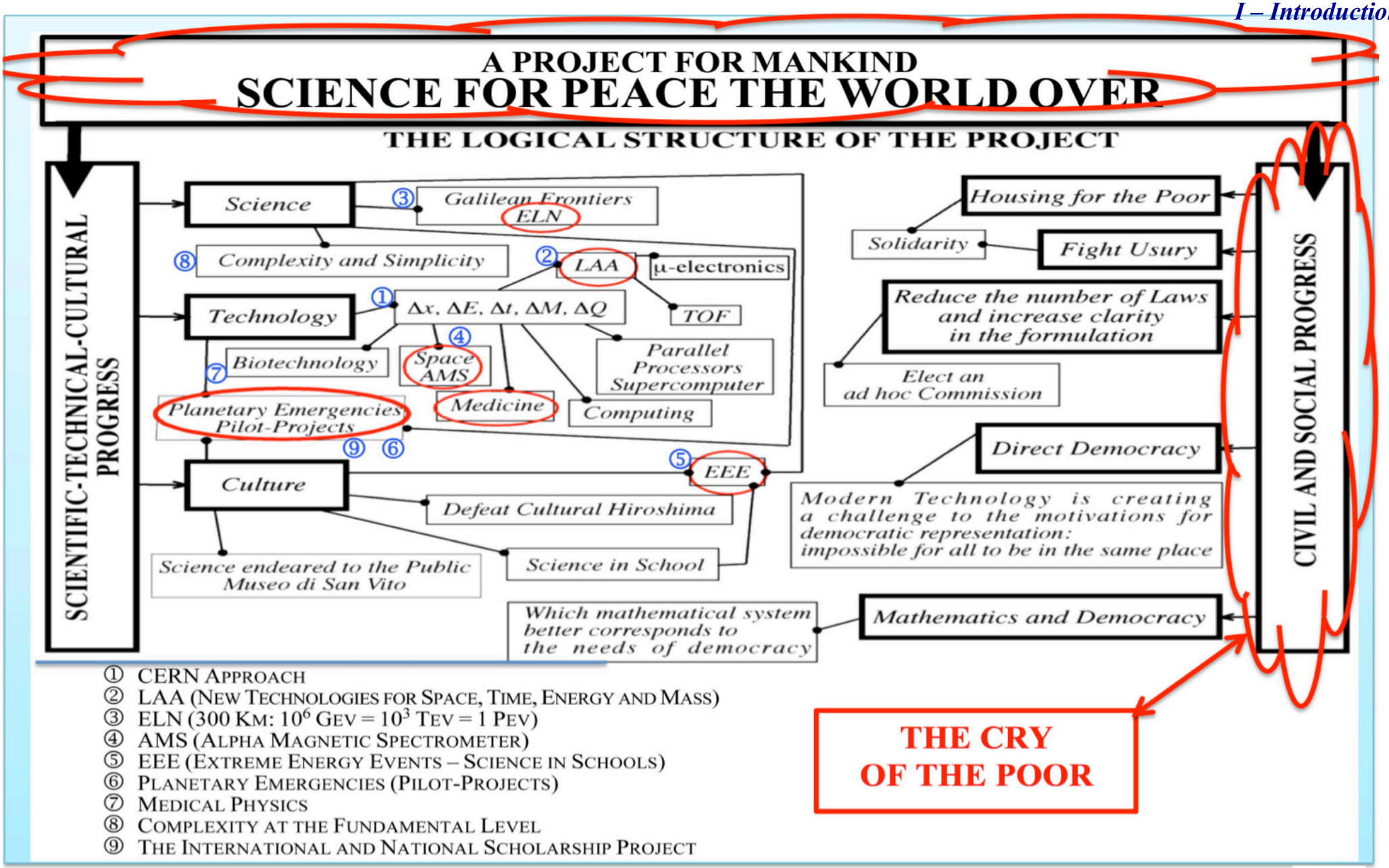

A PROJECT FOR MANKIND
SCIENCE FOR PEACE THE WORLD OVER
THE LOGICAL STRUCTURE OF THE PROJECT
SCIENTIFIC-TECHNICAL-CULTURAL PROGRESS
Science
Galilean Frontiers
ELN
Complexity and Simplicity
LAA
μ-electronics
Technology
Δx, ΔE, Δt, ΔM, ΔQ
TOF
Biotechnology
Space
AMS
Parallel
Processors
Supercomputer
Planetary Emergencies
Pilot-Projects
Medicine
Computing
Culture
EEE
Defeat Cultural Hiroshima
Science endeared to the Public
Museo di San Vito
Science in School
Which mathematical system
better corresponds to
the needs of democracy
Housing for the Poor
Solidarity
Fight Usury
Reduce the number of Laws
and increase clarity
in the formulation
Elect an
ad hoc Commission
Direct Democracy
Modern Technology is creating
a challenge to the motivations for
democratic representation:
impossible for all to be in the same place
Mathematics and Democracy
CIVIL AND SOCIAL PROGRESS
① CERN Approach
② LAA (New Technologies for Space, Time, Energy and Mass)
③ ELN (300 Km: $10^6$ Gev = $10^3$ Tev = 1 Pev)
④ AMS (Alpha Magnetic Spectrometer)
⑤ EEE (Extreme Energy Events – Science in Schools)
⑥ Planetary Emergencies (Pilot-Projects)
⑦ Medical Physics
⑧ Complexity at the Fundamental Level
⑨ The International and National Scholarship Project
THE CRY
OF THE POOR

**Figure 2**

In these Figures there are Projects which started to be implemented following the statement by

**Saint John Paul II**.

# This is why we should remember Saint John Paul II statements [1]:

«*Science and Faith are both gifts of God*».

*«Man could perish from the effects of technology that he himself develops, not from the truth that he discovers by means of scientific research».*

*«As at the time of spears and swords, so today, in the missile age, what kills, more than weapons, is man's heart».*

The future of our world depends on the progress of our cultural evolution which cannot forgett that Saint John Paul II opened the doors of Church to Science, thus starting the Great Alliance between Science and Faith on March 30, 1979.

H.H. Pope Francis, following the year of Faith, has focused the attention of Modern Culture on man's heart for a future where a great alliance between Faith, Science and Technology should become effective.

This great alliance needs a project to be implemented: 'The Project for Mankind', is known in the scientific community as '**The New Manhattan Project**'. And also as 'Science for Peace the World Over'. The purpose of the Project is to overcome the 'Cry of the Earth', which has a strong component in the 72 Planetary Emergencies.

# II – THE ROLE OF SCIENCE IN THE THIRD MILLENNIUM

We scientists **cannot remain silent** when the great public is bombarded with topics such as:

- Complexity is the New Science
- The Reductionism is over. All Sciences must be Holistic
- The Artificial Intelligence will overcome the Human Intelligence
- Chaos is the origin of Life

- The Global warming
- The energy crisis
- The information security
- The environment
- The Intelligent Design
- The Evolution
- and other Problems coming from the ‘Whole of Our Knowledge’.

We scientists
**cannot remain silent**.

The **answer** must be a Project:

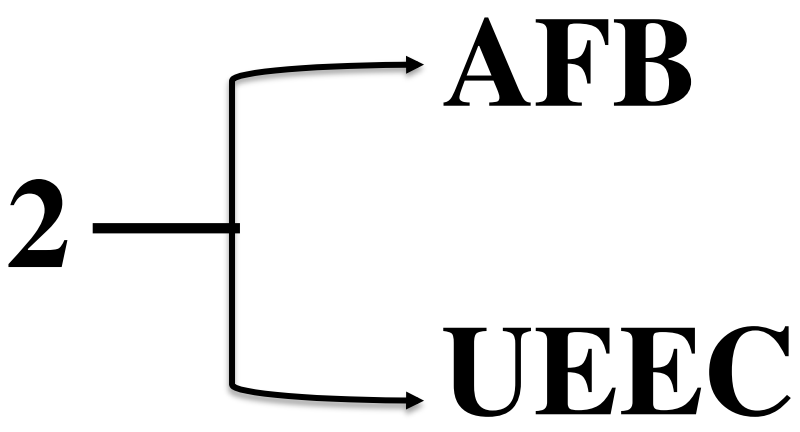
# New Manhattan Project

# Science, Technology, Culture

# This Project cannot ignore the **lastest News** from **Science**

$E_{Planck}$ & Complexity exist at the fundamental level.

# **Despite 70 definitions**
# of Complexity
# the experimental evidences
# are only



# The **latest news** from the **Whole of Our Knowledge**

$$10^{124} = \frac{h\,(\text{Universe})}{h\,(\text{Planck})}$$

**No Chaos**

**The TOF** record ≡ **15 psec**

**1 psec ≡ $10^{-12}$ sec**

if our brain could work

at this speed

we could elaborate in

**1 sec** = 30,000 years

of intellectual activity

We will see in Chapter 5 that the 'Whole of Our Knowledge' can be represented by a Rigorous Synthesis where there is no chance for Chaos to exist.

To study any of the topics previously mentioned, the mathematics needed is a system of at least three non-linear differential equations, coupled.

The same mathematics is needed for the study of the Grand Unification of the three Fundamental Forces of Nature: Electromagnetic, Weak Subnuclear and Strong Subnuclear. Each of these Forces has the gauge coupling $\alpha_1$, $\alpha_2$, $\alpha_3$ [2].

The three non-linear differential equations are coupled via their gauge couplings as reported in Figure 3.

$$\mu \frac{d\alpha_i}{d\mu} = \frac{b_i}{2\pi} \alpha_i^2 + \sum_j \frac{b_{ij}}{8\pi^2} \alpha_i \alpha_j$$

$\alpha_i$ , $\alpha_j$ (with $i = 1, 2, 3$; and $J = 1, 2, 3$ but $i \neq j$).

**Figure 3**

Such a system has **no analitic solution**; only mathematical models with free parameters can be constructed in order to simulate the unknown analytic solution.

Each model needs experimental verification.

We have to convince the great public that the solution to all these **problems** requires **clarity** and **rigour** and that the best way to study these problems is through Science.

Since Physics is the

'Queen of all Sciences',

(**Enrico Fermi**),

the solution of these problems needs physicists and scientists of all other fields.

But the present trend is to study the topics mentioned above through the 'new Science', the so called '**Science of Complexity**' [3], whose origin is in a large number of events which apparently cannot be studied following standard mathematics. A set of these events is reported in Figure 4.

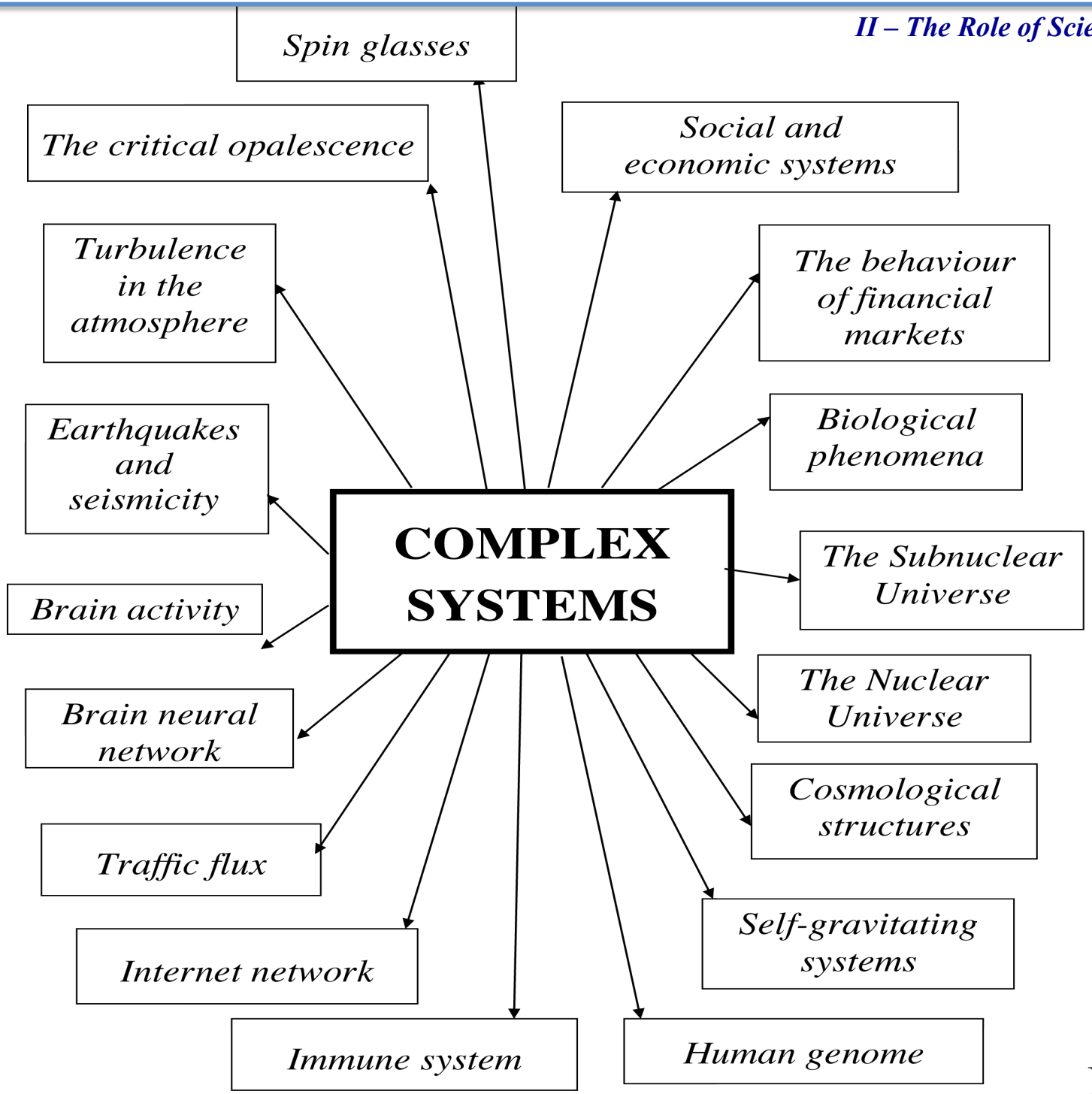

Spin glasses
The critical opalescence
Social and economic systems
Turbulence in the atmosphere
The behaviour of financial markets
Earthquakes and seismicity
Biological phenomena
COMPLEX SYSTEMS
The Subnuclear Universe
Brain activity
Brain neural network
The Nuclear Universe
Cosmological structures
Traffic flux
Self-gravitating systems
Internet network
Immune system
Human genome

**Figure 4**

We go from traffic flux, to the internet network, to earthquakes and seismicity, to social and economic systems, to the behaviour of financial markets, to the study of cosmological structures, and so on.

This is why 'Modern Culture' considers **'Complexity' a source of new insights** in **physics**, **biology**, **geology**, **cosmology**, **social sciences** and in **all intellectual activities** which look at the world through the lens of a standard analysis in terms of either **'Platonic Simplicity'** or **'Complexity'**.

This problem has its roots on what is the Motor for Progress. The scientific community, all over the world, was studying the (USA–USSR) Cold War and the prediction of the greatest minds in the world was in the 80's of last Century that the USSR Empire would have dominated the world for at least one Millennium: only in the fourth Millennium Freedom and Democracy could have been the result of the development of real communist regime like the Renaissance in our History teaches all of us. No one was able to predict the breaking into the History of Saint John Paul II.

Once in 1989 the
Berlin Wall
collapsed the problem of finding
the real Motor for Progress
started to be the central point.

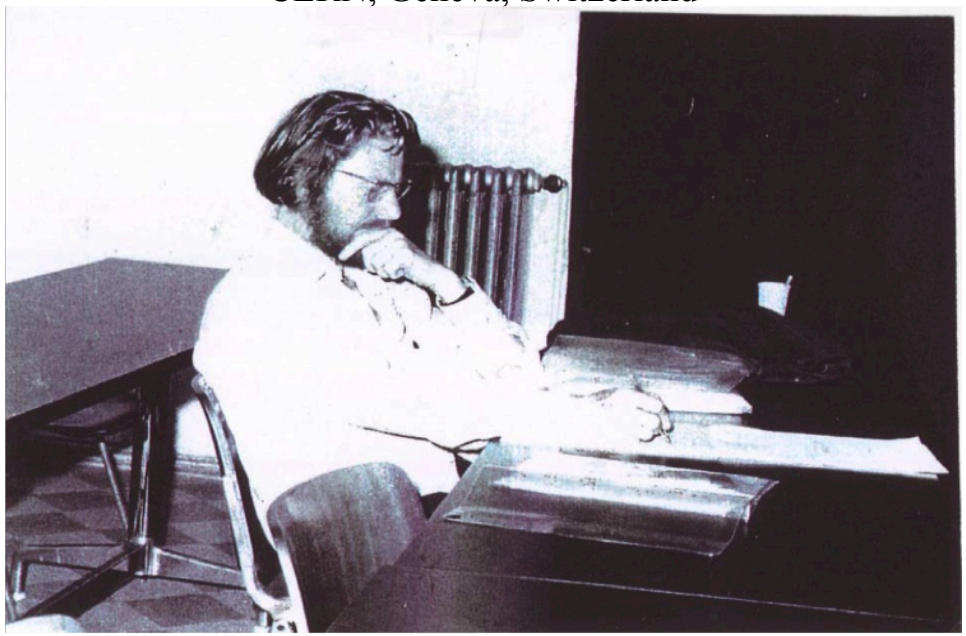
Let me quote an example dated on the year **2000** when in Vienna at the International Institute Erwin Schrödinger the problem of **new Projects** for **new Physics** was discussed and deeply analysed [4].

The conclusion was '**there is no new Physics without new Projects**'. New Projects are the source of totally unexpected discoveries [4] which are the source of new knowledge.

"QUANTUM [UN]SPEAKABLES"
*Commemoration of John S. Bell*
Universität Wien, 10-14 November 2000

# JOHN BELL AND THE TEN CHALLENGES OF SUBNUCLEAR PHYSICS

ANTONINO ZICHICHI
INFN and University of Bologna, Italy
CERN, Geneva, Switzerland



*John Stewart Bell in Erice*

*«There is no new Physics without new projects»*

*International Erwin Schrödinger Institut (ESI)*
*Wien – Friday, 10 November 2000*

John Bell
is the father of Bell's Inequality
which is the only rigorous answer
to the famous
Einstein-Podolsky-Rosen paradox
(EPR paradox).

In those years **Saint John Paul II** said (October 8th, 2000):

«*O Mother … we want to entrust the future that awaits us. Humanity can make this world a garden, or reduce it to a pile of rubble*».

# III – THE MOTOR FOR PROGRESS IS SCIENTIFIC DISCOVERY

# As said in Introduction the title of our Project is 3-fold:

- *The New Manhatan Project*
- *Science for Peace the World Over*
- *A Project for Mankind*

In order
to correctly interpret
this title
few words are needed
on the
Manhattan Project–1940.

In 1940 – nothing was known
on **Nuclear Physics**
and **Nuclear Technology**.
The only fact known was **Nuclear Fission**.
In less than 5 years,
from **nothing** came out the

- **Peace Technology** – Nuclear Reactor
- **War Technology** – Nuclear Weapons

[**Hiroshima**, *Uranium* and **Nagasaki**, *Plutonium*].

**The Manhattan Project** originated by the existence of **Hitler** and his project for a weapon million times more powerful than all other known weapons.

**The New Manhattan Project** [5] originates from the existence of the 'Cry of the Earth' with the **15 classes** of **Planetary Emergencies** [6].

If Science
would stop making
**discoveries**
our future generations
would have exactly
**our Technology.**

# **Recall**
# **the Human History**
# from
# **50,000 years up** to **1600 DC**
# all Technologies
# were based on
# **FIRE and WHEEL**.

But nobody was studying
the origin of ***Fire***
(which is the transformation of
**Mass→**into**→Energy**)
and of ***Wheel***
(which means reduction of
**friction**).
The only exception was
Archimedes.

# Archimedes is the author of the first *Gedankenexperiment* in the History of Mankind.

# The resurrection of **Archimedes** started with **Galileo Galilei** 1800 years later.

In the last 400 years we have followed Galilei's resurrection of Archimedes after 50,000 years of Intellectual Arrogance [7].

# Why

# ‘Intellectual Arrogance?’

In pre-Galilean thinking,
*for Atheists and believers alike, matter could not be a depository of fundamental truth.*

The Fathers of the Church were the first to say that Nature is a Book written by God. Galilei had the privilege of understanding that the characters of that Book had to be mathematical, and that it was not enough to reflect on the heavens and Stars.

It was necessary to ask humbly a question to the Fellow who created the world. This is still now the meaning of performing an experiment.

Four centuries of Galilean research work based on Reductionism, i.e. on the identification of the simplest elements in the study of Nature, has allowed us to get the greatest achievements of Science, i.e. the so called **Standard Model** and its extension (**SM&B**), illustrated in Figure 5.

# SM&B

## THE STANDARD MODEL AND BEYOND

① RGEs ($\alpha_i$ ($i \equiv 1, 2, 3$); $m_j$ ($j \equiv q, l, G, H$)) : $f(k^2)$.
- GUT ($\alpha_{GUT} \cong 1/24$) & GAP ($10^{16} - 10^{18}$) GeV.
- SUSY (to stabilize $m_F/m_P \cong 10^{-17}$).
- RQST (to quantize Gravity).

② Gauge Principle (hidden and expanded dimensions).
— How a Fundamental Force is generated: SU(3); SU(2); U(1) and Gravity.

③ The Physics of Imaginary Masses: SSB.
— The Imaginary Mass in SU(2)×U(1) produces masses ($m_{W^\pm}$; $m_{Z^0}$; $m_q$; $m_l$), including $m_\gamma = 0$.
— The Imaginary Mass in SU(5)⟹SU(3)×SU(2)×U(1) or in any higher (not containing U(1)) Symmetry Group ⟹ SU(3)×SU(2)×U(1) produces Monopoles.
— The Imaginary Mass in $SU(3)_c$ generates Confinement.

④ Flavour Mixings & CP ≠ , T ≠ .
— No need for it but it is there.

⑤ Anomalies & Instantons.
— Basic Features of all Non-Abelian Forces.

Note: $q$ ≡ quark and squark; $l$ ≡ lepton and slepton; G ≡ Gauge boson and Gaugino; H ≡ Higgs and Shiggs; RGEs ≡ Renormalization Group Equations; GUT ≡ Grand Unified Theory; SUSY ≡ Supersymmetry; RQST ≡ Relativistic Quantum String Theory; SSB ≡ Spontaneous Symmetry Breaking.
$m_F$ ≡ Fermi mass scale; $m_P$ ≡ Planck mass scale; $k$ ≡ quadrimomentum; C ≡ Charge Conjugation; P ≡ Parity; T ≡ Time Reversal; ≠ ≡ Breakdown of Symmetry Operators.

The five basic steps in our understanding of nature. ① The renormalization group equations (RGEs) imply that the gauge couplings ($\alpha_i$) and the masses ($m_j$) all run with $k^2$. It is this running which allows GUT, suggests SUSY and produces the need for a non point-like description (RQST) of physics processes, thus opening the way to quantize gravity. ② All forces originate in the same way: the gauge principle. ③ Imaginary masses play a central role in describing nature. ④ The mass-eigenstates are mixed when the Fermi forces come in. ⑤ The Abelian force QED has lost its role of being the guide for all fundamental forces. The non-Abelian gauge forces dominate and have features which are not present in QED.

**Figure 5**

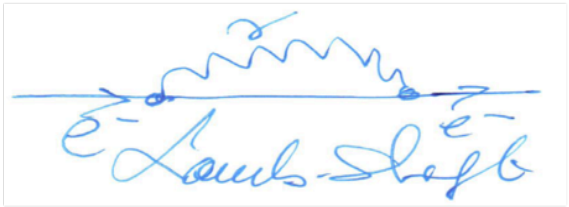
**The SM&B** [8] comes from the series of experimental discoveries which came from the discovery of

- '**Virtual Physics**' (Figure 6)
- the '**Nuclear Glue**' (Figure 7)

and the totally unexpected

- '**V-Particles**' (Figure 8).

# Virtual Physics



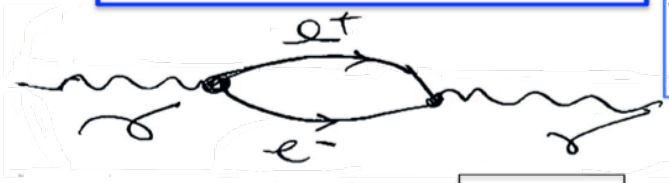
**1947**

+ 1000 MHZ
± 100 MHZ

*But Vacuum Polarization Effects had been discovered*

*Virtual Physics*

Recall
Victor F. Weisskopf
(≃ – 27 MHZ)



*(Blackett)* **1932**

↓

Radiative Effects

↓

*Scale Breaking in (DIS) ← (Scaling) → (No Quarks)*
*All Quantities run with $q^2$:*
Gauge Couplings [$\alpha_1(q^2)$, $\alpha_2(q^2)$, $\alpha_3(q^2)$] & Masses [the EGM effect]

↓

***Gauge Unification GAP and the EGM effect***

---

Note: MHZ ≡ $^{Mc}/_{sec}$.

**Figure 6**

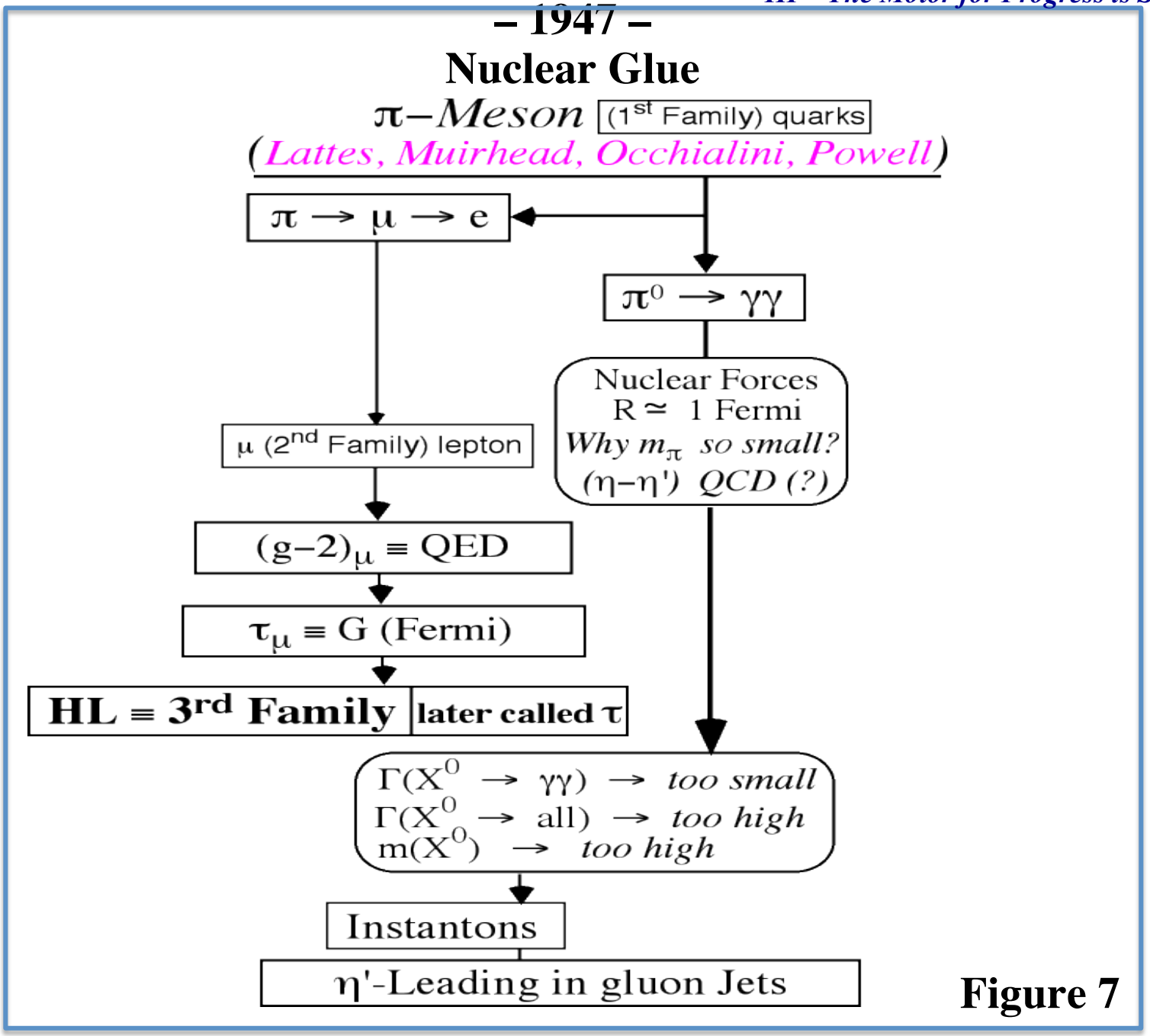

– 1947 –
Nuclear Glue
π–Meson (1st Family) quarks
(Lattes, Muirhead, Occhialini, Powell)
π → μ → e
π0 → γγ
Nuclear Forces
R ≃ 1 Fermi
Why mπ so small?
(η–η') QCD (?)
μ (2nd Family) lepton
(g–2)μ ≡ QED
τμ ≡ G (Fermi)
HL ≡ 3rd Family
later called τ
Γ(X0 → γγ) → too small
Γ(X0 → all) → too high
m(X0) → too high
Instantons
η'-Leading in gluon Jets

**Figure 7**

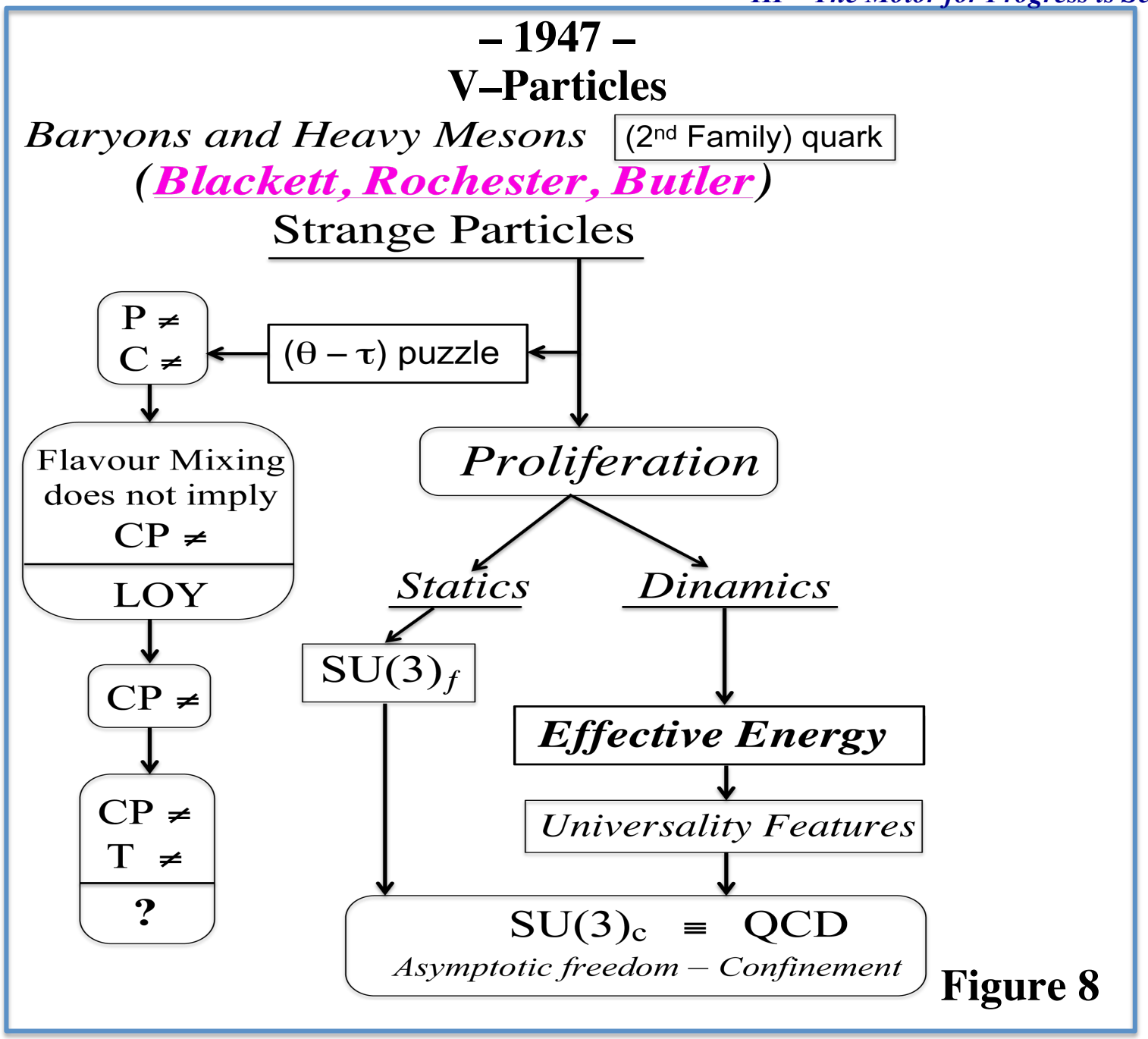

– 1947 –
V–Particles
Baryons and Heavy Mesons
(2nd Family) quark
(Blackett, Rochester, Butler)
Strange Particles
P ≠
C ≠
(θ – τ) puzzle
Flavour Mixing does not imply CP ≠
LOY
CP ≠
CP ≠
T ≠
?
Proliferation
Statics
Dinamics
SU(3)f
Effective Energy
Universality Features
SU(3)c ≡ QCD
Asymptotic freedom – Confinement

**Figure 8**

Our Technology is coming from the scientific discoveries which allowed us to reach the synthesis called the **SM&B**. And now the question is: what are the latest news from Science?

# IV – THE LATEST NEWS FROM SCIENCE

# The latest news from Science are

**$E_{Planck}$**

&

**Complexity** at the Fundamental Level

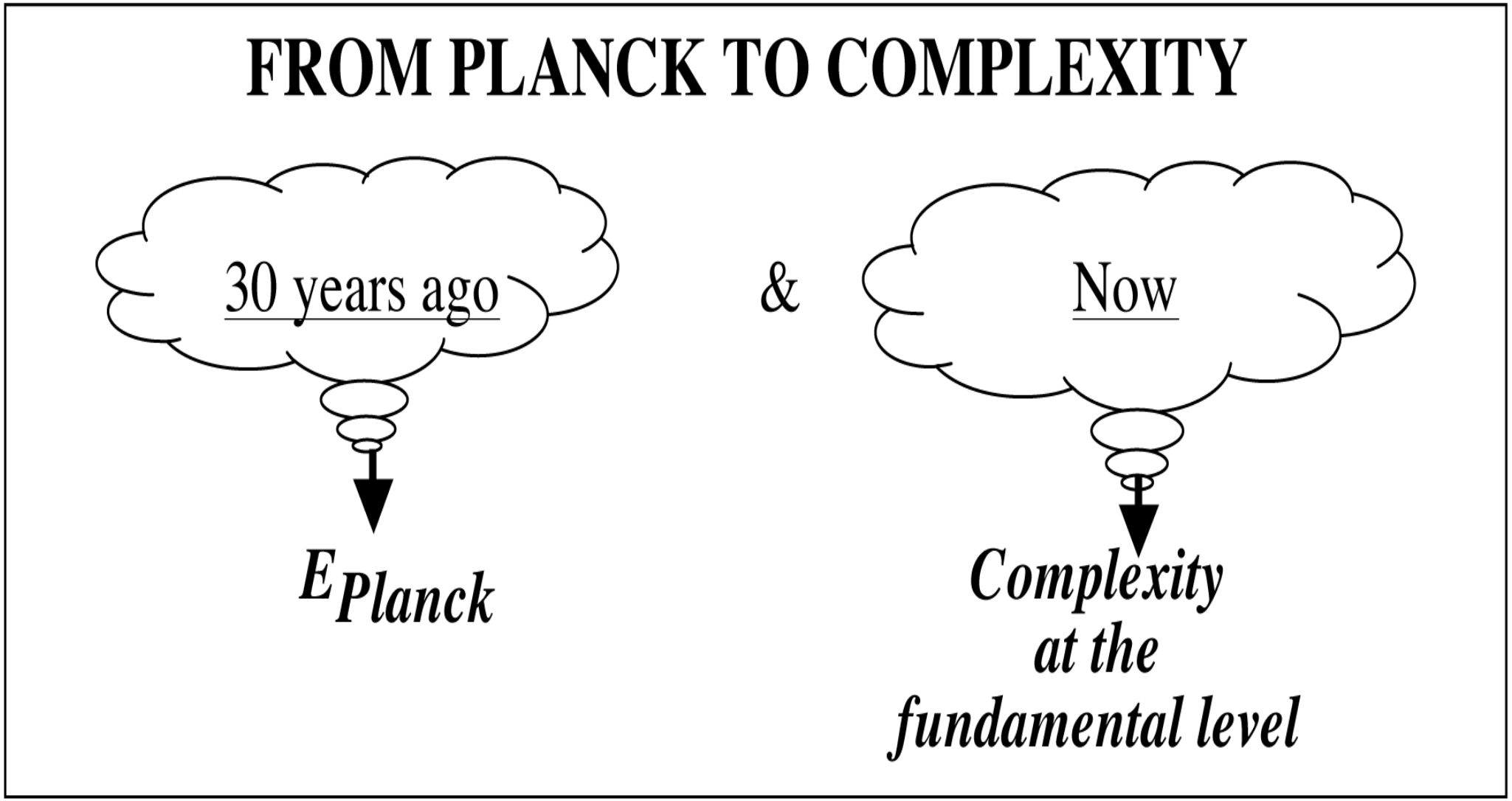

FROM PLANCK TO COMPLEXITY
30 years ago
&
Now
$E_{Planck}$
Complexity
at the
fundamental level

**Figure 9**

Thirty years ago a great scientific novelty came; all experimental discoveries obtained with our powerful accelerators (using protons and electrons) were to be considered only matters of extremely low energy.

The scale of energy on which to direct the attention to understand the Logic that rules the world, from the tiniest structures to the galactic ones, had to be shifted at a much higher level: to the mass-energy named after Planck, $E_{Planck}$ ($10^{19}$ GeV), something like seventeen powers of ten above the Fermi scale, $E_{Fermi}$ (300 GeV), that already seemed to be an extremely high level of energy.

And now

‘**Complexity at the fundamental level**’.

A recent study proves that
Complexity exists
at the fundamental level
of our knowledge:
i.e. Science.

A telegraphic proof follows.
Complexity is ill-defined.

There are very many definitions of Complexity: at least 70. We have selected **seven** definitions [9] and proveed that only **two** are the experimental evidences for the **existence** of Complexity.

These two experimental evidences are:

1) **AFB** (Anderson-Feynman-Beethoven-type) events
2) **UEEC** (Sarayevo-type) phenomena.

# Few words on AFB & UEEC

Why Beethoven? **Answer**:
Beethoven is able to do masterpieces of **Music**.
**But** he doesn't know the Laws of Acoustics.
Protons and neutrons are like Beethoven:
they make up regularities and properties which seem to establish the existence of a New Fundamental Law of Nature: Nuclear Physics.
Protons and neutrons behave as if **QCD** (Quantum Chromodynamics) was not there.
Without **QCD** Nuclear Physics could not exist and protons and neutrons could not exist.

# UEEC

We will see in Figure 11
that all scientific discoveries came as
totally unpredicted events.
If we compare the
lowest limit of Complexity (**Science**)
and the
highest limit of Complexity (**History**)
the result is that both these two extreme
limits are based on UEEC events.

The conclusion is that
**Complexity exists** from
the **minimum** limit
of Complexity (**Science**) to
the **maximum** asymptotic limit
of Complexity (**History**)
as illustrated in Figure 10.

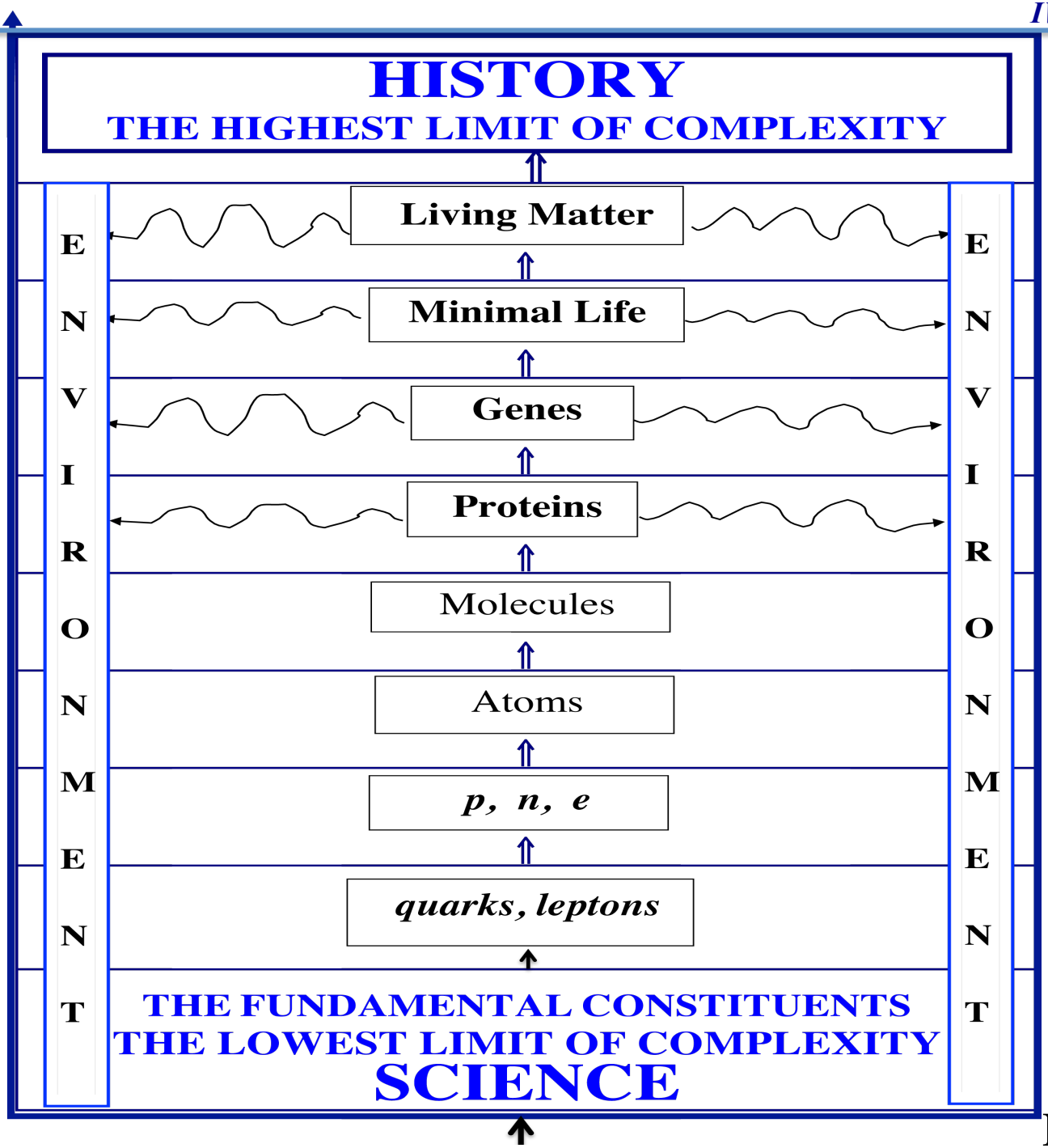

HISTORY
THE HIGHEST LIMIT OF COMPLEXITY
Living Matter
Minimal Life
Genes
Proteins
Molecules
Atoms
p, n, e
quarks, leptons
THE FUNDAMENTAL CONSTITUENTS
THE LOWEST LIMIT OF COMPLEXITY
SCIENCE
ENVIRONMENT
ENVIRONMENT

**Figure 10**

This result is based on the property, **probably the only one**, that ***Science*** and ***History*** share; i.e. **Evolution**.

- **Science** is the Evolution of our Basic Understanding of the laws governing the world in its Structure ≡ **EBUS**.
- **History** is the Evolution of the World in its Real Life ≡ **EWRL**.

In Figure 11 we compare these two asymptotic limits of Complexity – History and Science – on the basis of ‘What if?’; a condition elaborated by the Historians in what is now known as ‘virtual history’.

On the basis of ‘What if?’ these specialists conclude that the world would not be as it is, if one, or few, or any number of ‘What if?’ had not been as History tells us. This is not the case for Science.

The world would have exactly the same laws and regularities, whether Galileo Galilei or somebody else had discovered

$$F = mg$$

(F ≡ force; m ≡ mass;

g ≡ acceleration due to gravity),

and so on for all the other scientific discoveries.

It is in the consequences of ‘What if?’ that the two asymptotic limits of Simplicity and Complexity seem to diverge, despite the fact that the sequence of ‘What if?’ in Science belongs to the ‘totally unexpected events’ (UEEC) exactly like the others listed in the column of History. In Figure 11 there are fourteen examples of UEEC in History and in Science.

# 'WHAT IF' IN HISTORY AND IN SCIENCE

| | In History ≡ EWRL | | In Science ≡ EBUS |
|---|---|---|---|
| *I* | What if Julius Caesar had been assassinated many years before? | *I* | What if Galileo Galilei had not discovered that $F = mg$ ? |
| *II* | What if Charles VII had not been able to win the 100 years war? | *II* | What if Newton had not discovered that $F = G\frac{m_1 \cdot m_2}{R_{12}^2}$ ? |
| *III* | What if America had been discovered a few centuries later? | *III* | What if Maxwell had not discovered the unification of electricity, magnetism and optical phenomena, which allowed him to conclude that light is a vibration of the EM field? |
| *IV* | What if Napoleon had not been born? | *IV* | What if Becquerel had not discovered radioactivity? |
| *V* | What if Louis XVI had been able to win against the 'Storming of the Bastille'? | *V* | What if Planck had not discovered that $h \neq 0$ ? |
| *VI* | What if the 1908 Tunguska Comet had fallen somewhere in Europe instead of Tunguska in Siberia? | *VI* | What if Lorentz had not discovered that space and time cannot both be real? |
| *VII* | What if the killer of the Austrian Archduke Franz Ferdinand had been arrested the day before the Sarajevo event? | *VII* | What if Einstein had not discovered the existence of time-like and space-like real worlds? Only in the time-like world, simultaneity does not change, with changing observer. |
| *VIII* | What if Lenin had been killed during his travelling through Germany? | *VIII* | What if Rutherford had not discovered the nucleus? |
| *IX* | What if Hitler had not been appointed Chancellor by the President of the Republic of Weimar Paul von Hindenburg? | *IX* | What if Hess had not discovered cosmic rays? |
| *X* | What if Pyotr Kapitza accepted to be the leader of the USSR H-bomb Project as wanted by Stalin? | *X* | What if Dirac had not discovered his equation, which opens new horizons, including the existence of the antiworld? |
| *XI* | What if Nazi Germany had defeated the Soviet Union? | *XI* | What if Fermi had not discovered weak forces? |
| *XII* | What if Karol Wojtyla had not been elected Pope, thus becoming John Paul II? | *XII* | What if Fermi and Dirac had not discovered the Fermi–Dirac statistics? |
| *XIII* | What if Gorbachev had not been defeated by Yeltsin? | *XIII* | What if Yukawa had not proposed the existence of a "meson" in order to have the nuclear glue? |
| *XIV* | What if the USSR had not collapsed? | *XIV* | What if the 'strange particles' had not been discovered in the Blackett Lab? |

**Figure 11**

# V – THE WHOLE OF OUR KNOWLEDGE

History and Science bring us to consider the Whole of Our Knowledge, illustrated in Figure 12, where the Superworld represent the frontier of Galilean Science. In Figure 12A there is a synthesis of that the Superworld need in terms of fundamental concepts.

First question: can the synthesis reported in Figure 12 be deduced from Chaos? Is there somebody who is able to achieve this result? The answer is no.

Let us restrict the problem of Chaos to the synthesis reported in Figure 12A. The answer is again no.

There is a number in Figure 12 which is the ratio of the action of the Universe divided by the action of Planck. This number is

$$\simeq 10^{124}$$

and represent the amount of knowledge which can exist in our Universe.

No matter what we want to elaborate with our brain; for this we need at least the amount of action with is the Planck constant, i.e. *h*.

When people speak of ‘Intelligence’ they forget that no matter what this ‘Intelligence’ can do, even if done by computers a minimum of action which cannot be smaller than *h* is needed.

Conclusion: our mathematical model of the brain cannot be based on a system of electronic circuits. This model would have a probability for a new original idea too high with respect to experimental evidence.

No model can explain how it happens that all fundamental scientific discoveries came as totally unpredicted events (UEEC) as synthesized in Figure 11. A description of Figure 12 is in Appendix 2.

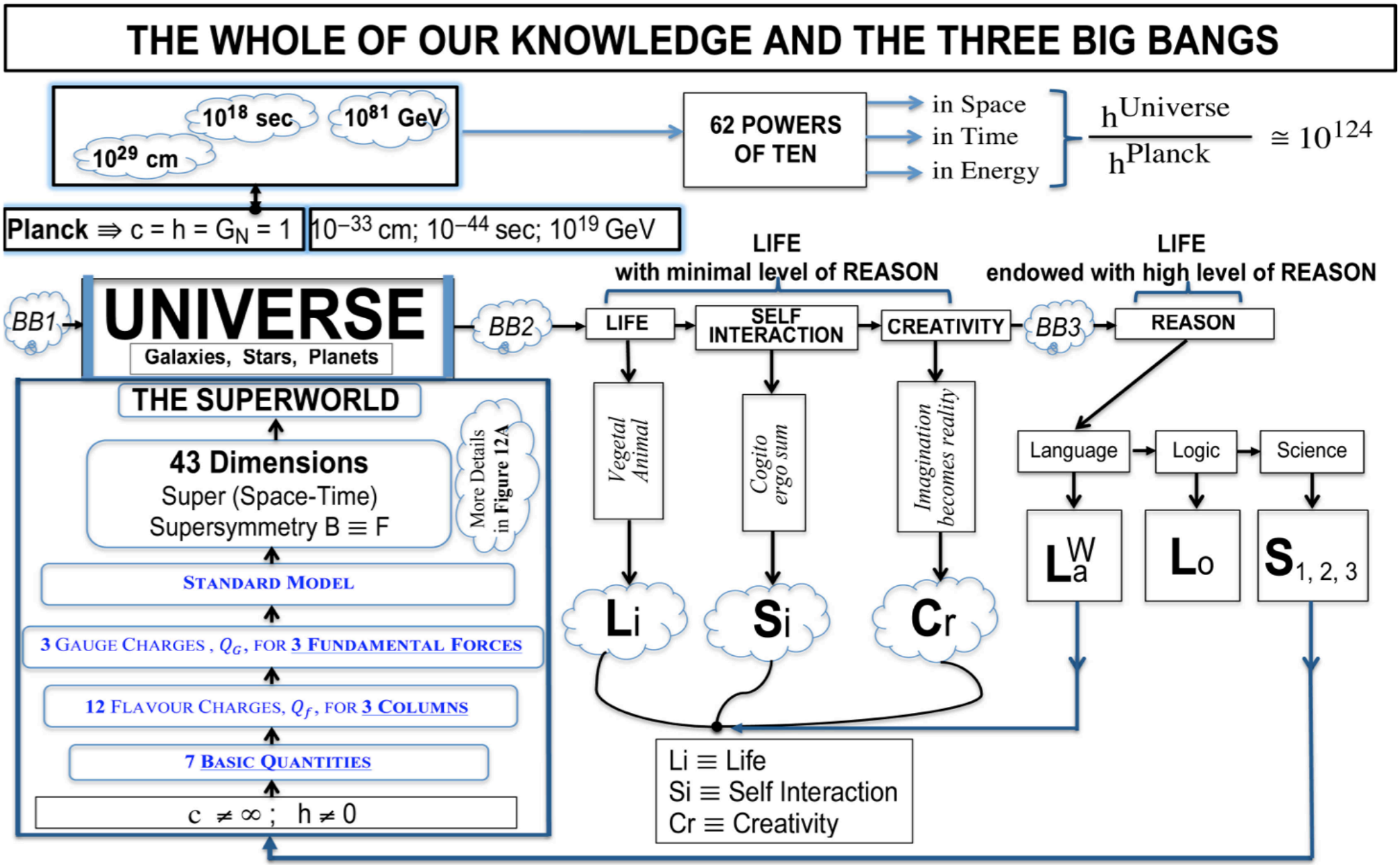

THE WHOLE OF OUR KNOWLEDGE AND THE THREE BIG BANGS
10^18 sec
10^81 GeV
10^29 cm
62 POWERS OF TEN
in Space
in Time
in Energy
h^Universe / h^Planck ≅ 10^124
Planck ⇒ c = h = G_N = 1
10^−33 cm; 10^−44 sec; 10^19 GeV
LIFE with minimal level of REASON
LIFE endowed with high level of REASON
BB1
UNIVERSE
Galaxies, Stars, Planets
BB2
LIFE
SELF INTERACTION
CREATIVITY
BB3
REASON
THE SUPERWORLD
43 Dimensions
Super (Space-Time)
Supersymmetry B ≡ F
More Details in Figure 12A
STANDARD MODEL
3 GAUGE CHARGES , Q_G, FOR 3 FUNDAMENTAL FORCES
12 FLAVOUR CHARGES, Q_f, FOR 3 COLUMNS
7 BASIC QUANTITIES
c ≠ ∞ ; h ≠ 0
Vegetal Animal
Cogito ergo sum
Imagination becomes reality
Language
Logic
Science
Li
Si
Cr
L_a^W
L_o
S_1, 2, 3
Li ≡ Life
Si ≡ Self Interaction
Cr ≡ Creativity

**Figure 12**

# THE SUPERWORLD

$(9 + 1 + 1) \equiv 11 \equiv B\ ;\ 32 \equiv F$

Space · Coupling · Time · Bosonic Dimensions · Fermionic Dimensions

$43 = \text{Dim}$

Total numbers of Dimensions

## THE THREE FUNDAMENTAL FORCES

| $F_{EW}$ | $F_{QCD}$ | $F_G$ |
|---|---|---|
| Electroweak: The force acting between quarks & leptons | Quantum ChromoDynamics: The force acting between quarks & gluons | The Gravitational Force |

THREE GAUGE CHARGES, $Q_G$, FOR THE THREE FUNDAMENTAL FORCES

## THREE COLUMNS OF LEPTONS AND QUARKS WITH TWELVE FLAVOUR CHARGES $Q_f$

$\begin{pmatrix} \nu_e \\ e^- \end{pmatrix}$ ; $\begin{pmatrix} \nu_\mu \\ \mu^- \end{pmatrix}$ ; $\begin{pmatrix} \nu_{HL} \\ HL^- \end{pmatrix}$ 1967

$\tau^-$ 1975

$\begin{pmatrix} u \\ d \end{pmatrix}$ ; $\begin{pmatrix} c \\ s \end{pmatrix}$ ; $\begin{pmatrix} t \\ b \end{pmatrix}$

TWELVE $Q_f$ FOR THE THREE COLUMNS

s ; t ; m ; E ; $\vec{\sigma}$ ; $Q_G$ *"Subnuclear Colour" Charges* ; $Q_f$ *"Subnuclear Flavour" Charges*

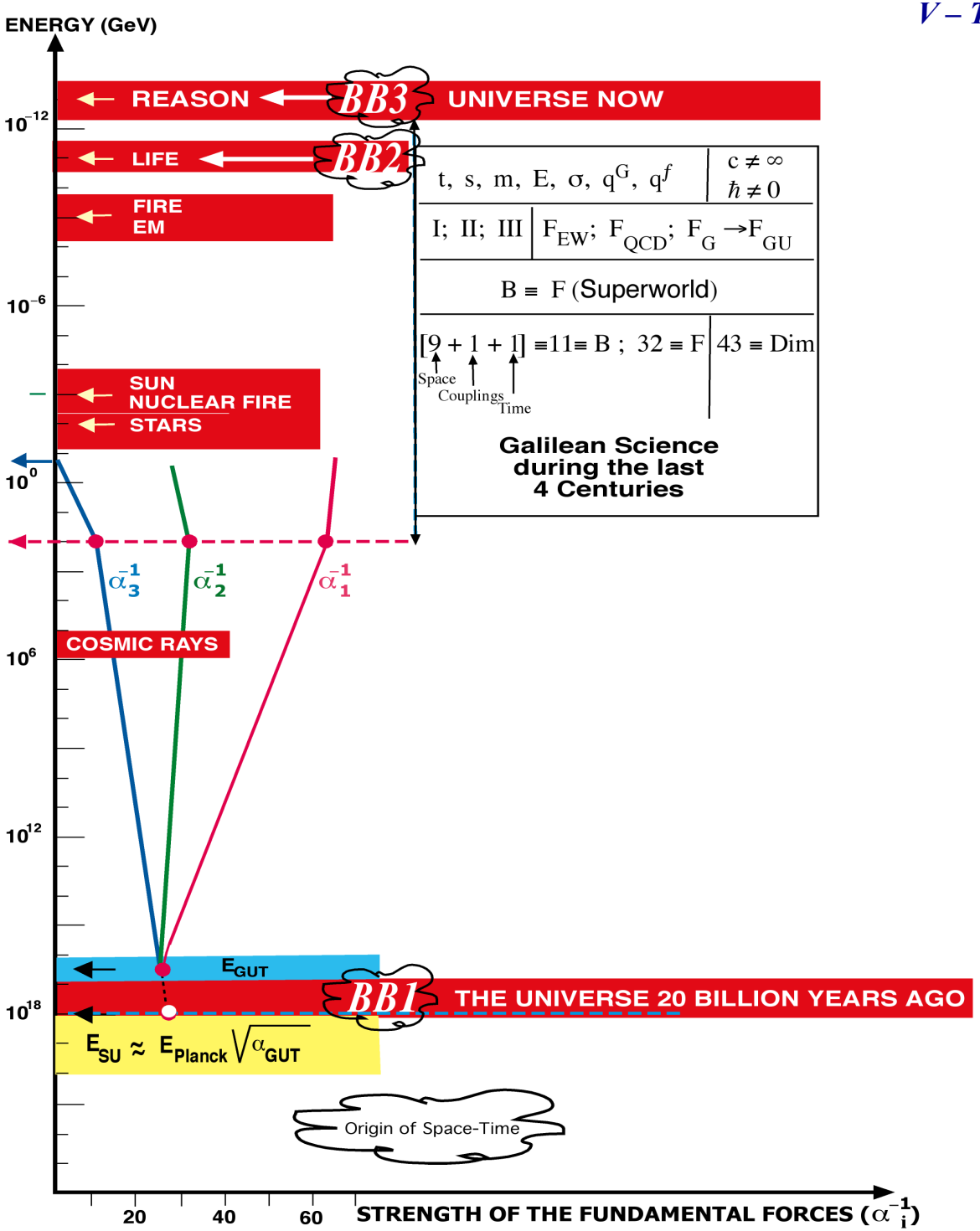
Space · Time · Mass · Energy · Spin · *(generating the Fundamental Forces)* · *(responsible for the stability of Matter).*

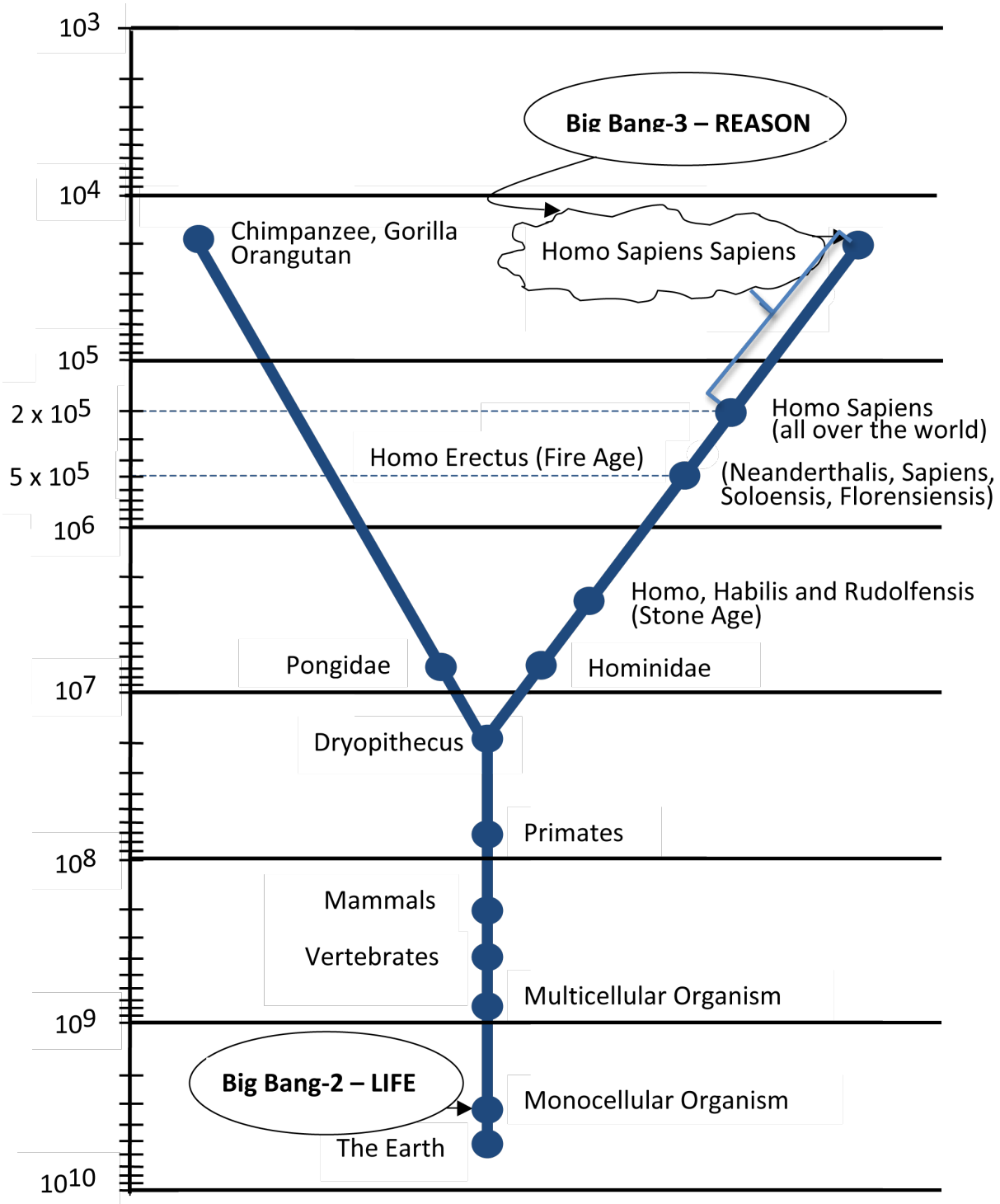
SEVEN BASIC QUANTITIES

$c \neq \infty\ ;\ h \neq 0$

**Figure 12A**

From the
**Whole of Our Knowledge**
it is born the Project:
**Science for Peace**
**the World Over**.

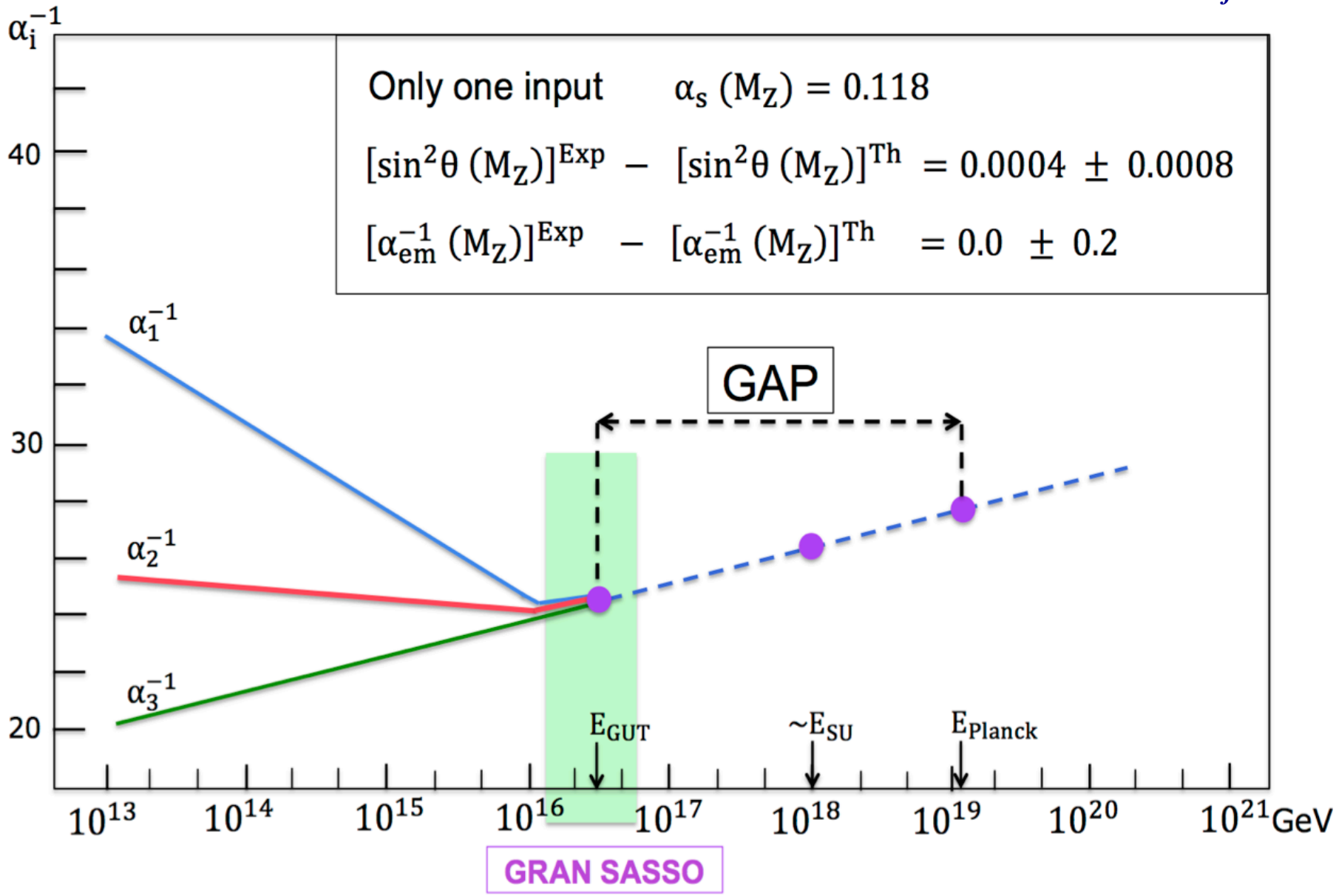

ENERGY (GeV)
REASON
BB3
UNIVERSE NOW
LIFE
BB2
FIRE
EM
SUN
NUCLEAR FIRE
STARS
t, s, m, E, σ, q^G, q^f
c ≠ ∞
ħ ≠ 0
I; II; III
F_EW; F_QCD; F_G →F_GU
B ≡ F (Superworld)
[9 + 1 + 1] ≡11≡ B ; 32 ≡ F
43 ≡ Dim
Space
Couplings
Time
Galilean Science during the last 4 Centuries
α⁻¹3
α⁻¹2
α⁻¹1
COSMIC RAYS
E_GUT
BB1
THE UNIVERSE 20 BILLION YEARS AGO
E_SU ≈ E_Planck √α_GUT
Origin of Space-Time
STRENGTH OF THE FUNDAMENTAL FORCES (α⁻¹i)


$10^3$
Big Bang-3 – REASON
$10^4$
Chimpanzee, Gorilla
Orangutan
Homo Sapiens Sapiens
$10^5$
$2 \times 10^5$
Homo Sapiens
(all over the world)
Homo Erectus (Fire Age)
$5 \times 10^5$
(Neanderthalis, Sapiens,
Soloensis, Florensiensis)
$10^6$
Homo, Habilis and Rudolfensis
(Stone Age)
Pongidae
Hominidae
$10^7$
Dryopithecus
Primates
$10^8$
Mammals
Vertebrates
Multicellular Organism
$10^9$
Big Bang-2 – LIFE
Monocellular Organism
The Earth
$10^{10}$

# Big Bang n. 1

All Fundamental Forces
start at **once**? **Altogether**?

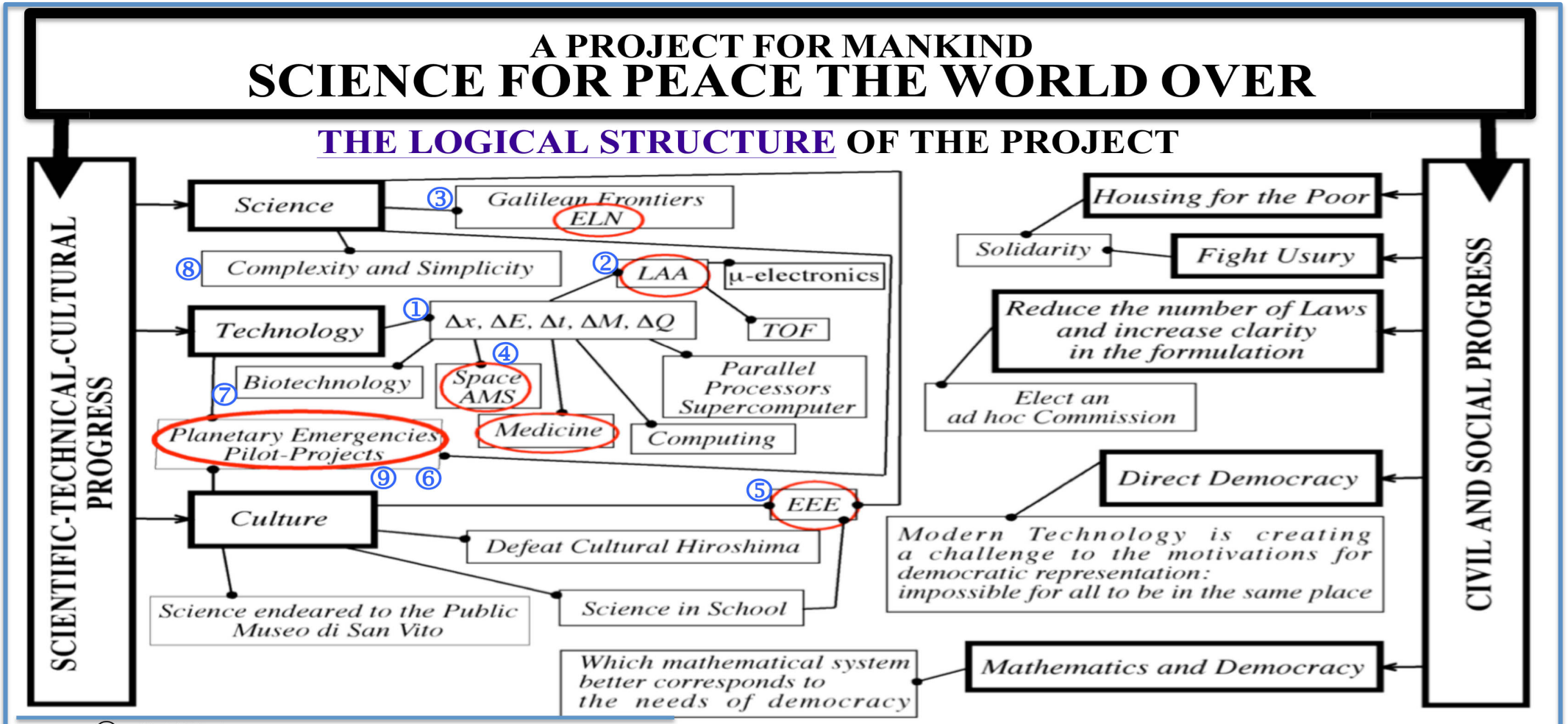
**The GAP** and its consequences:
1st starts the
**Gravitational Forces**
and later
**QED + QFD + QCD**




The GAP between the Planck Energy, $E_{Planck}$ , and the two energy levels, $E_{GUT}$ , where the three gauge couplings converge and $E_{SU}$, the energy where the RQST (Relativistic Quantum String Theory) puts the origin of the Gravitational Forces. The Gran Sasso is the biggest underground Lab to study neutrinos and cosmic energies of extremely high values.

# VI – THE LOGIC OF 'SCIENCE FOR PEACE THE WORLD OVER'. 'THE PROJECT FOR MANKIND'

The '**Project for Mankind**' illustrated in Figure 13 consists of two scientific-technological components and one component that is exclusively cultural. Total three components: Science, Technology and Culture. Each of these three components is characterized by great timeliness.




① CERN APPROACH
② LAA (NEW TECHNOLOGIES FOR SPACE, TIME, ENERGY AND MASS)
③ ELN (300 KM: $10^6$ GEV = $10^3$ TEV = 1 PEV)
④ AMS (ALPHA MAGNETIC SPECTROMETER)
⑤ EEE (EXTREME ENERGY EVENTS – SCIENCE IN SCHOOLS)
⑥ PLANETARY EMERGENCIES (PILOT-PROJECTS)
⑦ MEDICAL PHYSICS
⑧ COMPLEXITY AT THE FUNDAMENTAL LEVEL
⑨ THE INTERNATIONAL AND NATIONAL SCHOLARSHIP PROJECT

**Figure 13**

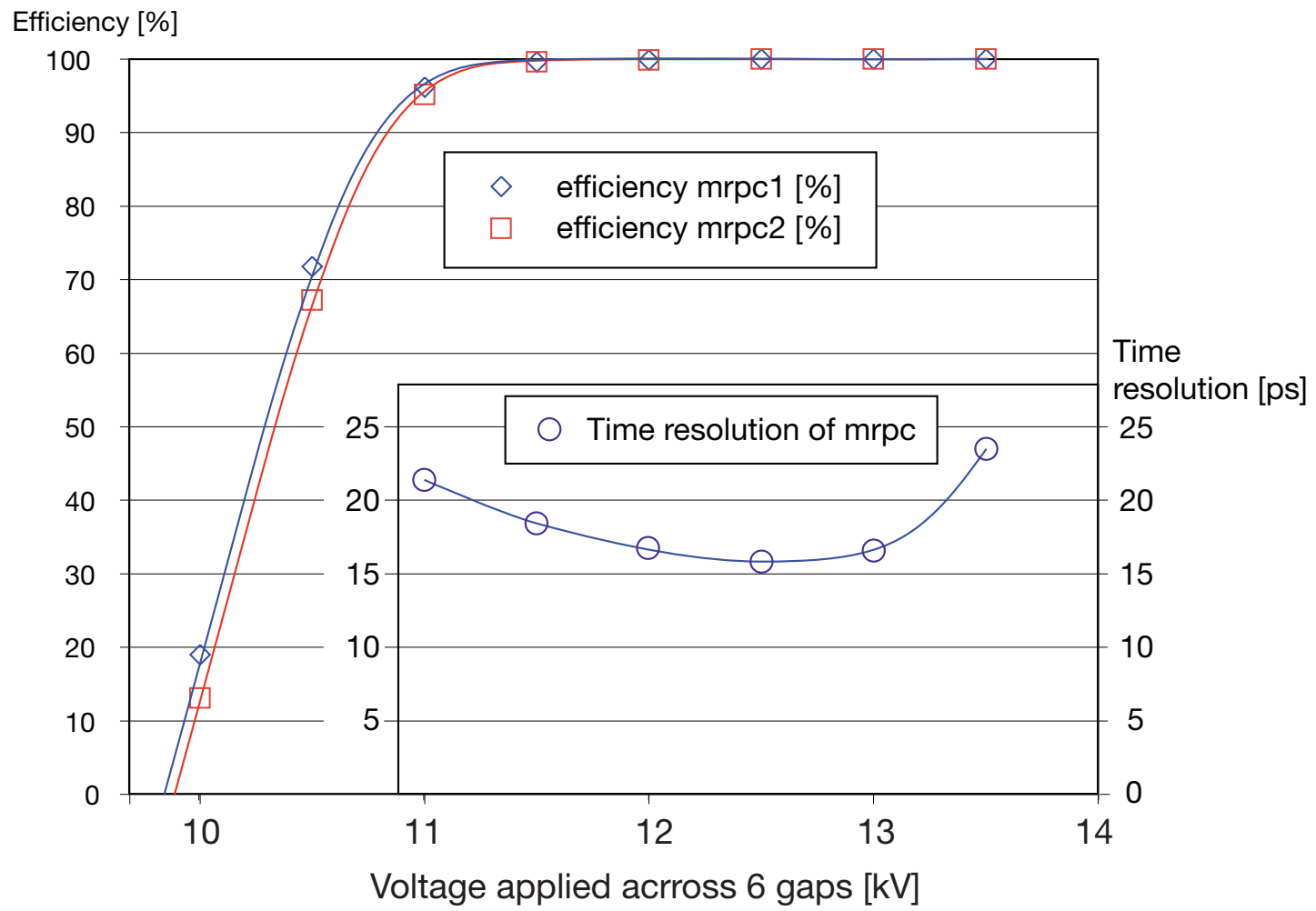
- **Science**. **The first component** concerns the most advanced frontier of Modern Physics - its goal is to realize the most powerful proton accelerator in the world, ELN: Eloisatron (**E**uroasiatic **L**ong **I**ntersecting **S**torage **A**ccelerator). The machine consists of two rings, each of which is 300 km long and intersects with the other so as to enable interactions between protons at the maximum energies imaginable today with the most advanced subnuclear techniques.

- **Technology**. **The second component** involves a series of technological studies whose goal is to invent the most powerful instruments for measuring, with precisions never reached before, the fundamental quantities on which any set of physics variables is based, such as: space, time, quantity of motion, energy and charge (this is the LAA Project).

In this Project there is a pilot-project for the Time Of Flight (TOF) of Subnuclear particles which now holds the **world record** for accuracy:

**15 picoseconds**

(one picosecond corresponds to one thousandth of a billionth of a second).




Efficiency and time resolution of two 24 gap MRPC tested in a 5 GeV/c pion beam.

# If our brain could work at 1psec instead of 1 sec, we could elaborate in one of our seconds all that Human brain elaborates during 30 thousands years.

Our capacity to measure these fundamental variables of physics keeps improving through the invention of new technologies, at the heart of which are born new instruments capable of promoting progress in the most advanced sectors of application. This is why the technological component of the Project has diversified into many sectors of modern technology, sectors ranging from **medical**, **biomedical**, and **genetic engineering** research to the conquest of **Space**, to the tools necessary in **everyday life**, like **computers**, **supercomputers** and **information networks** like Internet and GRID.

- **Culture**. **The third component**. There is an additional component that includes the preceding ones but that is purely cultural in nature, in the sense that its role is to communicate the practical value of the results obtained in the projects on **Science**, **Technology** and **Planetary Emergencies** to **everybody**. Planetary Emergencies have a strong cultural component since the 72 Planetary Emergencies are relevant to our everyday life. To study these problems will enable us to give Governments the only way to resolve them despite they often appear deprived of short-term and even long-term solutions.

**Some interesting details**.

To set out to confront and resolve the types of problems cited in the Three Components – Science, Technology, Culture – might **appear utopian**.

This is mistaken, however, because the Three Components already have **roots in years of research** carried out with the intent of creating the foundation on which to base an institution like 'A Project for Mankind'.

The three Components of the Project were elaborated by an international scientific community that identifies itself with the ideals of the WFS (World Federation of Scientists, born during the times of the Cold War), such as a Science without secrets and without borders, as we have stated many times. More informations are given in Appendix 4, where the roots of the New Manhattan Project are reported.

# VII – STATUS OF THE PROJECT

# SUMMARY OF PROJECTS

# 8 ONGOING PROJECTS

| | |
|---|---|
| **ONGOING PROJECT–1** | Managing Large Projects that Depend on New Technology: The CERN Approach |
| **ONGOING PROJECT–2** | The LAA Project |
| **ONGOING PROJECT–3** | The ELOISATRON Project |
| **ONGOING PROJECT–4** | The International and National Scholarships Project |
| **ONGOING PROJECT–5** | Extreme Energy Events |
| **ONGOING PROJECT–6** | The Polish Scientific Strategy on Climate |
| **ONGOING PROJECT–7** | Precise Timing for Medical Physics (TOF world record) |
| **ONGOING PROJECT–8** | Complexity at the Fundamental Level |

# 15 PROJECTS
## ready to start

| | |
|---|---|
| **PROJECT–9** | Control Planetary Emergencies Using the Science of Complex Networks |
| **PROJECT–10** | Nuclear Safety Centre: A Priority for the New Manhattan Project |
| **PROJECT–11** | Novel Technology for Nuclear Safeguards, Security and Nonproliferation |
| **PROJECT–12** | Development, Analysis and Evaluation of Cyber Resilience Strategies |
| **PROJECT–13** | Countering Terrorism Threats in Smart Cities: A concept Demonstration Using Unmanned Aircraft System (UAS) to Protect Critical Infrastructure |

**PROJECT–14** Organizating Earth Defense: An International Conference to make First Operative Steps

**PROJECT–15** Epidemiological and Laboratory Findings on Metabolic and Neurobehavioral Disorders due to Fetal and Infant Exposure to Hormonal Disruptors: Hypotheses Generation and Evaluation

**PROJECT–16** Global Emergency of Premature and Low Birth Weight Infant Mortality: KMC Strategy as a Solution?

**PROJECT–17** Biomonitoring: Exposure to Chemicals and Cancer Development. Investigations in '*Terra dei Fuochi*'

| | |
|---|---|
| **PROJECT–18** | Research on Oncogenic and Emerging/re-Emerging Infectious Diseases |
| **PROJECT–19** | Neurodegeneration and Dementia: The Research Centre in The New Manhattan Project |
| **PROJECT–20** | Circular Economy Patterns and the Bio-economy: General Principles and Specific Applications in Organic Waste Treatment |
| **PROJECT–21** | Risk Evaluation for Agricultural Chemicals of Emerging Concern on food Safety and Human Health |
| **PROJECT–22** | The Great Green Wall |
| **PROJECT–23** | World Water Crisis Centre Proposal: The GRACE Satellite |

# 9 PRELIMINARY PROJECTS

| | |
|---|---|
| **PRELIMINARY PROJECT–24** | The Erice Water Crisis Centre to influence and reduce water crises around the world |
| **PRELIMINARY PROJECT–25** | The Cyber World in 2030 |
| **PRELIMINARY PROJECT–26** | The Normative Challenges of Cyber Security: Prerequisites of a Universal Secure Cyber Space |
| **PRELIMINARY PROJECT–27** | Young People's Radicalization and Terrorism |

| | |
|---|---|
| **PRELIMINARY PROJECT–28** | The Institution of an Advanced School for Human and Social Medicine |
| **PRELIMINARY PROJECT–29** | The Welfare in an Aging Society |
| **PRELIMINARY PROJECT–30** | Linking Knowledge to Action: Building a Support Network for Safe Drinking Water and Sanitation |
| **PRELIMINARY PROJECT–31** | Interdisciplinary Research Centre of Excellence for Children Welfare |
| **PRELIMINARY PROJECT–32** | Sustainability and Scientific Culture: A Challenge for the Future |

# VIII – OVERVIEW OF THE 72 PLANETARY EMERGENCIES

# THE 15 SOURCES OF THE 72 PLANETARY EMERGENCIES

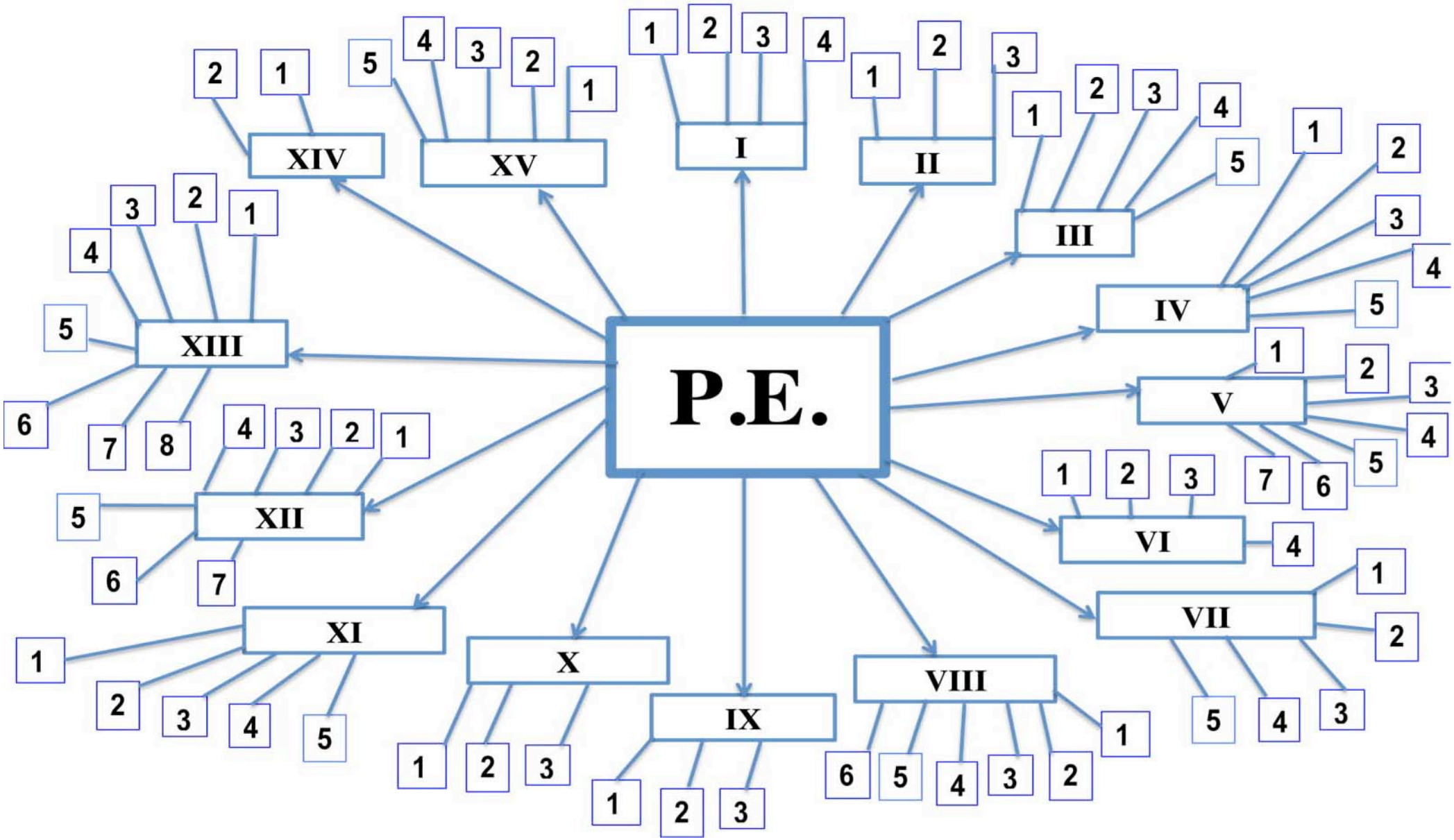



**Figure 14**

# OVERVIEW OF THE 72 PLANETARY EMERGENCIES GROUPED INTO 15 CLASSES

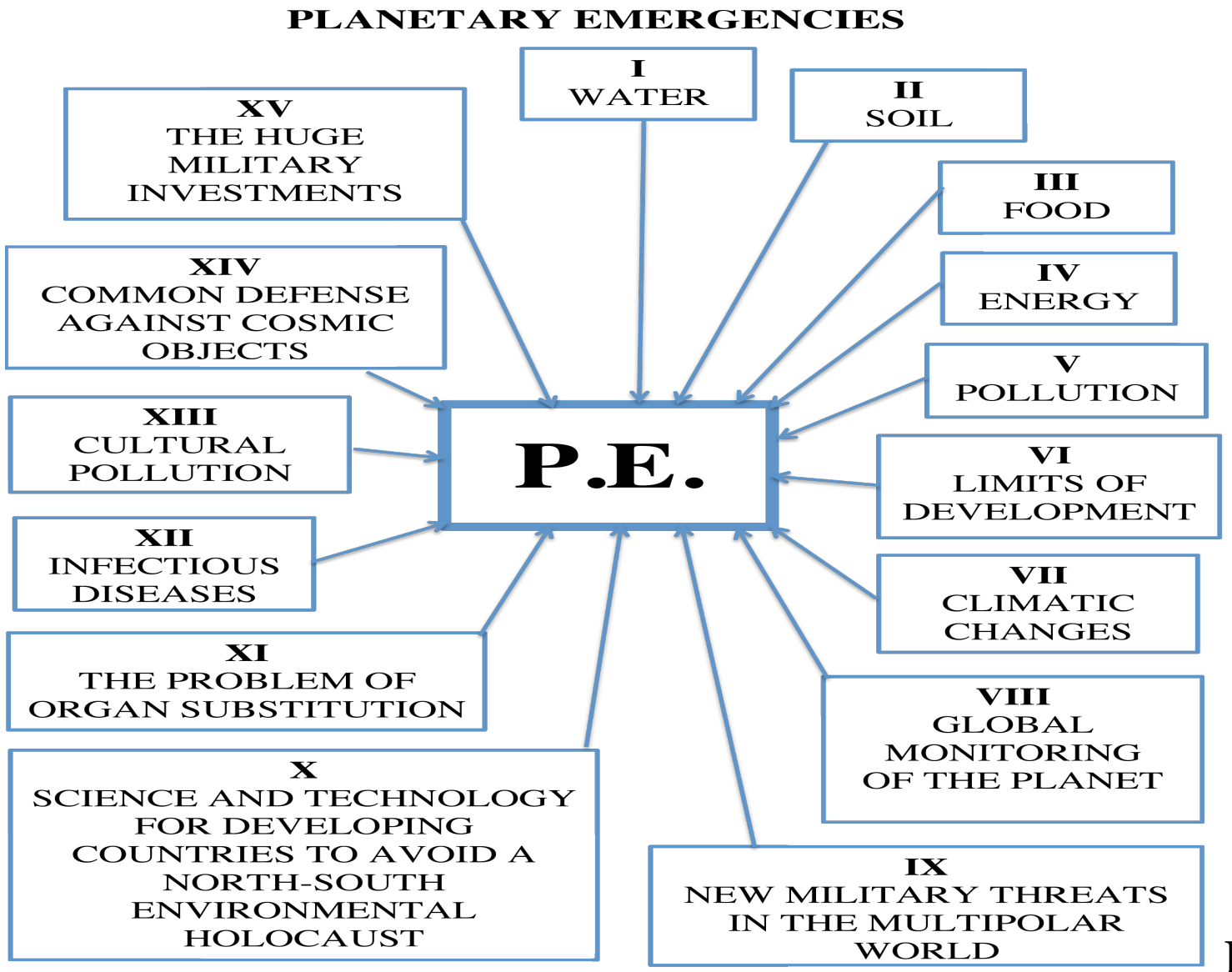



**Figure 15**

| **THE 72 PLANETARY EMERGENCIES**<br>IDENTIFIED BY THE ERICE SCIENTISTS<br>AND CLASSIFIED INTO 15 BASIC SOURCES | | NUMBER<br>OF SOURCES |
|---|---|---|
| I | *WATER* | 4 |
| II | *SOIL* | 3 |
| III | *FOOD* | 5 |
| IV | *ENERGY* | 5 |
| V | *POLLUTION* | 7 |
| VI | *LIMITS OF DEVELOPMENT* | 4 |
| VII | *CLIMATIC CHANGES* | 5 |
| VIII | *GLOBAL MONITORING OF THE PLANET* | 6 |
| IX | *NEW MILITARY THREATS IN THE MULTIPOLAR WORLD* | 3 |
| X | *SCIENCE AND TECHNOLOGY FOR DEVELOPING COUNTRIES TO AVOID A NORTH-SOUTH ENVIRONMENTAL HOLOCAUST* | 3 |
| XI | *THE PROBLEM OF ORGAN SUBSTITUTION* | 5 |
| XII | *MEDICINE, INFECTIOUS AND OTHER DISEASES* | 7 |
| XIII | *CULTURAL POLLUTION* | 8 |
| XIV | *INFORMATION SECURITY AND COMMON DEFENSE AGAINST COSMIC OBJECTS* | 2 |
| XV | *THE HUGE MILITARY INVESTMENTS* | 5 |
| | **Total** | **72** |

**I** *Total: 4*

# WATER

① PROTECTION OF NATURAL RESOURCES

② SEARCH FOR NEW SOURCES

③ DESALINIZATION

④ SAVINGS

**II** *Total: 3*

# SOIL

① PROTECTION AGAINST POLLUTANTS

② DEFENCE FROM CATASTROPHIC EVENTS

③ DROUGHT AND DESERTIFICATION

# III *Total: 5*

# FOOD

- PRODUCTION
  - ① CLASSICAL AGRICULTURE
  - ② MARINE AGRICULTURE
- ③ PROCESSING
- ④ STORAGE
- ⑤ NEEDS & WASTE

# IV *Total: 5*

## ENERGY

- PRODUCTION
  - ① CHEMICAL
  - ② NUCLEAR
    - FUSION (Future)
    - FISSION
      (Now) Waste Transformation Accelerator Driven Reactors (I.S.)*
      *I.S. = Intrinsically Safe
- ③ RENEWABLE
- ④ DISTRIBUTION
- ⑤ INCREASED EFFICIENCY & SAVINGS

# V

*Total: 7*

# POLLUTION

## GLOBAL

① THE $CO_2$ PROBLEM

② GREENHOUSE EFFECT

③ OZONE DEPLETION

④ ACID RAIN

## LOCAL

⑤ OIL AND CHEMICAL SPILLS

⑥ URBAN AND DOMESTIC

⑦ INDUSTRY

**VI** *Total: 4*

# LIMITS OF DEVELOPMENT

① DEMOGRAPHIC GROWTH

② THE MEGA METROPOLISES AND THE COLLAPSE OF ALL VALUES

③ WATER, SOIL, FOOD, ENERGY

④ UNEMPLOYMENT

VII *Total: 5*

# CLIMATIC CHANGES

THE 1ST LEVEL SCIENTIFIC PROBLEMS

① THE MATHEMATICS NEEDED TO SIMULATE THE METEOROLOGICAL MOTOR

② THE EXPERIMENTAL DATA NEEDED IN ORDER TO CHECK THE VALIDITY OF THE PREDICTIONS

THE 2ND LEVEL SCIENTIFIC PROBLEMS (GLOBAL EFFECTS)

③ THE PROBLEM OF UNDERSTANDING THE ORIGIN OF CLOUDS

④ THE EFFECTIVE CONSEQUENCES OF COSMIC RAYS

⑤ THE PROBLEMS OF NOW-CASTING, MEDIUM-RANGE AND GALACTIC-RANGE

VIII *Total: 6*

# GLOBAL MONITORING OF THE PLANET

① POLLUTION MONITORING

② ATMOSPHERIC MONITORING

③ DEFENCE AGAINST FLOODS AND OTHER UNEXPECTED EXTREME EVENTS

④ EARTHQUAKES

⑤ VOLCANOES & CALDERA

⑥ DEFENCE AGAINST COSMIC OBJECTS

IX *Total: 3*

# NEW MILITARY THREATS IN THE MULTIPOLAR WORLD

① GLOBAL DEFENCE SYSTEM

② DANGER OF PROLIFERATION OF WMD*

③ TERRORISM

*WMD = Weapons of Mass Destruction

X *Total: 3*

# SCIENCE AND TECHNOLOGY FOR DEVELOPING COUNTRIES TO AVOID A NORTH-SOUTH ENVIRONMENTAL HOLOCAUST

① THE NATIONAL SCHOLARSHIP PROJECT

② SCIENCE WITHOUT SECRETS AND THE PROBLEM OF TECHNOLOGICAL DEVELOPMENTS PRO AND AGAINST MANKIND

③ THE ROLE OF BIG SCIENTIFIC RESEARCH CENTERS USING INERT MATTER AND LIVING MATTER

**XI** *Total: 5*

# THE PROBLEM OF ORGAN SUBSTITUTION

① ARTIFICIAL ORGANS

② NATURAL ORGANS

③ THE UNDERSTANDING OF "MINIMAL LIFE"

④ FROM INERT TO LIVING MATTER

⑤ THE CONTRIBUTION COMING FROM GENETIC ENGINEERING

XII *Total: 7*

# MEDICINE, INFECTIOUS AND OTHER DISEASES

① AIDS

② OTHER PATHOLOGIES (EBOLA*)

③ INFECTIONS DUE TO STANDARD MEDICAL CARE

④ IN THE FIELD (EBOLA*)

⑤ IN THE LABORATORY (EBOLA*)

⑥ NEUROPATHOLOGICAL SOURCES

⑦ BIOTECHNOLOGICAL SOURCES

XIII *Total: 8*

# CULTURAL POLLUTION

① THE PROBLEM OF MODERN TECHNOLOGY & DEMOCRACY

② RIGOROUS FOUNDATION OF DEMOCRACY: MATHEMATICS & DEMOCRACY

③ THE VALUES OF SCIENCE AND THE BASIC DISTINCTION BETWEEN SCIENCE & TECHNOLOGY

④ SCIENCE & FAITH

⑤ TV

⑥ RADIO

⑦ PRESS: SCIENCE & JOURNALISM

⑧ VIDEO & OTHER MEANS

POLITICAL VIOLENCE USING THE MEDIA

XIV *Total: 2*

# COMMON DEFENSE AGAINST COSMIC OBJECTS

① DETECTION

② DEFENSE

METEORITES AND COMETS

WITHOUT MEMORY THERE IS
NEITHER SCIENCE NOR CIVILIZATION

| | |
|---|---|
| DINOSAUR EXTINCTION 65 MILLION YEARS AGO ($10^9$ MT) | ARIZONA 15MT ($F_e$) - 50,000 YEARS AGO |
| | SIBERIA 10MT ($H_2O$) - 1908 |

XV *Total: 5*

# THE HUGE MILITARY INVESTMENTS

① DISMANTLING OF THE 60,000 NUCLEAR WARHEADS

② DESTRUCTION OF CHEMICAL WEAPONS

③ RECONVERSION OF WAR INDUSTRIES

④ NEW INITIATIVES TO CHANNEL MILITARY RESOURCES TOWARDS PROJECTS FOR PEACE

⑤ THE NEW ARMS RACE FOR HIGH PRECISION WEAPONS

# IX – CONCLUSION: AN EXAMPLE OF WHAT ALL PARLIAMENTS SHOULD DO IN THIS SATELLITE OF THE SUN

Before Galilei all cultures attributed to the heavens properties that lay above those of the stones. Galilei brought the Logic of Nature into stones and common matter, saying that our intellect has a power below that of the Author of the Logic of Nature.

And thus it is necessary to bow before His intellectual Majesty and ask humbly how He has made the world. In other words, what rigorous Logic – of all possible logics – did He follow to make the world as it appears to our eyes and our intellect. The significance of a rigorous and reproducible experiment is precisely what Galilei intended and experienced:

to humbly ask a question
to the Author of the Logic.

This is how, in just four centuries, we have managed to decipher a good part of the Logic of Nature. And we have managed to understand just how right was Galilei's humility. In fact, from the dawn of civilization right up to Galilei – in other words, during 50 thousand years – all that man thought he had discovered about how the world was made, without ever carrying out an experiment, turned out to be wrong; the only exception being Archimedes.

Still today, Galilean teaching rules the logic of all the scientific laboratories in which the Fundamental Laws of Nature are studied.

Galilei studied stones in order to discover the Logic of Nature. He could have discovered Chaos instead. Had Galilei not existed, we would know nothing about the existence of the Fundamental Laws of Nature.

# So a question arise:

- what did Galilei knew about the fact that the Fundamental Laws of Nature had to exist?

Science aims at understanding what God has written, using the rigour of Mathematics. Galilei said and thought that the Fundamental Laws of Nature are in fact expressed as precise mathematical equations. The father of Science did not know that his studies of oscillating pendulums or stones rolling down an inclined plane would have allowed him to deduce rigorous laws.

Chaos, randomness, whim might just as possibly have appeared instead: one day like this, a year later quite different. One law for Pisa, another for the Moon.

Galilei instead was thinking in terms of fundamental and universal laws, expressible in rigorously mathematical form. Together, these laws were to represent, and *de facto* do represent, the Logic of Nature.

‘In that stone there is the hand of the Lord. By studying *common objects* I will discover the Laws of He who has made the world’.

This was the Faith that inspired Galilei to challenge the dominant Culture of his time. He simply wanted to read the Book of Nature, written by the Creator in mathematical characters.

Knowing how to read it means making available for the benefit of man the laws that rule the Cosmos, in communion, not in antithesis, with the word of God, that is, the Bible.

The Bible is written in a simple way, so that everyone can understand it; its purpose is not to explain how the Immanent part of our existence is made.

Instead, it has the goal of tracing out for man the path that leads to the Lord. Science gives us the certainty of not being the children of Chaos, but of a rigorous Logic.

Who is the Author of this Logic? Atheism replies: no one.

This is why Science, born in the Immanent, brings man towards the Transcendent, because it is absurd that such Rigorous Logic does not have an Author.

Four centuries after the time of Galilei, that which the father of Science was able to see with a pure act of Faith and Love towards Creation becomes visible in dazzling clarity: Nature and the Bible are both works by the same Author.

The Bible — said Galilei — is the word of God. Nature instead is His writing. If we lived in the era of Science, these truths would be the cultural heritage of everyone.

What the Parliament of the Republic of Poland has done is a lesson to all Parliaments of the world.

# The Polish Parliament

has devoted one day to the 'Cry of the Earth' and reported the best example of how this 'Cry' has to be analyzed and overcome following the rigour that Science allows to have when we study a problem. This is the best example of how the great alliance between 'Faith and Science' can be the source for the implementation of the 'New Manhattan Project'.

**The Great Alliance between Science and faith is needed in order the overcome the 'Cry of the Earth'.**

«***Science and Faith are both gifts of God***» (Pope John Paul II).

Science has been discovered by our Culture thanks to Galileo Galilei Divine Man [7].

It was Galilei who said that the footprints of the Creator were to be found in the stones (just as in the Stars). Galilei brought the Logic of the Stars into common matter (stones, string, wood), through an act of Faith on the existence of a fundamental Logic which governs the real world.

# APPENDIX 1: MEMORY IS NEEDED

*«Without Memory neither Science nor Civilisation could exist».*

*Enrico Fermi* [10]

*«The Berlin Wall*
*started to collaps many years*
***before 1989**,*
*when in Erice*
***Teller** and **Velikhov***
*came to the Seminars on Nuclear War»*

Eugene Wigner, **1989**

*«To put together Teller and Velikhov was a fact that none of us had ever believed».*
Paul Dirac, **1982**

**THE SECOND NUCLEAR WAR SEMINAR – 1982 – ERICE**

Edward Teller (centre), scientific adviser of President Reagan, and Yevgeniy Velikhov (left), scientific adviser of President Gorbachev, together with A.Z. in Erice during the second International Seminar on Nuclear War on August 1982.

# All starts with Paul A.M. Dirac:

# 1981

*The Futility of War*

# 1982

Special Lecture:

*Kapitza's life as I know it*


From left: Luigi Dadda, Pierre A. Piroué, Enrico Bignami, Yuval Ne'eman, Richard L. Garwin, John C. Eccles, Eugene P. Wigner, A.Z., Edward Teller, Paul Adrien Maurice Dirac, George Charpak (1981).

# The Erice Statement

# 1982

The Erice Statement written in 1982
by *Paul A.M. Dirac, Piotr Kapitza and A.Z.*

ETTORE MAJORANA FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE

# THE ERICE STATEMENT

- *It is unprecedented* in human history that mankind has accumulated such a military power to destroy, at once, all centres of civilization in the world and to affect some vital properties of the planet.

  The *danger* of a nuclear holocaust is not the unavoidable consequence of the great development of pure Science.

  In fact, *Science* is the study of the Fundamental Laws of Nature.

  *Technology* is the study of how the power of mankind can be increased.

  Technology can be for peace and for war. The choice between peace and war is not a scientific choice. It is a cultural one: the *culture of love* produces peaceful technology. The *culture of hatred* produces instruments of war. Love and hatred have existed forever. In the bronze and iron ages, notoriously pre-scientific, mankind invented and built tools for peace and instruments of war. In the so called "modern era" it is imperative that *culture of love* wins.

  An enormous number of scientists share their time between pure Science research and military applications. This is a fundamental source for the arms race.

  It is necessary that a *new trend* develops, inside the scientific community and on an international basis.

It is of vital importance to identify the basic factors needed to start an effective process to protect human life and culture from a third and unprecedented catastrophic war. To accomplish this it is necessary to change the peace movement from a unilateral action to a truly international one involving proposals based on mutual and true understanding.

- **Here are our proposals:**

  1. Scientists who wish to devote all of their time, fully, to study theoretically or experimentally the basic laws of Nature, should in no case suffer for this free choice, to do only pure Science.
  2. All Governments should make every effort to reduce or eliminate restrictions on the free flow of information, ideas and people. Such restrictions add to suspicion and animosity in the world.
  3. All Governments should make every effort to reduce secrecy in the technology of defense. The practice of secrecy generates hatred and distrust. To start a ban for military secrecy will create greater stability than offered by deterrence alone.
  4. All Governments should continue their action to prevent the acquisition of nuclear weapons by additional nations or non-national groups.
  5. All Governments should make every effort to reduce their nuclear weapons stockpiles.
  6. All Governments should make every effort to reduce the causes of insecurity of non-nuclear powers.
  7. All Governments should make every effort to ban all types of nuclear tests in war technology.

- **Conclusion**

  Those scientists — in the East and in the West — who agree with this «Erice Statement», engage themselves morally to do everything possible in order to make the *new trend*, outlined in the present document, become effective all the world over and as soon as possible.

---

- This Statement was written in ERICE, August 1982, by Paul A.M. DIRAC, Piotr KAPITZA and Antonino ZICHICHI. By now the number of signatories of the Erice Statement has exceeded 100˙000, the world over.

---

- The 'Erice Statement' has attracted, in the eighties, the attention of World Leaders such as Deng Xiao Ping (China), Mikhail Gorbachev (USSR), Olof Palme (Sweden), Sandro Pertini (Italy), Ronald Reagan (USA), Pierre Trudeau (Canada) and stimulated various actions on their part for a Science without secrecy and without frontiers.


First row: Paul Dirac and Piotr Kapitza
Second row: Eugene Wigner, John Eccles amd Richard Garwin
Erice, **1982**.

# PIOTR KAPITZA


If Kapitza had not refused to be the n. 1 of the USSR H-bomb project
the world would have had a millennium of Stalinistic Empire.

Kapitza, 'pupillo' insieme a Dirac di Rutherford (il padre della Fisica Nucleare), era stato di fatto 'sequestrato' alla fine degli anni trenta in USSR dove si era recato per una visita ai suoi.

Kapitza fu uno tra i più attivi estimatori di Giovanni Paolo II. Lo definì: «*La Luce del mondo accesasi per cacciare le tragiche tenebre del nazismo e dello stalinismo*».

Nella foto c'è Piotr Kapitza a Erice nel 1982 per i Seminari sulle Guerre Nucleari. In seconda fila a destra Richard Garwin, il cervello numero uno con Teller, nel progetto per la Bomba H Americana.

# 'WHAT IF' IN HISTORY AND IN SCIENCE

| | In History ≡ EWRL | | In Science ≡ EBUS |
|---|---|---|---|
| *I* | What if Julius Caesar had been assassinated many years before? | *I* | What if Galileo Galilei had not discovered that $F = mg$ ? |
| *II* | What if Charles VII had not been able to win the 100 years war? | *II* | What if Newton had not discovered that $F = G\frac{m_1 \cdot m_2}{R_{12}^2}$ ? |
| *III* | What if America had been discovered a few centuries later? | *III* | What if Maxwell had not discovered the unification of electricity, magnetism and optical phenomena, which allowed him to conclude that light is a vibration of the EM field? |
| *IV* | What if Napoleon had not been born? | *IV* | What if Becquerel had not discovered radioactivity? |
| *V* | What if Louis XVI had been able to win against the 'Storming of the Bastille'? | *V* | What if Planck had not discovered that $h \neq 0$ ? |
| *VI* | What if the 1908 Tunguska Comet had fallen somewhere in Europe instead of Tunguska in Siberia? | *VI* | What if Lorentz had not discovered that space and time cannot both be real? |
| *VII* | What if the killer of the Austrian Archduke Franz Ferdinand had been arrested the day before the Sarajevo event? | *VII* | What if Einstein had not discovered the existence of time-like and space-like real worlds? Only in the time-like world, simultaneity does not change, with changing observer. |
| *VIII* | What if Lenin had been killed during his travelling through Germany? | *VIII* | What if Rutherford had not discovered the nucleus? |
| *IX* | What if Hitler had not been appointed Chancellor by the President of the Republic of Weimar Paul von Hindenburg? | *IX* | What if Hess had not discovered cosmic rays? |
| *X* | What if Pyotr Kapitza accepted to be the leader of the USSR H-bomb Project as wanted by Stalin? | *X* | What if Dirac had not discovered his equation, which opens new horizons, including the existence of the antiworld? |
| *XI* | What if Nazi Germany had defeated the Soviet Union? | *XI* | What if Fermi had not discovered weak forces? |
| *XII* | What if Karol Wojtyla had not been elected Pope, thus becoming John Paul II? | *XII* | What if Fermi and Dirac had not discovered the Fermi–Dirac statistics? |
| *XIII* | What if Gorbachev had not been defeated by Yeltsin? | *XIII* | What if Yukawa had not proposed the existence of a "meson" in order to have the nuclear glue? |
| *XIV* | What if the USSR had not collapsed? | *XIV* | What if the 'strange particles' had not been discovered in the Blackett Lab? |

**Figure 11**

# Geneva

# **1985**

# Reagan & Gorbachev

In 1985 at the famous Geneva meeting when the two most powerful world leaders (Reagan and Gorbachev) met they both agreed that the biggest enemy for Peace in the world is the existence of secret Labs, as stated in the Erice Statement. They both declared that they would have opened their secret Labs, thus following the Erice Statement signed by more than 100,000 scientists the world over.

Secret Labs
are
the enemy

nº. 1

of Peace.

We will open
all secret Labs

**Reagan & Gorbachev, Geneva 1985**

**Since this dream turned**
out to be
very difficult
to achieve,
the only way out
came to be
to destroy the secret
**at its origin**.

# The Motor of Progress

is

scientific discovery

which generates

technological inventions:

**HERE is the PROBLEM.**

The inventions can be

for → Peace

but also

for → War

} Technology

# Bertrand Russell

«You Physicists
would sell your
**soul**
to the **devil**
in order to be able
to perform an
experiment».

It is thanks to **Lord Blackett** [11] that I had the privilege to spend an evening with **Bertrand Russell** and know his views on us physicists engaged at the frontiers of human knowledge in order to understand the Logic of Nature.

Blackett invited me at his place along with his friend, Bertrand Russell, who said: «*You, physicists, would sell your souls to the devil just to be allowed to implement your experiments*». And turning to me: «*What about you, my young fellow, what do you think of it?*».

Actually, that meeting at Blackett's house had the purpose of discussing **Relativity** and the role played by **Galilei**. Blackett was not happy of what Russell had written in his book the **ABC of Relativity**; Galilei was only cited once despite the fact that Galilei's Principle of Relativity was so well formulated that included Electromagnetic Phenomena (unknown to Galilei). I was there because, from childhood, I had read all of Galilei's writings.

From the Galilei-Einstein theme, the conversation turned to a subject that was **gnawing at Russell's** mind: *Physicists, that vile cursed race of beings*. He did not say it out loud, but he certainly harboured the thought. At one point he even exclaimed: "**The day there will be a slowdown in the race for armaments you physicists will be in trouble**. We do not know for how many decades this will continue. Therefore, your future is secure. However, if I could think of a world without any more conflicts between great powers, if I were you I would change job. I don't know when the '**cold war**' between the two super powers will become '**hot**'. We should do all we can to avoid this and you should know that, in a planet without the two opposing super powers, the race for armaments will subside and so will the financing of frontiers research.

The **political powers are not financing your projects to better understand the Logic of Nature. This belongs to us and the truth will be in our hands. You physicists are getting all that attention from governments because of the potential applications of your research to war technologies**. The day that interest will wane, there will be no more financing for your projects".

Later on, coming back to Russell's rather shocking point of views, Blackett told me: «*You know, Russell is mad at us because, after all,* ***Kurt Gödel*** *is one of us*».

This Era of Peace, for which Blackett and Russell strongly disagreed as to the way and means to achieve it, has now become reality; there is no more need for a race for armaments.

We are now at the crossroads: will the political powers of free and democratic countries follow the road predicted by Russell's pessimism and feared by all the free worlds' scientists? Or will they go the way **Blackett had shown**, during the difficult times following the end of the war, by putting in place the **first European Scientific Institution, CERN**, which he wanted to be beyond all ideological, political and racial barriers, without secrets or frontiers, and entirely dedicated to fundamental research without any kind of warlike technological applications?

# Bertrand Russell

*«**The further away** the scientific discovery is from what the culture believes having understood **the more unpredictable the technological applications**, for good or evil, will be. You are talking now about Fundamental Forces and elementary particles without having understood what is at play. After the Nuclear Universe you are working to discover another type, more sophisticated and microscopic, of Universe. The governments, **as long as the secret laboratories will continue to exist**, will keep financing you out of the reciprocal fear of the new technologies which could turn out to be applicable to arms that would be ever more precise and ever more potent».*

# Bertrand Russell

«When East-West
military confrontation
will be over (end of Cold War)
you young fellows
you'd better change work.
There will be no money
for your experiments.
Why do you really think
that Governments support
CERN and your experiments?»

If the Berlin-Wall
had not fallen the most
powerful machine in the world

**ELN**

(**EL**oisatro**N** = Euroasiatic LOng Intersecting Storage Accelerator)
would have been built.

**Reagan**
**Gorbachev**
**Deng Xiao Ping**
had all agreed.

# THREE YEARS BEFORE THE FALL OF THE BERLIN WALL

*From left to right (first row):*
Professor Zhou Guang Zhao (Scientific Advisor to Premier Deng Xiao Ping), Professor Edward Teller (Scientific Advisor to President Reagan), Professor Antonino Zichichi (Chairman of the International Committee 'Science for Peace') and Professor Eugenij Velikhov (Scientific Advisor to President Gorbachev), shaking hands after reaching the Agreement for International Scientific Collaboration East-West-North-South without Secrecy and without Frontiers (**1986**).

# Geneva

# 1986

## The International Centre for Scientific Culture - World Laboratory

* * * * * * * * *

We live in a culture that ignores the **72 Planetary Emergencies**.
In 1985 the two most powerful Heads of State (USA, USSR)
Reagan and Gorbachev,
said in Geneva that the enemy number one of Peace in the world
are the secret Laboratories; they declared their will to open them,
as proposed by the scientists signatories of the
**Erice Statement**, for a Science without secrets and without borders.
Unfortunately, even today, the secret Laboratories are closed and
the only solution is to fight the secret in Science at the origins,
with the implementation of the '**New Manhattan Project**'.

* * * * * * * * *

* * * * * * * *

**The New Manhattan Project ≡ A Project for Mankind**

It would be pure utopia if he did not have roots in what has been actually achieved, starting from the University of Bologna, in the fight against the Planetary Emergencies.

The scientific-technological results obtained demonstrate that the problems of the **72 Planetary Emergencies** can be solved.

* * * * * * * *

* * * * * * * *

The Culture of our time, called modern,
ignores the great achievements of Science
and brings us back to before 1985,
when the **Future of all Nations** was in danger because of the
60 thousand H-bombs
(each one million tons of TNT equivalent)
accumulated in the arsenals of the two superpowers.
Today, the danger lies in the existence
of the **72 Planetary Emergencies**
that threaten the **Future of all Nations** North-South-East-West.

* * * * * * * *

Not letting tens of
thousands of years
as it happened with
the **Wheel** and the **Fire,**
or one hundred years
as it happened with
the discovery of the electron.
But within a few years as shown by the
**Manhattan Project**.

Enrico Fermi feared,
already half a Century ago, that
the Political Hiroshima
would have been followed by
the **Cultural Hiroshima**
in which we are immersed.

The only way to rid
the future of the world
from the nightmare of the
**72 Planetary Emergencies**
is the realization of the
'**New Manhattan Project**'.

# APPENDIX 2:

# THE WHOLE OF OUR KNOWLEDGE. THE THREE BIG BANGS

Science and History bring us to consider the "whole of our knowledge", reported in Figure 12. A few words on Figure 12.

The **First Big Bang** (*BB1*) is needed in order to describe how we go from the Vacuum to the Universe, made of inert matter.

The **Second Big Bang** (*BB2*) is needed in order to describe how we go from inert matter to matter endowed with life. This is being studied in many laboratories. Hundreds of scientists are fully engaged in studying what is called the "problem of minimal life", i.e. how many pieces of inert matter are needed in order to produce the most elementary piece of "living matter".

The **Third Big Bang** (*BB3*) is needed in order to describe how we go from matter endowed with life (and no Reason) to the most elementary form of living matter endowed with the privilege of also having Reason.

Please note that the term Reason is not referring to the most simple form of Reason needed by living matter in order to guarantee life. The term Reason is the form of Reason which produces Language, Logic and Science.

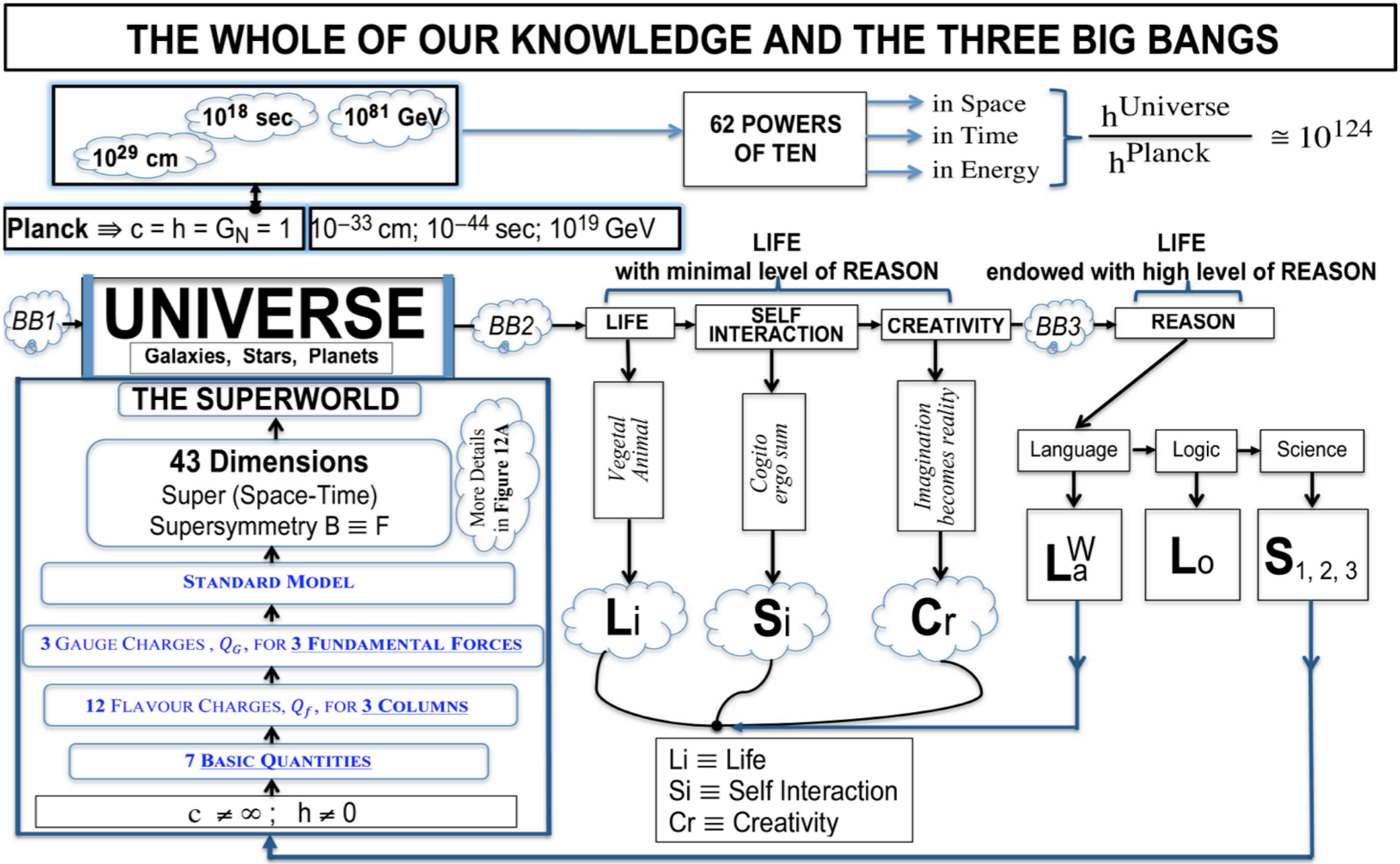

THE WHOLE OF OUR KNOWLEDGE AND THE THREE BIG BANGS
10^18 sec
10^81 GeV
10^29 cm
62 POWERS OF TEN
in Space
in Time
in Energy
h^Universe / h^Planck ≅ 10^124
Planck ⇒ c = h = G_N = 1
10^−33 cm; 10^−44 sec; 10^19 GeV
LIFE with minimal level of REASON
LIFE endowed with high level of REASON
BB1
UNIVERSE
Galaxies, Stars, Planets
BB2
LIFE
SELF INTERACTION
CREATIVITY
BB3
REASON
THE SUPERWORLD
43 Dimensions
Super (Space-Time)
Supersymmetry B ≡ F
More Details in Figure 12A
STANDARD MODEL
3 GAUGE CHARGES , $Q_G$, FOR 3 FUNDAMENTAL FORCES
12 FLAVOUR CHARGES, $Q_f$, FOR 3 COLUMNS
7 BASIC QUANTITIES
c ≠ ∞ ; h ≠ 0
Vegetal Animal
Cogito ergo sum
Imagination becomes reality
Language
Logic
Science
Li
Si
Cr
L_a^W
L_o
S_1, 2, 3
Li ≡ Life
Si ≡ Self Interaction
Cr ≡ Creativity

**Figure 12**

There are hundreds of thousands of forms of living matter (vegetal and animal, small and big) but only one form of living matter is able to invent "**Language**" (which gives rise to Permanent Collective Memory, better known as Written Language), "**Rigorous Theoretical Logic**" (known as Mathematics) and "**Rigorous Experimental Logic**" (known as first level Galilean Science).

These three Big Bangs are indicated in Figure 12, where the knowledge of the Universe plays a central role.

However, if the Third Big Bang had not occurred, none of us would have been able to discuss our problems and I could not have written this book. The content of this Chapter and of Figure 12 includes many points I discussed with Professor Blackett when I was the youngest member of his group. Let me try to give a recollection of these interesting discussions.

It is thanks to Science that we have discovered the seven fundamental components needed to construct the real world as we know it and participate in it. These seven components are **space** (s), **time** (t), **spin** ($\sigma$), **mass** (m), **energy** (E), **gauge charge** ($q_G$) which generates the Fundamental Forces of Nature and **flavour charge** ($q_f$) which produces the stability of all fundamental particles, called quarks and leptons.

The seven components are the result of the three Big Bangs. The description of Figure 12 would take too much space. We will limit ourselves to the shortest possible remarks.

The seven quantities must give rise to quarks and leptons which exist into three "Families". This is the meaning of I, II, II in Figure 12. The seven quantities must also generate the four fundamental forces. Notice in Figure 12 the Electromagnetic and the Weak Forces are mixed into the so called Electroweak Force ($F_{EW}$). The reason being that these two forces start at the Fermi Energy from a mixed source. The other two forces are, the Subnuclear Strong ($F_{QCD}$) and the Gravitational Force ($F_G$). All these forces should be unified into the Grand Unified Force ($F_{GU}$).

All fundamental particles are not balls but spinning balls with semi-odd-integer value for their spin. All glues produced by the fundamental forces are also spinning balls, but with integral value for their spin. The spinning balls with semi-odd-integer value for their spin

$$\left( {}^{1}/_{2} \; ; \; {}^{3}/_{2} \; ; \; {}^{5}/_{2} \; ; \; {}^{7}/_{2} \; ; \; \ldots \right)$$

are called "Fermions", **F**. The spinning balls with integer value for their spin

$$( 0, \; 1, \; 2, \; 3, \; 4, \; \ldots )$$

are called "Bosons", **B**. Fermions obey a statistical law totally different from the statistical law which have to obey the Bosons. The fermionic statistical law establishes that two identical Fermions cannot be in the same place. The bosonic statistical law establishes that in the same place can be any number of Bosons. The "same place" is a simple way to specify not only a "place" but a series of properties needed to identify an elementary particle.

The Superworld would be the result coming from a new Symmetry between Fermions and Bosons, (B ≡ F). This "**Supersymmetry**" should be valid not only for "particles" but also for Space and Time.

This is the origin of Superspace-Time with 43 dimensions, which are 11 bosonic and 32 fermionic. The 11 bosonic dimensions are 9 for Space, one for the fundamental coupling and one for Time. Out of the nine bosonic dimensions of Space, six remain compactified and three are expanded. The other bosonic dimension which is expanded is the Time dimension. The total number of bosonic expanded dimensions is therefore four.

In our world we have in fact four bosonic expanded dimensions: three for Space and one for Time. This is why we have so much **Space** and so much **Time** available. A volume of our Space needs three dimensions: height, width and length. The fact that all these three quantities can be measured with the same instrument, called meter, is the proof that our Space has three dimensions. The dimensions needed for Time is only one and is measured with a clock (Einstein dixit).

Along the Time dimension there are phenomena for which the two arrows of Time (from past to future and from future to past) are allowed, thus obeying to the Wigner theorem. Others phenomena are not obeying the Wigner theorem. In synthesis: only some "elementary processes" can go in the two opposite directions along the Time axis without changing any of their properties.

The other seven bosonic dimensions remain compactified. As said already, one of these corresponds to the fundamental coupling of the Grand Unified Force ($F_{GU}$) from which all other forces ($F_{EW}$; $F_{QCD}$; $F_G$) are generated.

In addition to the 11 bosonic dimensions there are 32 fermionic dimensions. These remain all compactified. As mentioned before, the bosonic and fermionic dimensions are the basis of the Superspace with a total of 43 dimensions.

An important property distinguishes the fermionic dimensions from the bosonic dimensions.

In the Superspace with bosonic dimensions it is possible to go in one direction or in the opposite direction, as we do in everyday's life along the three expanded dimensions of Space. In the Superspace with fermionic dimensions this is impossible.

The Superspace with 43 dimensions, and all their properties, which we have briefly described, are needed for everything that refers to inert matter. Life extends beyond the confines of inert matter. When we introduce life into a description of the world, the first problem to solve, as already mentioned, is the transition called Big Bang Two (*BB2*) from inert matter to living matter.

There are very many forms of matter with life (vegetal and animal) and with very low levels of Reason. The number of all these forms of life is in the range of a million. Despite this enormous number, only one form of living matter has the privilege of being endowed with the extraordinary property of a high level of Reason. As shown in Figure 12 the Third Big Bang (*BB3*) is needed in order to have the transition to this form of matter.

It is thanks to the existence of matter with high level Reason that we have been able to discover **Language**, **Logic** and **Science**. Language has produced "Permanent Collective Memory" (PCM) better known as "writing". With logic we mean Rigorous Theoretical Logic, better known as Mathematics. There is another form of Rigorous Logic, which needs experimental reproducibility, and it is known as Science. Two more details. In Figure 12 the letter **c** indicates the speed of light which is a fundamental constant of Nature and it is not infinite (∞) as believed to be for millennia. The first fellow who attempted to measure the speed of light is Galilei in the sixteenth century. He would have succeeded to prove that the speed of light was not ∞ if it would have been thirty times the speed of sound.

The speed of light is not infinite but a million times greater than that of sound. This is why Galilei was unable to measure it. Galilei had at his disposition the distance between two hills in the Tuscan countryside, in other words just a few kilometres. We had to wait Ole C. Rømer (1644–1710), who used Jupiter's *Io* as the cosmic lantern, and the orbital velocity of the Earth. This gave him the "million times" factor that Galilei did not have. Not only was *Io* discovered by Galilei, but the regularity in the light signals emitted by the moons of Jupiter had led Galilei to propose using it as a "cosmic clock". And it was by using Galilei's "cosmic clock", and the speed by which the Earth moved, away from and closer to Jupiter, due to its orbital motion, that Rømer succeeded in demonstrating that the speed of light is not infinite measuring for the first time after Galileo Galilei, its finite value, as Galilei was expecting.

The other detail in the same box of Figure 12 refers to the quantity h, which is the other fundamental quantity of Nature: action. For millennia this quantity was believed to be as small as wanted, including zero. Planck proved, in 1900, that the smallest quantity of action cannot be zero, $h \neq 0$, but greater or equal to the quantity now called Planck's action. If I give to a friend of mine a bit of energy for a small interval of time, this is a small action which corresponds to a very high number – billions of billions of billions – of the smallest amount of elementary action, i.e. the Planck's action.

Let us calculate the energy needed to bring one kilogramme of mass up by one meter. If this energy is multiplied by the Time of one second the result is a quantity of action equal to ten million of billion billion billion times the Planck's action.

A few other details for Figure 12. **Li** corresponds to all forms of matter endowed with Life, vegetal and animal. **Co** indicates all interactions that matter can have with life and with a minimum level of Reason. **Cr** stands for Creativity which is when even the lowest level of imagination becomes reality.

$\mathbf{L_a^W}$ is Written Language; **Lo** is the Theoretical Logic (Mathematics) and Science – as said several times – is Rigorous Experimental Logic. Science has three levels, this is the meaning of $\mathbf{S_{1,2,3}}$ .

The 1st level corresponds to reproducible experiments in a Laboratory: for example, the discovery of Antimatter [12].

The 2nd level corresponds to observations with no possibility of intervention: example, the study of evolution of Stars.

The 3rd level is when something happens only once: example, the first Big Bang. The 3rd level seems to be in contradiction with reproducibility and could seem in contradiction with the meaning of Science. All three Big Bangs are Science because their description can never be in contradiction with what has been discovered at the 1st level of Science.

In Figure 12 the Planck length ($10^{-33}$ cm) and the Planck time ($10^{-44}$ sec) are given.

These two quantities have been discovered by Planck in 1900 when he took as fundamental units the values of the three fundamental constants of Nature:

1) the speed of light;
2) the value of the Planck action;
3) the Newton constant.

When the radius of the Universe ($10^{29}$ cm) and the age of the Universe ($10^{18}$ sec) are divided by the Planck length and the Planck time the result is $10^{62}$:

$$\frac{10^{29}\text{cm}}{10^{-33}\text{cm}} = \frac{10^{18}\text{ cm}}{10^{-44}\text{ sec}} = 10^{62}\,.$$

These are two very meaningful big ratios linked to our world.

A statement concerning the biggest number. The biggest number comes out when the action of the Universe is divided by the Planck action. This ratio is the number "**one**" followed by hundred twenty-three zeros: $10^{123}$, as reported in Figure 12.

Figure 12 recalls to me how much gratitude I must have towards Professor Blackett, whose interest for the whole of our knowledge has given me the intellectual stimulus for such a Figure.

# APPENDIX 3: ACTIVITY AT PRESENT

The activity
going on at present
is in our

**Permanent Monitoring Panels:**

PMPs.

**The PMPs are ingaged in the study of the Problems** presented in Chapter 3 **which are connected with the following set**:

- **BIOTECHNOLOGY**
- **BRAIN AND BEHAVIOUR**
- **CLIMATOLOGY**
- **DEFENCE AGAINST COSMIC OBJECTS**
- **DESERTIFICATION**
- **ENERGY**
- **FLOODS AND EXTREME WEATHER EVENTS**
- **INFORMATION SECURITY**
- **LIMITS OF DEVELOPMENT**
- **MISSILE PROLIFERATION**
- **MOTHER & CHILD**
- **POLLUTION**
- **MOTIVATIONS FOR TERRORISM**
- **MITIGATION OF TERRORIST ACTS**
- **TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHY**
- **WATER.**

# The scope of each PMP is:

- Monitoring the scientific results of research conducted in the relevant fields.
- Organising scientific workshops to reconcile conflicting views on scientific issues and channel research efforts.
- Helping disseminate relevant scientific data and information.
- Organising yearly Group Meetings and reporting on group activities to the WFS Annual General Meeting in Erice.
- Writing recommendations for use by governments and international agencies.

At present each PMP
is working on a component of the

# ‘SCIENCE FOR PEACE THE WORLD OVER THE PROJECT FOR MANKIND’.

Once the ‘Science for Peace the Word Over’
will receive the financial support
from all Governments in the world,
each PMP will have the responsibility
for the detailed elaboration
and the implementation of the
**Project** specific to its competence.

# APPENDIX 4:

# THE ROOTS OF THE NEW MANHATTAN PROJECT

# THE FUTURE

## The New Manhattan Project

- 1981 – Erice Statement: Science without Secrets
- 1985 – Geneva (Reagan + Gorbachev): the enemy n. 1 of Peace in the world are Secret Laboratories

- 1987 – $e^-$ (J.J. Thomson) $\Rightarrow$ 100 years $\equiv$ No Project
- 1940–1945 (Nuclear Fission) $\Rightarrow$ 5 years $\equiv$ Manhattan Project

- For $10^5 - 10^4$ years
  ***Intellectual Arrogance***
- **Galileo Galilei 1600**
  ***Intellectual Humility***

{ The Wheel $\Rightarrow$ (friction)
The Fire $\Rightarrow$ (mass$\Rightarrow$energy) }

**SM&B now**

When we put together

**Science**

**Technology**

and

**Culture**

the roots are on

some giants of last century Physics,

as given in the cover page of the

**'NEW MANHATTAN PROJECT'**

**Wigner**
**Fermi**
**Dirac**
**Kapitza**
**Teller**
**Oppenheimer**

# THE NEW MANHATTAN PROJECT

## Science for Peace the World Over


ANTONINO ZICHICHI

*University of Bologna and INFN, Italy*
*CERN, Geneva, Switzerland*
*Enrico Fermi Centre, Rome, Italy*
*Pontifical Academy of Sciences, Vatican City*
*World Federation of Scientists, Beijing, Geneva, Moscow, New York*
*Ettore Majorana Foundation and Centre for Scientific Culture, Erice, Italy*

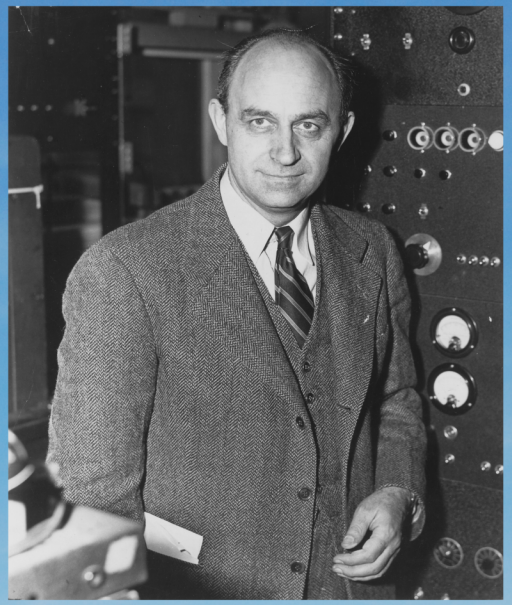

**The fathers of the New Manhattan Project**

*The physicists*
*of the Manhattan Project*
*were all of very high reputation.*
*Those quoted herein*
*have played*
*a key role*
*for taking decisions*
*in the critical moments*
*of the Project.*

# They have a strong coupling with the Erice Centre

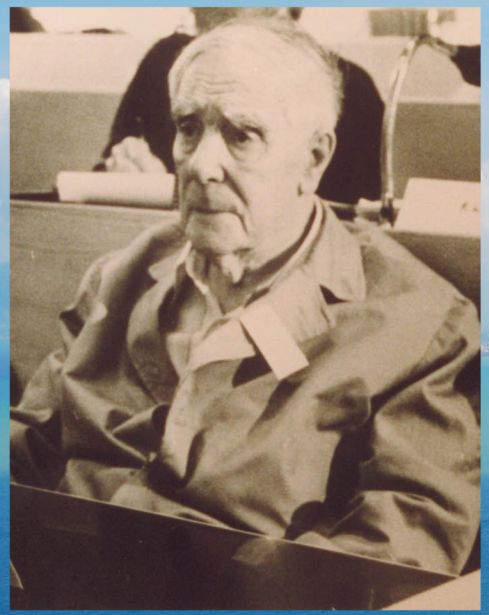
1

2



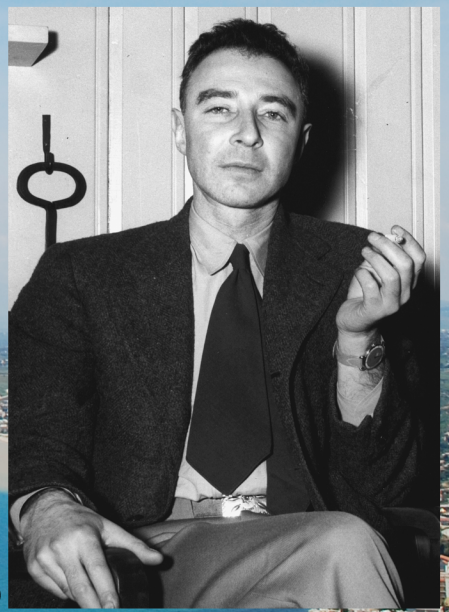
3

4



5

6



① **Eugene Wigner**: The father of the 'Time-reversal Invariance'.

② **Enrico Fermi**: The father of the Weak Forces and the man who on 2 December 1942 was able to light a fire that is not dependent on the Sun and that is millions of times more powerful than all the other fires.

③ **Paul Dirac**: The father of the Dirac equation which opened to Science the horizon of the antiparticles and of the antiworld.

④ **Piotr Kapitza**: The father of superfluidity (and no secret Labs, Erice Statement); he was the hero of Science in USSR for his courage to decline the directorship of the nuclear-fusion bomb (now called the H–bomb) thousands times more powerful than the nuclear-fission bomb called Atomic (Hiroshima and Nagasaki).

⑤ **Edward Teller**: The father of the USA H-Bomb and the inventor of the SDI (Strategic Defence Initiative).

⑥ **Robert Oppenheimer**: The Director of the Manhattan Project.

**«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE**

# *DATA ON ACTIVITIES SINCE 1963*

**127** SCHOOLS,

**1.780** COURSES,

**123.807** PARTICIPANTS

[**140** OF WHICH NOBEL LAUREATES

*(91 of them were awarded the Nobel Prize after their participation in the Ettore Majorana Schools and 49 were already Nobel laureates when they started to take part in the Centre activities)*]

COMING FROM **932** UNIVERSITIES

AND LABORATORIES OF **140** NATIONS.

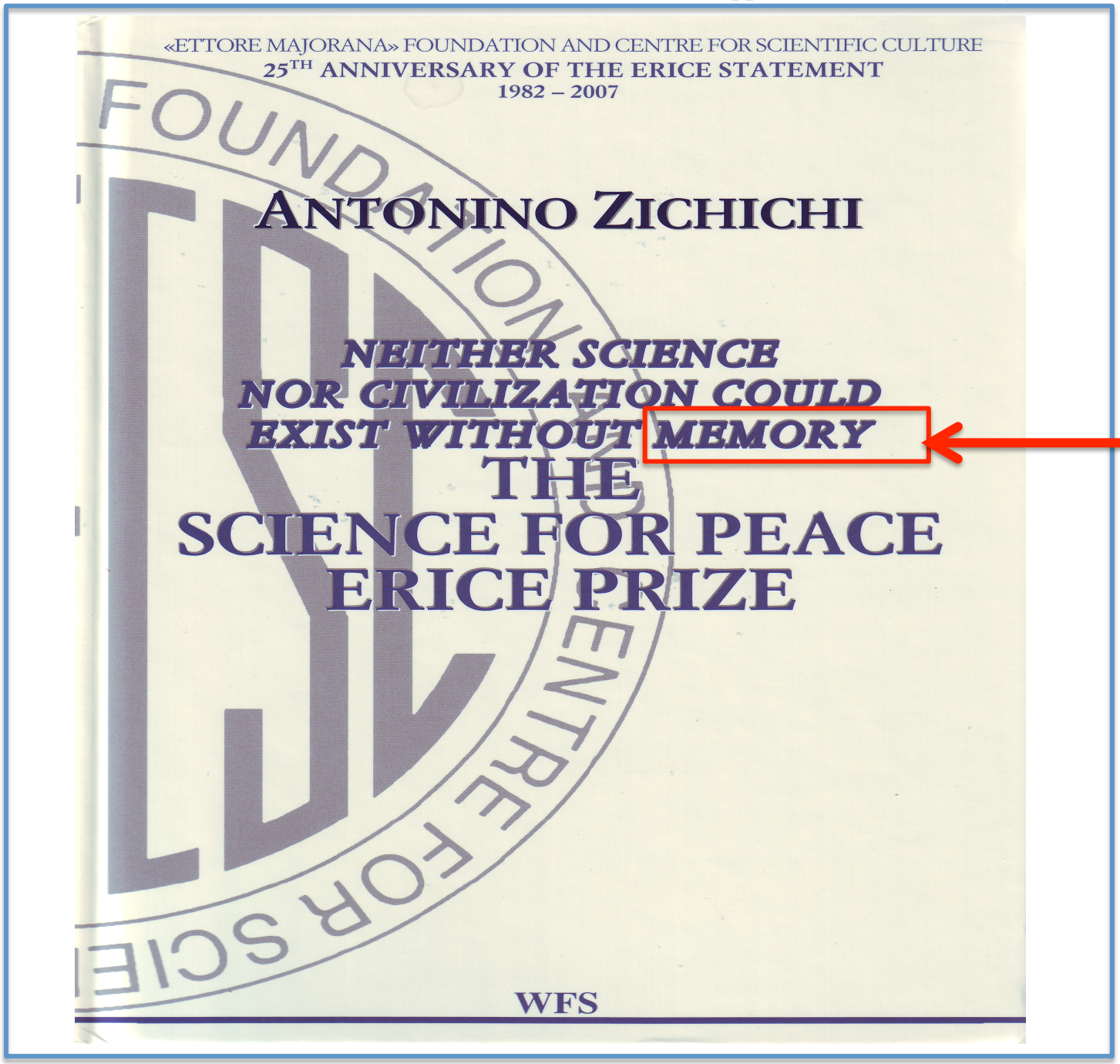
# SCIENCE IS THE MOTOR FOR PROGRESS

**THIS IS WHY SCIENCE IS NEEDED FOR THE CULTURE OF THE THIRD MILLENNIUM**

SCIENCE → **Unification of all Forces of Nature**

&

POLITICAL VIOLENCE → **15 Classes of Planetary Emergencies Total number: 72**


«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE
25TH ANNIVERSARY OF THE ERICE STATEMENT
1982 – 2007
ANTONINO ZICHICHI
NEITHER SCIENCE
NOR CIVILIZATION COULD
EXIST WITHOUT MEMORY
THE
SCIENCE FOR PEACE
ERICE PRIZE
WFS

On the occasion of the twenty-fifth anniversary of the Ettore Majorana Foundation and Centre for Scientific Culture (EMFCSC), in order to promote the values of scientific culture worldwide and following a proposal by the World Federation of Scientists (WFS), a special law was voted unanimously by the Sicilian Parliament to establish the

*"Ettore Majorana Prize – Erice – Science for Peace"*.

The Prize has been awarded to fellows who played a leading role in promoting and implementing the goals outlined in the "Erice Statement" for a Science without secrets and without borders.

P.A.M. Dirac, P.L. Kapitza, A.D. Sakharov, E. Teller, V.F. Weisskopf, J.B.G. Dausset, S.D. Drell, M. Gell-Mann, H.W. Kendall, L.C. Pauling, A. Salam, C. Villi, R. Doll, J.C. Eccles, T.D. Lee, L. Montagnier, Qian Jaidong, J.S. Schwinger, U. Veronesi, G.M.C. Duby, R.L. Garwin, S.L. Glashow, D.C. Hodgkin, R.Z. Sagdeev, K.M.B. Siegbahn, Y.P. Velikhov, J. Karle, J.M.P. Lehn, A. Magnéli, N.F. Ramsey, H. Rieben, J.J. van Rood, C.S. Wu, R.L. Mössbauer, A. Müller, H. Kohl, M.S. Gorbachev, H.H. John Paul II, R. Clark, M. Cosandey, A. Peterman, R. Wilson, J. Alderdice, J.J. Friedman, M. Koshiba, S. Coleman, A.N. Chilingarov, P.C.W. Chu, L. Esaki, W.N. Lipscomb Jr., J. Szysko, M.-K. Wu, H.A. Hauptman, D.H. Hubel, R. Huber, B.I. Samuelsson, H. Sun, A.E. Yonath, G. 't Hooft, Y.T. Lee, W. Arber, S.C.C. Ting.

**San Giovanni Paolo II**
l'*8 ottobre del 2000* richiamò
l'attenzione della Cultura Moderna
sulle due scelte possibili per il futuro del pianeta:
"***giardino o ammasso di macerie***".

" ***Laudato si'*** " *(9 ottobre 2016)*
con il
"***grido della Terra***"
e il
"***grido dei poveri***"
è oggi il riferimento culturale di **Papa Francesco**
che porta avanti l'impegno di San Giovanni Paolo II.

In Italia,
la "**Tre Giorni**" **dell'Università di Bologna**
– 19-21 Giugno 2014 –
è stata la manifestazione più importante
con 30,000 persone e 60 eventi
al fine di
attrarre l'attenzione del grande pubblico
sulle Emergenze Planetarie
e sul Ruolo della Scienza
nel III Millennio
affinché una Grande Alleanza
tra Scienza e Fede possa salvare il Pianeta.

*Il Presidente della Repubblica*

TELEGRAMMA

PROF. ANTONINO ZICHICHI
PRESIDENTE
"ETTORE MAJORANA" FOUNDATION AND CENTRE
FOR SCIENTIFIC CULTURE
VIA GUARNOTTA, 26
91016 ERICE (TP)

CARO PROFESSORE,

TI RINNOVO IL MIO RAMMARICO PER NON POTER ESSERE PRESENTE ALL'INAUGURAZIONE DEL SEMINARIO INTERNAZIONALE SULLE EMERGENZE PLANETARIE.

SONO CONSAPEVOLE DELL'IMPORTANZA DEGLI STUDI E DELLE RIFLESSIONI SCIENTIFICHE AL RIGUARDO E DI QUANTO SIA NECESSARIO CHE LE ISTITUZIONI NAZIONALI E INTERNAZIONALI VI PRESTINO ATTENTO ASCOLTO.

CON QUESTA CONVINZIONE ESPRIMO AI PARTECIPANTI AL SEMINARIO L'APPREZZAMENTO PER L'INCONTRO PROMOSSO DAL CENTRO ETTORE MAJORANA E L'AUGURIO DI BUON LAVORO

SERGIO MATTARELLA

# THE GREAT ALLIANCE BETWEEN POLITICS AND SCIENCE

## *PIETRO GRASSO – PRESIDENT OF THE ITALIAN SENATE*

ABSTRACT

*«Science is the most effective engine of peace that exists in the world».*

*«Speaking of war the prodigious development of technology has been made possible by the enormous funding for war-related R&D. Why doesn't political power make those same resources available today to overcome planetary emergencies?»*

*«Planetary emergencies to be adequately considered, constructively and transparently is the greatest battle of civilisation that we can imagine».*

*«Science without secrets and without barriers": this utopian goal can become real».*

# APPENDIX 5:
# THE AUTHORS OF THE PROJECT

* * *

The roots of the PROJECT
are on all those scientists
who have contributed to the search for
a Science without Secrets and Borders.
Their names follow.

* * *

# SCIENTISTS AND SPECIALISTS WHO HAVE CONTRIBUTED TO THE VARIOUS ACTIVITIES OF PILOT-PROJECTS

A. Abed Rabbo, S.V. Ablameyko, G. Adam, A. Adamishin, J. Adams, E. Adar, V. Adefela, K.S. Adhao, P. Adonnino, P.K. Aggarwal, K.B. Aglawe, C. Aglietta, P.B. Agrawal, A. Aguzzi, K. Ahmad, Z. Ahsan, R. Ajalov, A. Ajami, T. Akhmetov, J.P.D. Akue, H. Al Shahristani, M. Al-Ashkar Jabbour, H. Al-Shahristani, N. Al-Shalabi, K. Alberini, J. Alderdice, M. Alessi, R. Alexakhin, M. Ali, H. Alper, L. Alurralde, I. Amer, M.N. Amin, D.M. Anderson, R. Anderson, M.J. Antonovsky, G. Anzivino, A. Arefiev, I. Armillas, M. Arneodo, R. Arnowitt, C.J. Arntzen, G.T. Aronica, A. Aru, F. Arzarello, K. Asenso-Okyere, A.V. Asole, S. Atran, B.H. Aurade, A. Aureli, M. Awawdeh, R. Axelrod, V.B. Badhe, G. Badino, S.D. Bagchi, M.K. Bagde, M.A. Bagirov, K.R. Bagree, D.R. Bahekar, U.D.N. Bajpai, P. Bakaki, L. Bakanidze, J.S. Bakarc, G. Balamurugan, R. Balbinot, R. Baldini Ferroli, T.P. Ballestero, A.M. Band, G. Bandyopadhyay, S. Bandyopadhyay, H. Banerjee, S.K. Banerjee, A.N. Bannore, G. Barbagli, A. Barkat, W.A. Barletta, F. Barré-Sinoussi, L. Barrett, G. Barrocu, P. Bartel, M. Barthelemy, V. Baryakhtar, I. Bashmakov, M. Basile, G. Basile, A. Bassett, M. Bassetti, B. Basu, D. Basu, C.O. Bauer, A. Bazzani, E. Beach, A. Beauchamp, U. Becker, S.G. Bedi, S.Y. Bedore, R.B. Belorkar, N.G. Belsare, M.J.S. Belton, I. Ben Israel, M. Ben-Akiva, G. Benedek, G. Benfratello, M. Benot, R.W. Bentley, J. Berbiers, F. Bergsma, A. Bernotas, A. Bertin, R. Bertola, L.A.M. Bettencourt, V.S. Bhagde, D.R. Bhakre, P.D. Bhalcrao, K.S. Bhamra, N.C. Bhattacharya, T. Bhattacharya, S.N. Bhongle, M. Biagini, G. Biberfeld, S.S. Bijwe, A. Birkhofer, D. Birx, B. Blumberg, A. Boccafoschi, R.K. Bock, D. Bodansky, D.F. Boesch, R.D. Bojkov, L. Bolshov, S.M. Borikar, M.S. Borkar, A. Borthagaray, J.M. Borthagaray, O. Bosch, P. Bosch, E. Boschi, F. Bosio, J. Bouchard, R. Bouclier, A.F. Boukri, M.S. Boulahya, E. Braun, J.M. Braun, K. Brendlow, R.L. Breyer, V.B. Britkov, D. Brookshire, P. Brown, K.-M. Brust, R. Bruzzese, H. Budka, R. Budnitz, C. Bühlmann, F. Buonaguro, E. Buratti, J. Burger, D.K. Burghate, P.H. Burgi, D. Buriot, J. Bus, P. Cailleret, F. Calabrese, G. Caldarelli, K. Caldeira, G.M. Calderone, A. Caliandro, M. Campos, G. Canavan, A. Candela, S. Cannistraro, L. Caputi, G. Cara Romeo, T. Carettoni, G.R. Carmichael, L.V. Carmona, I. Carreca, S. Carruba, R.M. Carter, R. Casaccia, E. Cascetta, J.P. Casciano, A. Castellina, A. Castelvetri, A. Cavallini, A. Cellino, L. Cervenakova, J. Chahoud, D. Challoner, S.M. Chandekar, C. Chapman, G. Charpak, N. Charpak, Bofei Chen, Chaoqiang Chen, Huijun Chen, Jianpu Chen, Limin Chen, Pengri Chen, Senyu Chen, Siyu Chen, A.F. Cheng, D. Chereshkin, M. Cherian, M. Chiarini, A. Chiavassa, A.N. Chilingarov, S.P. Chiney, Yong-Sang Choi, N.H. Christ, S.A. Christopher, P. Chylek, O. Ciancio, L. Cifarelli, M. Cifarelli, F. Cindolo, M.V. Civita, A. Clare, K. Clark, R.A. Clark, J.H. Clarke, R. Cloninger, Zang Coa, E. Coccia, M. Cocco, T.B. Cochran, S. Cocina, D. Cohen, E. Colavita, W.E Colglazier, T.J. Collins, P.M. Conneally, A. Contin, A.H. Cook, S. Cooper, S. Cornelius, W.J. Cosgrove, M. Creutz, D. Crosetto, F. Crosta, I. Crotty, Huachuam Cui, Ruyu Cui, Shiangzong Cui, K. Czerski, V. D'aragona, G. D'Alì, C. D'Ambrosio, M. D'Arcy, S. D'Auria, C. Daase, Guiliang Dai, C.K. Damle, D.N. Darane, M. Dardo, P. Darriulat,

T.K. Das, M. Dasgupta, B.K. Datta, R. Datta, U.R. Datta, S. Datta Majumdar, D. Davasumony, R. Davis, J.W. Day, C. Dazzi, S. De Leon Mendoza, S. De Pasquale, V. De Sabbata, R. De Salvo, E. De Sanctis, G. De The, J.-F. Debroux, C. Decarli, S.T. Dekosky, C. Del Papa, A. Della Torre, Shusen Deng, Yanping Deng, S.L. Deoghare, V.S. Deogoankar, D.W. Deshkar, A.A. Deshmukh, B.T. Deshmukh, D.T. Deshmukh, K.C. Deshmukh, R.M. Deshmukh, V.R. Deshmukh, A.M. Deshpande, G.T. Deshpande, M.V. Deshpande, P.D. Deshpande, J.A. Dhanaraj, S.B. Dhannasare, G.B. Dhanokar, R.V. Dharaskar, M.V. Dhargave, M.T. Dharmadhikari, T.N. Dhobe, S. Di Liberto, M. Di Martino, R. Dierstein, J. Diez-Nicolas, C. Difiglio, G. Dinunzio, P. Diodati, M. Diop, A. Dirac, B. Dirac-Svejstrup, R. Dobinson, S. Dorey, D. Dorogan, P. Douglas, D.H. Douglass, J.E. Drewes, A. Driks, P. Droege, Wenfu Du, Xijiu Du, W. Duax, G. Duca, P. Duggal, A.G. Duncan, R. Duncan, J. Dupont, J. Dupraz, M. Dutta, T. Dyson, K. Eckhard, P.A. Eckhoff, V. Egikova, W. Eichhammer, T. Ekelöf, J. Ekmann, R.B. Elgira, M. Eliashvili, C. Ellis, C.D. Ellis, A.C. Elmore, Z. Eshhar, C. Essex, L. Everett, F. Fabbri, J.P. Fabre, N. Falsaperna, Cheng Fang, Shouxian Fang, Rong-Xiang Fang, M. Farah, M.R. Farlow, R.N. Faustov, Bai Fengning, C.D. Ferguson II, S. Ferrara, L. Ferrario, M. Ferreira Rea, A. Ferro-Luzzi, S. Fetter, G. Fierotti, P.J. Finck, J. Fischer, B. Fischhof, E. Fishbach, M. Fitzpatrick, L. Fog, M. Folstein, S.E. Folstein, D. Fong, P. Ford, D. Ford, R.E. Ford, S. Fortunato, R. Fox, I. Franca Junior, F. Frasconi, L. Friedl, R. Friedrich, E. Friis-Christensen, H. Fritzsch, M. Fukushima, F.P. Fulci, W. Fulgione, W. Fulkerson, M. Fusco Girard, P.M. Gadkari, A. Gagarinski, V.J. Gaikwad, C. Gajdusek, Y. Galaktionov, S. Galassini, P. Galeotti, M. Gallagher, B. Galland, R. Gallo, A. Galvez, M. Ganguli, R. Ganguli, Cuishan Gao, Wei Gao, Wenxiu Gao, P. Garderet, R.L. Garwin, M. Gasperini, J. Gaudacn, K.N. Gawande, S.G. Gawande, S.W. Gawande, G. Geiger, M. Gennari, M. Georgescu, P. Georgescu, H. Ghaffarzadeh, M.H. Ghate, S.M. Ghatole, H. Ghazi, S. Ghernaouti, B. Ghetti, G.A. Ghike, S.G. Ghosh, S.N. Ghosh, E. Giacobino, I. Gilada, G.T. Gillies, T.J. Gilmartin, F. Giorgi, M. Girard, P. Giusti, S. Gizowsky, K. Goebel, W.C. Goede, V.G. Gokhale, V.M. Gokhale, R. Goldoni, B.D. Goldstein, R. Goldstein, G. Gomes Serra, A. Gonzales-Pozo, N. Gopalkrishnan, Y. Gorodkov, M. Gourdin, T. Grahame, G. Gray, K. Gray, W.M. Grayman, A.R. Green, J.M. Greenberg, D. Greene, A. Grieder, D.W. Griffin, A. Grigoryan, J.G. Grimes, M. Grinius, C. Grinnel, A.T. Grove, A. Grübler, Mengping Gu, Shudi Gu, Songhua Gu, Fengqi Guang, I. Guastalla, B. Guerard, O. Guifo, L.J. Guillette, Weixin Guo, Yanan Guo, Zhiyuan Guo, V.D. Gupta, K. Gurney, B. Gurusamy, A. Gusev, T. Gys, M.J. Haddadin, S. Hadjitodorov, J.L. Haines, L. Hammarstrom, Qian Han, D. Hanson, W. Happer, J. Hardy, A.W. Harris, N. Harris, A. Hasanov, M.H.A. Hassan, M. Hassanizadeh, D. Hatzifotiadou, D. Hawkins, J.A. Haynes, R.B. Haynes, Mengjia He, B. Heap, E. Heijne, D. Heim, G. Heindel, S. Hellman, U. Helmbrecht, H.C. Hendrie, G. Herten, D. Hill, J. Hinkula, W.B. Hirurkar, E.K. Hocking, M. Holtzem, J.-M. Hombert, P. Hoodbhoy, H. Hoorani, R. Hoskins, M. Hourican, K. Howdeshell, Jialiu Hu, Jiawei Hu, Lidong Hu, Kaixi Huang, Li Huang, Nan Huang, Yinzhi Huang, R.K. Huber, G. Hubler, P.P. Huddar, W.F. Huebner, Yu-Ping Huo, C. Huraux, S.I. Hussain, C. Hutchinson, J.L. Hutton, N.T. Ibrahimov, G. Iklódy, M.F. Ingalgi, D. Ingersoll, A.G. Ingle, B.G. Ingle, R.P. Ingole, A. Ioppolo, T. Isaacs, Y.Y. Israel, P.K. Iyengar, C. Izaurralde, Y.A. Izrael, P. Jackson, J.D. Jafar, J. Jain, S.K. Jain, R.K. Jambhorka, P.T. James, F. Janouch, J. Jarab, P. Jarron, M. Jefferson, P. Jenni, R.K. Jenny, M. Jensen, Yanwu Jia, Chunhua Jiang, Yanling Jiang, Qingshou Jin, Youkai Jin, Bai Jingzhi, A.S. Joalikar, S. Jobling, D.N. Joharapurkar, K. Johnsen, D. Johnson, V.B. Johri, L. Jones, S.V.

Joshi, D. Jost, V. Journé, B.T. Judge, Yin Jun, D.K. Kadu, R.E. Kahn, B. Kai, L. Kairiukstis, J.M. Kale, M.G. Kale, A. Kamal, A. Kamalakar, M.A. Kamarulnizam, Y. Kamyshkov, T.M. Karadci, I. Karawan, M. Kareithi Fanin, U. Kasper, N. Kassis, W. Kastenberg, D.M. Katarla, T. Kawata, S.A.H. Kbatil, Songbai Ke, D.G. Kelkar, A.A. Keller, B. Kellman, D. Kennedy, G.M. Kesharwani, G.S. Khadekar, M.T. Khadse, G.A.N. Khan, M.Q. Khan, S. Khan, P. Khanal, A.T. Khandare, M.L. Khandelwal, R.B. Kharade, T.M. Kharade, R.B. Kharat, U.U. Kharat, R. Khatami, H. Khatib, S.M. Khodragade, N.W. Khodragade, P. Khosla, Do-Won Kim, D. Kimball, W. Kininmonth, T. Kinoshita, J. Kirkby, M.S. Kishirsagar, V. Klaus, A. Klimburg, E. Klushin, G. Knies, E. Knupp, E. Kobal, L.P. Koh, A. Konovalov, S. Kopits, M.S. Korde, I. Koren, A. Korshenko, C.P. Korthals-Altes, A.P. Kowale, B.P. Kowale, S.J. Kowall, J.-P. Kraehenbuhl, M.N. Krasnoperov, J. Krause, V. Kremenyuk, W. Krisher, J.E. Kristjansson, V. Krivokhizha, D.J. Kroll, N. Kroo, A.V. Krutskikh, Benlin Kuang, J.-F. Kuka, V.P. Kukhar, A.L. Kulikov, A.B. Kulkarni, D.K. Kulkarni, R.S. Kulkarni, A. Kumar, G.N. Kumbhare, R. Kuschel, A. Kutanov, I. Laakso, J.C. Labbè, G.R. Labde, P. Lachmann, K.S. Lackner, S.A. Ladhake, E.F. Lambin, L. Lane, Pengfei Lang, B. Langford, R.B. Lanjewar, R. Lanza, M.V. Lapsa, H. Larsen, S. Lau, G. Laurenti, N. Lawson, Tsung-Dao Lee, A. Lee, A. Lehmann, S. Leivesley, T. Lenton, A.R. Leo, M. Leo, G. Leoni, A. Lerner-Lam, G. Lester, H. Leutz, G. Levi, M. Levine, S. Levisley, Binfang Li, Bomin Li, Dashi Li, Dezhong Li, Guanglin Li, Jia Li, Jiacai Li, Jianguo Li, Jin Li, Youmeng Li, M. Li, V. Liakhovets, A.A. Lindberg, J. Lindsten, R.S. Lindzen, Dachun Ling, R. Linsky, Dekang Liu, Diankui Liu, Shiyao Liu, Tai Liu, Yucheng Liu, C. Liverani, M. Locati, P. Lock, V. Loginov, G.C. Lokre, L. Lone, Shida Long, A.D. Lopez, Changguo Lu, Jihua Lu, Weida Lu, G. Luches, D. Luckey, S. Lueders, H.S. Lunge, Yingxiong Luo, Zihua Luo, M.B. Lyles, P. Lyons, Jimao Ma, G. Maccarrone, M.C. Maccracken, J.S. Mackenzie, J.K. Madhugiri, H. Madsen, A. Maggiora, R.K.W. Mahalle, S.N. Mahapatra, M.A. Mahure, C.K. Majumdar, K. Makino, L. Malagnini, M. Malavasi, F. Mancini, B.N. Mandal, R. Manley, S.V. Manmode, M.E. Mann, J.L. Manputra, C. Mantegna, J.C. Manuguerra, Huishun Mao, B. Maraviglia, A. Margotti, A. Marino, G. Marland, S. Marmi, S. Martellucci, A. Martin, J.-F. Martin, V. Martyniuk, D. Masiga, R.A. Mason, T. Massam, T. Masuda, R. Materia, C.G. Mathe, K. Matsui, B.R. Maurya, C. Mayrhofer, S. Mazurek, P. Mazzanti, G. Mazzari, A.D. Mbewu, S. Mbulaiteye, C. McCombie, G. McConnell, C.A. Mcharc, S. Mcintyre, R. Mckitrick, M. Mckubre, F.J. Mcmahon, F. Mehr, K.H. Meier, H. Meinhard, V.N. Melnikov, S. Mendoza, M.G.K. Menon, A. Merari, M. Mesbahi, V.R. Metkar, R. Meunier, O. Meuvret, G. Meyer, Jianlin Mi, Rongsheng Mi, E.V. Miasnikov, A. Micallef, G. Miceli, L.M. Michaud, V. Mikhailov, A.I. Miller, B.L. Miller, G. Million, M. Milosevska, Dong-Pil Min, G.M. Mirdal, V. Mirianashvili, K.D. Mishra, R.B. Mishra, R.S. Mishra, S.B. Mishra, V.G. Miskin, I.V. Mitrofanov, J. Mittelstrass, A. Miyahara, S.G. Modak, A.K. Modi, G. Mohanty, S.C. Moholkar, C. Monckton of Brenchley, M. Moodie, A.L. Moore, C. Moore, L. Moore, S. Morain, A. Morelli, K. Morey, D. Morrison, F. Motta, A.E. Motter, R. Mount, W. Mualla, W. Mueller Seedorf, A. Mukherjee, S. Mukherjee, D. Mulenex, K.V. Muley, V.D. Muley, K.A. Müller, W. Muller-Seedorf, P.M. Mullineaux, A.M. Mundhada, A. Muriel, J.R. Murrell, S. Muthiah, B. Myers, A.B. Nadange, A. Nagurney, P.T. Naiekar, S.Y. Nandanwar, R. Nania, E. Nappi, G. Nardoni, N. Narjoud, R.Y. Narkhede, S.G. Nasare, K. Nash, V. Nassisi, L. Natrajan, A. Naudi, G. Navarra, B. Ndiaye, R. Nelson, K.A.N. Nerkar, S. Netesov, N. Neureiter, H. Newman, R. Newton, T.N. Nguyen, A.M. Niang, S. Nickovic, J. Niemela, N.A. Nik Mahmud,

B.R. Nikhade, F.M. Nirwan, W. Noh, A. Nolan, D. Norman, M. Ó Cinnéide, V. O'Shea, J. Oehlmann, Sun Kun Oh, E. Okandan, N. Olea, A. Oliva, L. Olsson, J. Ongena, C.R. Ordonez, J. Orear, I. Ortalli, A. Osterhaus, G. Ourisson, E. Özsoy, H.P. Paar, M. Pagliai, R.S. Pagrut, J.P. Pal, M. Pal, P. Palanza, F. Palmonari, G. Palshin, G.W. Paltridge, D. Palumbo, Huibao Pan, N.K. Pande, S.N. Pandey, T.N. Pandey, U.S. Pandey, Jiabiao Pang, K.G. Pangarkar, J.M. Pap, C. Papadia, G. Papini, S. Paradiso, S.C. Paranjape, Y.R. Paranjape, G. Parisi, D.E. Parker, F.L. Parker, R. Parker, T. Parkhalina, S. Parmigiani, D.V. Parwate, G. Passotti, C.B. Patil, M.B. Patil, P.D. Patil, S.P. Patil, B.A. Patki, A.A.N. Patrinos, A. Paul, K.V. Pawar, S.P. Pawar, K. Peabody O'brien, P. Pelfer, A.W. Pendharkar, C.R. Penn, K.D. Pennell, M. Pericak-Vance, G. Perkovich, C. Peroni, E. Perotto, J.S. Perry, V. Peskov, M.S. Petersen, A.T. Peterson, J. Peterson Myers, R. Petroski, A. Peyraube, M. Pezzotti, Duy Hien Pham, D. Piazza, D. Piedigrossi, L. Pietronero, A. Piontkovsky, G. Piragino, V. Pjidaev, C.S. Plesko, V. Plyaskin, G. Pocci, R.B. Pode, J. Podkanski, H.M. Poharkar, C.N. Potdar, N.B. Potdar, J. Pozela, V.K. Pratapwar, H. Pratomo, E. Predazzi, S. Prenafeta-Jenkin, E. Prescott, J. Price, S.D. Prince, G. Prisco, M. Puglisi, H.S. Pundkar, Zhuming Qian, Jimin Qiao, Jiu Qin, Hong Qiu, T. Quirk, R. Ragaini, V. Ragaini, V.D. Raghatate, S.B. Raichur, S. Raimondi, N. Rajabov, R. Rajaraman, V.B. Rajurkar, M. Rama Mohan Mao, A.D. Rangari, S.P. Rant, V.A. Ratate, G.D. Rathod, A.D. Raut, D.R. Raut, A. Razdan, V. Razumas, F. Re, A. Rebane, K. Rebane, B. Reitano, Wenbin Ren, A.C. Revkin, C. Reynolds, M. Ricci, P. Ricci, M. Ricketts, E. Ricotta, G. Righini, A. Rigoni, G. Rinaldi, J. Rispoli, C. Rizzuto, D.O. Rogers, H.-H. Rogner, F. Rohrbach, A. Ronne, N. Rosenberg, A.H. Rosenfeld, L. Rossi, G.T. Rossi, P. Rotelli, R. Roy, Tongze Ruan, E. Rubin, Z. Rudzikas, J.G. Ruiz, J.M. Ruiz, N. Rus, A. Rybalchenko, R. Rydell, H. Rykaszewski, O. Saavedra, N. Sacchetti, A. Safaenili, E. Sagarra, M. Sageman, J. Saginor, L. Said Issa, F. Sala, R. Salerno, I. Salihoglu, M. Salman, N. Samios, N. Samman, T. Sampson, D.L. Samudralwar, N.M. Samuel, I. Sandrea, M. Sankhare, M. Sano, B. Santer, J.C. Santiard, P. Santos-Ocampo, A. Sarkissov, G. Sartorelli, N.N. Saste, K.K. Satpathy, R.V. Satpute, F. Sauer, F. Sauli, M. Saviola, J.B. Savy, A. Saykin, W. Scandale, G. Scarlatti, D. Scavia, D. Schaffer, A. Schaper, E. Schenvit, J. Schipper, H. Schmidt, L. Schneider, R. Schock, E. Schöll, H. Schubert, U. Schuklenk, B. Schürch, R. Schweickart, G. Sciarabba, D. Scigocki, G. Scioli, D.R. Scott, L. Seeber, D. Segre, J. Séguinot, S.H. Selukar, D. Sen, M. Sen Gupta, N.D. Sen Gupta, J.U. Seo, S. Serci, G.G. Serra, G. Servizi, D. Sevier, Hanying Sha, L. Shabanova, E. Shaffer Vergino, D.I. Shahare, V. Sharan, P. Sharp, U. Shavit, N.J. Shaviv, E. Sheffner, V.P. Shelest, Boahua Shen, Junpeng Shen, Tianji Shen, P. Shetty, V. Shevchenko, Yinsheng Shi, Y. Shibata, A. Shihab-Eldin, V.S. Shiramwar, H. Shönbacher, S.P. Shrinkahnde, Weisan Shu, Yuede Shu, H.H. Shugart, J.B. Shukla, E. Shumilov, Shyampati, R. Sibilia, S. Siboni, K.M.B. Siegbahn, G. Simbolotti, G. Simonet, S.F. Singer, M.D. Singh, R.D. Singh, T. Singh, S.K. Singh, J. Singh Rana, K.P. Sinha, K.C. Sivaramakrishnan, A.W. Smith, D.K. Smith, A. Smithson, P.V. Soadekar, A. Sobel, T. Sofu, V.S. Soitkar, G. Soliani, P. Sonderegger, D.N. Soni, S. Sorek, S. Sorooshian, M. Spadoni, M.G. Spillantini, L. Sportelli, G. Sprehn, W.A. Sprigg, K.S. Sreenivasan, R.S.L. Srivastav, A. Starobinsky, L. Stein-Spencer, F. Steinhaeusler, G. Stephens, M. Steuer, W.M. Stigliani, E. Storm, B. Stram, G. Stratan, N. Stratan, C. Strenger, M. Stürmer, M. Suffert, Songlan Sun, Yuelin Sun, Honglie Sun, Yuliang Sun, V.J. Sundaram, S.N. Supe, G. Susinno, H. Svensmark, D.L. Swackhamer, S.P. Swami, H. Swan, S.H. Swan, K. Swanson, K. Szigethy, J. Szyszko, V.A. Tabhane, S. Tailhardat, Y. Takano, K. Talattof, V.K. Tale, G. Tallia, C. Talsness, R.K. Talwekar, M. Tamada, T.M.

Tamhane, H. Tanaka, Baoping Tang, Cheng Tang, Shuming Tang, M.J. Tannenbaum, P. Tans, M.S. Tapi, G.G. Tappan, E. Tarkowski, A. Tavkhelidze, A.N. Tawfik, T. Taylor, S. Tazzari, U. Teipel, M.T. Teli, T.J. Telranhe, B.R. Tembhurne, Kejian Teng, A.E. Terraneo, B. Tertrais, S.C. Thaker, V.A. Thakhare, A.W. Thakre, R.V. Thakre, V.M. Thatte, W. Thielemans, T.L. Thomas, K. Thompson, R.C. Thompson, R. Thorstensson, Fang Tian, L. Tieszen, S.D. Tikar, D. Tillitt, R. Timerbaev, S.C.C. Ting, B.P. Tiwari, S.A. Tiwari, S. Tlou, A.F.B. Tompson, G. Torelli, B. Torto, T. Toth, H.I. Touré, G. Triesman, G.C. Trinchero, P. Tschakert, A.A. Tsonis, V. Tsygichko, V.S. Tumram, G. Turchetti, G. Tveit, W.E. Tyner, P.F. Uhlir, H. Ujita, D.U. Umak, T. Valencic, S. Valenti, P. Vallania, P. Van De Terre, R. Van Der Zwaan, W. Van Dieren, E. Vardas, A. Vasiliev, J. Veizer, Y.P. Velikhov, V. Vengrinovich, G. Venturi, E.S. Vergino, S. Vernetto, I. Vetliski, A.D. Vickery, K. Vidya Gaikwad, Z. Vilakazi, F. Villa, J. Villinger, A. Vishnoi, M. Vivargent, O. Vizitiu, V.D. Volkan, F.S. Vom Saal, B. Von Alvensleben, J.G. Von Der Schmitt, F. Von Hippel, L. Votano, D.C. Wade, D.G. Wadke, S.D. Wadke, F. Waelbroeck, R.V. Waghamare, W.U. Waghmode, R. Walgate, J.D. Walker, S.H. Walkey, A.B. Walkhade, Bosi Wang, Dianchen Wang, Feng Wang, Hengfeng Wang, Hengjiu Wang, Hui-jun Wang, Jin Wang, Linlin Wang, Linzhou Wang, Man Wang, Shuhong Wang, Shuqin Wang, Taijie Wang, Tao Wang, Yunyong Wang, P.B. Wani, A.M. Wankhede, P.C. Wankhede, T.V. Warhekar, J. Warner, A. Warren, W.M. Washington, T.S. Wasnik, H. Wegener, Cao Wei, Kaiyu Wei, Zhuangzi Wei, T. Weidberg, T. Wenaus, H. Wenninger, R. Wesson, J.R. Westby, M. Wheelis, M. White, L. White, T. Wigley, R. Wigmans, C. Wilfert, R.G. Will, C. Williams, M. Willutzky, J. Wilson, R. Wilson, G. Witschel, D. Witthaut, A.T. Wolf, G. Wolf, H. Wolf, L. Wood, E. Worcester, L.J. Wright, Baizhi Wu, Chuanchou Wu, Maw-Kuen Wu, Mian Wu, Weimin Wu, Wentai Wu, Yingzhi Wu, Zhendong Wu, B. Wyslouch, Beixing Xi, Chen Xi, Jiwei Xi, Jun Xia, Liangrong Xiao, Jialin Xie, Peipei Xie, Xiaoxi Xie, Yenyi Xie, Jianming Xu, Shaowang Xu, Xiaokang Xu, Zhongxiong Xu, Zheng Kai Xu, Jingxuan Xue, Shengtian Xue, R. Yagannathan, A. Yair, N. Yamamoto, Binshan Yan, Jie Yan, Taixuan Yan, Wuguang Yan, Dajiang Yang, Yun Yang, H. Yano, Xiaoguang Yao, C.H. Ye, K.E. Yeager, R. Yeager, S.H. Yeh, A.K. Yelne, S.V. Yenkar, D. Yeomans, D.A. Yerxa, Zeng Yi, Jun Yin, Zhaosheng Yin, Cai Yixing, Zhang Yiyan, H. Youn, T. Ypsilantis, Fangqun Yu, Qinchang Yu, Qingfu Yu, Zhenze Yu, Zhongqian Yu, Daoxian Yuan, Wen Yue, T. Yuhara, T.M. Zachariah, M. Zahrani, A.V. Zaitsev, G. Zanetti, I.S. Zektser, H. Zeller, R. Zetterstrom, Boachang Zhang, Chuang Zhang, Huashun Zhang, Pinghua Zhang, Yan Zhang, Yingping Zhang, Zhenjiu Zhang, Xiliang Zhang, Yiyan Zhang, Bin Zhao, Duo Zhao, Fuguang Zhao, Jijiu Zhao, Jingbao Zhao, Weiren Zhao, Yongjie Zhao, Guoqing Zheng, Linsheng Zheng, Shuchen Zheng, Youchun Zheng, Zhipeng Zheng, Cai Zhiguo, Shicai Zhong, Dadi Zhou, Jikang Zhou, Shu Zhou, Xiaoguang Zhou, Yuehua Zhou, Fuquan Zhu, Liangsheng Zhu, Renquan Zhu, Ren-Yaun Zhu, Shangen Zhu, Yucan Zhu, Jie Zhuang, A. Zichichi, J. Ziegler, J. Zinn, G.M. Zinovjev, K. Zographos, H. Zvonkova.

# APPENDIX 6:

# RECORDS OF ALL ACTIVITIES ARE IN THE PROCEEDINGS OF THE INTERNATIONAL SEMINARS ON PLANETARY EMERGENCIES, PUBLISHED BY WORLD SCIENTIFIC

# PROCEEDINGS OF THE INTERNATIONAL SEMINARS ON NUCLEAR WAR AND PLANETARY EMERGENCIES

THE SCIENCE AND CULTURE SERIES
Nuclear Strategy and Peace Technology

---

Chairman and Series Editor: Antonino Zichichi

---

1981 International Seminar on Nuclear War — 1st Session: The World-wide Implications of Nuclear War.

1982 International Seminar on Nuclear War — 2nd Session: How to Avoid a Nuclear War.

1983 International Seminar on Nuclear War — 3rd Session: The Technical Basis for Peace.

1984 International Seminar on Nuclear War — 4th Session: The Nuclear Winter and the New Defence Systems: Problems and Perspectives.

1985 International Seminar on Nuclear War — 5th Session: SDI, Computer Simulation, New Proposals to Stop the Arms Race.

1986 International Seminar on Nuclear War — 6th Session: International Cooperation: The Alternatives.

1987 International Seminar on Nuclear War — 7th Session: The Great Projects for Scientific Collaboration East-West-North-South.

1988 International Seminar on Nuclear War — 8th Session: The New Threats: Space and Chemical Weapons — What Can Be Done with the Retired I.N.F. Missiles-Laser Technology.

1989 International Seminar on Nuclear War — 9th Session: The New Emergencies.

1990 International Seminar on Nuclear War — 10th Session: The New Role of Science.

1991 International Seminar on Nuclear War — 11th Session: Planetary Emergencies.

1991 International Seminar on Nuclear War — 12th Session: Science Confronted with War.

1991 International Seminar on Nuclear War and Planetary Emergencies — 13th Session: Satellite Monitoring of the Global Environment.

1992 International Seminar on Nuclear War and Planetary Emergencies — 14th Session: Innovative Technologies for Cleaning the Environment.

1992 International Seminar on Nuclear War and Planetary Emergencies — 15th Session (1st Seminar after Rio): Science and Technology to Save the Earth.

1992 International Seminar on Nuclear War and Planetary Emergencies — 16th Session (2nd Seminar after Rio): Proliferation of Weapons for Mass Destruction and Cooperation on Defence Systems.

1993 International Seminar on Planetary Emergencies — 17th Workshop: The Collision of an Asteroid or Comet with the Earth.

1993 International Seminar on Nuclear War and Planetary Emergencies — 18th Session (4th Seminar after Rio): Global Stability Through Disarmament.

1994 International Seminar on Nuclear War and Planetary Emergencies — 19th Session (5th Seminar after Rio): Science after the Cold War.

1995 International Seminar on Nuclear War and Planetary Emergencies — 20th Session (6th Seminar after Rio): The Role of Science in the Third Millennium.

1996 International Seminar on Nuclear War and Planetary Emergencies — 21st Session (7th Seminar after Rio): New Epidemics, Second Cold War, Decommissioning, Terrorism and Proliferation.

1997 International Seminar on Nuclear War and Planetary Emergencies — 22nd Session (8th Seminar after Rio): Nuclear Submarine Decontamination, Chemical Stockpiled Weapons, New Epidemics, Cloning of Genes, New Military Threats, Global Planetary Changes, Cosmic Objects & Energy.

1998 International Seminar on Nuclear War and Planetary Emergencies — 23rd Session (9th Seminar after Rio): Medicine & Biotechnologies, Proliferation & Weapons of Mass Destruction, Climatology & El Nino, Desertification, Defence Against Cosmic Objects, Water & Pollution, Food, Energy, Limits of Development, The Role of Permanent Monitoring Panels.

1999 International Seminar on Nuclear War and Planetary Emergencies — 24th Session: HIV/AIDS Vaccine Needs, Biotechnologies, Neuropathologies, Development Sustainability – Focus Africa, Climate and Weather Predictions, Energy, Water, Weapons of Mass Destruction, The Role of Permanent Monitoring Panels, HIV Think Tank Workshop, Fertility Problems Workshop.

2000 International Seminar on Nuclear War and Planetary Emergencies — 25th Session: Water – Pollution, Biotechnology – Transgenic Plant Vaccine, Energy, Black Sea Pollution, Aids – Mother-Infant HIV Transmission, Transmissible Spongiform Encephalopathy, Limits of Development – Megacities, Missile Proliferation and Defence, Information Security, Cosmic Objects, Desertification, Carbon Sequestration and Sustainability, Climatic Changes, Global Monitoring of Planet, Mathematics and Democracy, Science and Journalism, Permanent Monitoring Panel Reports, Water for Megacities Workshop, Black Sea Workshop, Transgenic Plants Workshop, Research Resources Workshop, Mother-Infant HIV Transmission Workshop, Sequestration and Desertification Workshop, Focus Africa Workshop.

2001 International Seminar on Nuclear War and Planetary Emergencies — 26th Session: AIDS and Infectious Diseases – Medication or Vaccination for Developing Countries; Missile Proliferation and Defense; Tchernobyl – Mathematics and Democracy; Transmissible Spongiform Encephalopathy; Floods and Extreme Weather Events – Coastal Zone Problems; Science and Technology for Developing Countries; Water – Transboundary Water Conflicts; Climatic Changes – Global Monitoring of the Planet; Information Security; Pollution in the Caspian Sea; Permanent Monitoring Panels Reports; Transmissible Spongiform Encephalopathy Workshop; AIDS and Infectious Diseases Workshop; Pollution Workshop.

2002 International Seminar on Nuclear War and Planetary Emergencies — 27th Session: Society and Structures: Historical Perspectives – Culture and Ideology; National and Regional Geopolitical Issues; Globalization – Economy and Culture; Human Rights – Freedom and Democracy Debate; Confrontations and Countermeasures: Present and Future Confrontations; Psychology

of Terrorism; Defensive Countermeasures; Preventive Countermeasures; General Debate; Science and Technology: Emergencies; Pollution, Climate – Greenhouse Effect; Desertification, Water Pollution, Algal Bloom; Brain and Behaviour Diseases; The Cultural Emergency: General Debate and Conclusions; Permanent Monitoring Panel Reports; Information Security Workshop; Kangaroo Mother's Care Workshop; Brain and Behaviour Diseases Workshop.

2003 International Seminar on Nuclear War and Planetary Emergencies — 29th Session: Society and Structures: Culture and Ideology – Equity – Territorial and Economics – Psychology – Tools and Countermeasures – Worldwide Stability – Risk Analysis for Terrorism – The Asymmetric Threat – America's New "Exceptionalism" – Militant Islamist Groups Motives and Mind-sets – Analysing the New Approach – The Psychology of Crowds – Cultural Relativism – Economic and Socio-economic Causes and Consequences – The Problems of American Foreign Policy – Understanding Biological Risk Chemical Threats and Responses – Bioterrorism – Nuclear Survival Criticalities – Responding to the Threats – National Security and Scientific Openness – Working Groups Reports and Recommendations.

2003 International Seminar on Nuclear War and Planetary Emergencies — 30th Session: Anniversary Celebrations: The Pontifical Academy of Sciences 400th - The "Ettore Majorana" Foundation and Centre for Scientific Culture 40th – H.H. John Paul II Apostolate 25th – Climate/Global Warming: The Cosmic Ray Effect; Effects on Species and Biodiversity; Human Effects; Paleoclimate Implications; Evidence for Global Warming – Pollution: Endocrine Disrupting Chemicals; Hazardous Material; Legacy Wastes and Radioactive Waste Management in USA, Europe; Southeast Asia and Japan – The Cultural Planetary Emergency: Role of the Media; Intolerance; Terrorism; Iraqi Perspective; Open Forum Debate – AIDS and Infectious Diseases: Ethics in Medicine; AIDS Vaccine Strategies – Water: Water Conflicts in the Middle East – Energy: Developing Countries; Mitigation of Greenhouse Warming – Permanent Monitoring Panels Reports – Workshops: Long-Term Stewardship of Hazardous Material; AIDS Vaccine Strategies and Ethics.

2004 International Seminar on Nuclear War and Planetary Emergencies — 31st Session: Multidisciplinarity Global Approach of Governments and International Structures: Societal Response – Scientific Contributions to Policy – Economics – Human Rights – Communication – Conflict Resolution – Cross-Disciplinary Responses to CBRN Threats: Chemical and Biological Terrorism – Co-operation Between Russia and the West – Asymmetrical Conflicts – CBW Impact – Cross-Disciplinary Challenges to Emergency Management, Media Information and Communication: Role of Media in Global Emergencies – Emergencies Responders – Working Groups' Reports and Recommendations.

2004 International Seminar on Nuclear War and Planetary Emergencies — 32nd Session: Limits of Development: Migration and Cyberspace; in Europe; Synoptic European Overview; From and Within Asia; Globalization - Climate: Global Warming; a Chronology; Simple Climate Models; Energy and Electricity Considerations – T.S.E.: CJD and Blood Transfusion; BSE in North America; Gerstmann-Straussler-Scheinker Disease – The Cultural Emergency: Innovations in Communications and IT – Cosmic Objects: Impact Hazard; Close Approaches; Asteroid Deflection; Risk Assessment and Hazard Reduction; Hayabusa and Follow Up – AIDS and Infectious Diseases: Ethics in Medicine; International Co-operation; Laboratory Biosecurity Guidelines; Georgian Legislation; Biosecurity Norms and International Organizations, Legal Measures Against Biocrimes – Water and Pollution: Cycle Overview; Beyond Cost and Price; Requirements in Rural Iran; Isotope Techniques; Clean and Reliable Water for the 21st Century – Permanent Monitoring Panels Reports – Workshops: Global Biosecurity; Cosmic Objects.

2005 International Seminar on Nuclear War and Planetary Emergencies — 34th Session: Energy: Nuclear and Renewable Energy; Energy Technologies for the 21st Century; Repositories Development; Nuclear Power in Europe and in Asia; The Future of Nuclear Fusion – Climate: Global Warming; Celestial Climate Driver; Natural and Anthropogenic Contributions; Climate Data and Comparison with Models; Understanding Common Climate Claims – AIDS and Infectious Diseases: New Threats from Infectious Agents – SARS Epidemic; Vaccines Development;

Transmissible Spongiform Encephalopathies Update – Limits of Development: International Points of View on Migration – Pollution: Science and Technology; Subsurface Laser Drilling – Desertification: A Global Perspective; Integrated Approach – Disarmament and Cultural Emergencies: A WFS Achievement in China; Non-Proliferation – Permanent Monitoring Panel Reports – Workshops: Energy; Information Security; Building Resilience Associated with the Third Meeting on Terrorism.

2006 International Seminar on Nuclear War and Planetary Emergencies — 36th Session: Energy: Global Nuclear Power Future; Global Monitoring of the Planet Proliferation: Nuclear Weapons; AIDS and Infectious Diseases: Avian Flu – Global Health; Climatology; Global Warming/Aerosols and Satellites; Pollution: Plastic Contaminants in Water; Information Security: Relevance of Cyber Security; Limits of Development: Development of Sustainability; Defence Against Cosmic Objects; WFS General Meeting; Cultural Energy-Focus: Terrorism; Permanent Monitoring Panel Reports; Limits of Development Permanent Monitoring Panel Meeting; World Energy Monitoring Workshop.

2007 International Seminar on Nuclear War and Planetary Emergencies — 38th Session: World Energy Crisis; Managing Climate Change; Mitigation of Greenhouse Gases; Geoengineering & Adaptation; Theoretical Alternatives to Climate Modelling; US Missile Defence Shield; Global Monitoring of the Planet; Life Cycle Nuclear Energy Environmental Issues; The Epidemic of Alzheimer; Infectious Agents and Cancer.

2008 International Seminar on Nuclear War and Planetary Emergencies — 40th Session: Energy: Nuclear Power Present and Future; Sustainability of Biofuels; Resolving the Nuclear Waste – Climatology Model and Statistics; Ozone and Climate Change Interaction; Spatio-Temporal Field of Atmospheric $CO_2$; Forest Policies – Medicine: Vector-Borne Diseases; Screening Technology – Pollution: Air-Borne Particulates – Global Monitoring of the Planet: Disarmament and Non-Proliferation Regime; The Crisis in Internet Security; The Northern Sea Route – The Erice Science for Peace Award Scientific Session.

2009 International Seminar on Nuclear War and Planetary Emergencies — 42th Session: World Energy Crisis – Energy & Pollution: Essential Technologies for Managing the Coupled Challenges of Climate Change and Energy Security, Energy, Water, Climate, Pollution & Limits of Development in Asian Countries; Global Monitoring of the Planet-Sensitivity of Climate to Additional $CO_2$ as Indicated by Water Cycle Feed-back Issued, Climate Uncertainties Addresses by Satellites, The Basic Mathematics Needed for all Models; Pollution and Medicine – The Revolution in the Environmental Health Sciences and the Emergence of Green Chemistry; Information Security – Cyber Conflict and Cyber Stability; Finding a Path to Cyber Peace; Cultural Pollution – The Erice Science for Peace Award Scientific Session.

2010 International Seminar on Nuclear War and Planetary Emergencies — 43rd Session: The Role of Science in the Third Millennium Energy: Nuclear Power Plants – Sustainable Systems – Pollution: Oil Spills – Air, Water and Waste Criteria – Climate: Paleoclimate Natural Variations and Implications – Sensitivity, Climategate, USA Legislation – Cosmic Objects: Countermeasures – Mitigation of Terrorist Acts: Scientific Contributions to Biosecurity – Lectio Magistralis: Science in Everyday Life – Information Security: Cyber Conflicts and Stability – The Erice Science for Peace Award Scientific Session.

2011 International Seminar on Nuclear War and Planetary Emergencies — 44th Session: The Role of Science in the Third Millennium Energy: World Energy Crisis – Global Nuclear Energy Issues after Fukushima – Energy Efficiency / Energy and Pollution – Unconventional Natural Gas: Benefits and Risks / Climate – Cosmic Rays and Climatic Processes / Water and Pollution – Water Scarcity and Pollution – Contaminants of Emerging Concern / Information Security – The Role of Science in Information Technology and Internet Tools in Developing Countries Food, Soil & Medicine – Greenhouse Gases Consequences – Evidence-Based Third Millennium Medicine / Lectio Magistralis – The Role of Science in the Third Millennium.

2012 International Seminar on Nuclear War and Planetary Emergencies — 45th Session: Lectio Magistralis Global Warming Emergency/Why Science is Needed for the Culture of the Third Millennium – Mitigation of Terrorist Acts – Improvised Nuclear Devices – Gap Analysis of EU – Precenting Nuclear Explosive Terrorism – Public Perception / Climate & Climate Economics / Global Nuclear Energy Issues – Outlook in Japan, China, Europe and USA – Sustainable Nuclear Energy Systems – Economics of Nuclear Power / Energy & Sustainability in Cities – Global Sustainibility – Smart Grids – Complexity / Global Food Production & Forest Dynamics / Water, Pollution & Terrorism / Brain Aging & Behaviour / Frontiers in Fast Computing & Informatics / Information Security.

2013 International Seminar on Nuclear War and Planetary Emergencies — 46th Session: Why Science is Needed for the Culture of the Third Millennium – Lectio Magistralis: Alliance between Politics and Science / Nuclear Power Safety and Development / Water Pollution & Terrorism / Climate and the Limits of Geoengineering / Mitigation of Megaterrorism and Hybrid Threats / Pollution Innovative Cleanup Technologies / Information Security: Cybersecurity at Cross-Roads / Energy – Key to the Evolution of Cities / Energy as a Planetary Emergency / AIDS and Infectious Diseases.

2015 International Seminar on Nuclear War and Planetary Emergencies — 48th Session: The Role of Science in the Third Millennium / Why Science is Needed for the Culture of the Third Millennium / The New Manhattan Project /The USA-Iran Nuclear Agreement / Toward Global Eradication of Infectious Disease / Renewable and Nuclear Energy / Energy End-Use Management / Ipcc: Issues and Alternatives Dying Oceans / Countering Terrorism with Technology and Data Cyber Security Issues / Systematic Errors in Climate Measurements / Energy for the Poor / Terrorist Motivations / Emerging Risk of Endocrine Disrupting Herbicide / Mechanisms of Susceptibility/Resistance to Human Pathologies / Cosmic Objects Update / Water Pollution and Development Issues–EU Energy Transition Plans and Ship-Based Nuclear Energy

# REFERENCES

[1] *Scientific Culture and the Ten Statements of John Paul II*
A. Zichichi, in Proceedings of the Plenary Sessions of the Pontifical Academy of Sciences on *The Cultural Values of Sciences (*8-11 November 2002), *Scripta Varia* 105, pp. 288-313, Vatican City (2003).

[2] *The Evolution of Gaugino Masses and the SUSY Threshold*
F. Anselmo, L. Cifarelli, A. Peterman and A. Zichichi, *Nuovo Cimento* 105A, 581 (1992);

*The Normalization Group in Quantum Theory*
E.C.G. Stueckelberg and A. Petermann, *Helv. Phys. Acta* 24, 317 (1951);

*La Normalisation des Constantes dans la Théorie des Quanta*
E.C.G. Stueckelberg and A. Petermann, *Helv. Phys. Acta* 26, 499 (1953);

*Quantum Electrodynamics at Small Distances*
M. Gell-Mann and F.E. Low, *Phys. Rev.* 95, 1300 (1954);

*Introduction to the Theory of Quantized Fields*
N.N. Bogoliubov and D.V. Shirkov, Interscience Publishers, New York (1959);

*Renormalization Group and the Deep Structure of the Proton*
A. Petermann, *Phys. Reports* 53, 157 (1979);

For a lucid decription of the subject see '*Renormalization and Symmetry: a review for Non-Specialists*', S. Coleman, in '*Properties of the Fundamental Interactions*', Erice 1971, A. Zichichi (ed), Editrice Compositori, Bologna, 605 (1973).

[3] *Complexity Exists at the Fundamental Level*
A. Zichichi, in *How and Were To Go Beyond the Standard Model*, Proceedings of the International School of Subnuclear Physics, Erice 2004, Vol. 42, pp. 251-327, World Scientific (2007); presented at Desy, Hamburg, November 2005;

*Complexity and Predictions at the Fundamental Level of Scientific Knowledge*
A. Zichichi, in Proceedings of the Plenary Session of the Pontifical Academy of Sciences on *Predictability in Science: Accuracy and Limitations* (3–6 November 2006), *Acta* 19, pp. 11-33, Vatican City (2008);

*Complexity at the Fundamental Level of our Knowledge*
A. Zichichi, in Proceedings of the Plenary Sessions of the Pontifical Academy of Sciences on *Complexity and Analogy in Science: Theoretical Methodological and Epistemological Aspects* (5–7 November 2012), *Acta* 22, pp. 57-90, Vatican City (2015).

[4] *The Ten Challenges of Subnuclear Physics*
A. Zichichi, in Proceedings of the *International Conference on "Quantum [un]speakables" in Commemoration of John S. Bell*, 10-14 November 2000, International Erwin Schrödinger Institut (ESI), Universität Wien (Austria), pages 429-477 (2002).

[5] *The New Manhattan Project – Science for Peace the World Over*
A. Zichichi, Il Cigno GG Edizioni (2015).

[6] *Scienza ed Emergenze Planetarie*
A. Zichichi, Rizzoli, three editions (1993–1994), Supersaggi Rizzoli, twenty-three editions (1996–2006).

[7] *Galilei, divin uomo*
A. Zichichi, Il Saggiatore, four editions (2001–2006), Marco Tropea Editore, two editions (2009–2010), translated into English and published by Italian Physical Society, two editions (2009–2010);

*Galileo Galilei's Genius in all fields of Human Knowledge*
A. Zichichi, SIF (2010–2012);

*Exhibition and Solemn Mass in honour of Galileo Galilei*
A. Zichichi, SIF (2010–2012);

*The Cultural Roots of the Work of Art 'Galilei Divine Man' donated by the CCAST Scientists to the Basilica*
A. Zichichi, SIF (2011–2012).

[8] *Subnuclear Physics - The First Fifty Years*
A. Zichichi; O. Barnabei, P. Pupillo and F. Roversi Monaco (eds), Academy of Sciences and University of Bologna, published by World Scientific, Series in 20th Century Physics, Vol. 24 (2000).

[9] *Rigorous Logic in the Theory of Evolution*
A. Zichichi, in Proceedings of the Plenary Sessions of the Pontifical Academy of Sciences on *Scientific Insights into the Evolution of the Universe and of Life* (31 October – 4 November 2008), *Acta* 20, pp. 101-178, Vatican City (2009).

[10] *Neither Science nor Civilization Could exist Without Memory. The Science for Peace Erice Prize*
A. Zichichi, WFS (2007).

[11] A *Lesson for the Future of Our Science My Testimony on Lord Patrick M.S. Blackett*
A. Zichichi, World Scientific (2016).

[12] *Experimental Observation of Antideuteron Production*
T. Massam, Th. Muller, B. Righini, M. Schneegans and A. Zichichi, *Nuovo Cimento* 39, 10 (1965).

**(1985)** Geneva (Reagan & Gorbachev)

**1939 $\Rightarrow$ 1989 $\Rightarrow$ 50 years**

$6 \times 10^4 \times 10^6$ tons $\Rightarrow 6 \times 10^{10}$ $\Rightarrow$ ton (tnt) equivalent

60,000 H Bombs $\Rightarrow 6 \times 10^9$ $\Rightarrow$ 10 tons (tnt) procapite

**1989 ⟹ 2000 ⟹ 72 Planetary Emergencies**

**Saint John Paul II ⟹ 8 October 2000**

**H.H. Pope Francis ⟹ 9 October 2016**

⟹ + 50 years

?

# ATTENTION PLEASE

$6 \times 10^4 \times$ H Bombs $\Longrightarrow$ **STATIC**

72 Planetary Emergencies $\Longrightarrow$ **DYNAMICS**

**One example: Smog $\Longrightarrow$ in one year**
**467,000 in Europe (EEA)**