

Giuliano Preparata: Riflessioni su uno scienziato per eccellenza 25 anni dopo

A lecture to honour a friend and a great scientist

Giuliano Preparata

Who paved the way for us to follow

By

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Roma

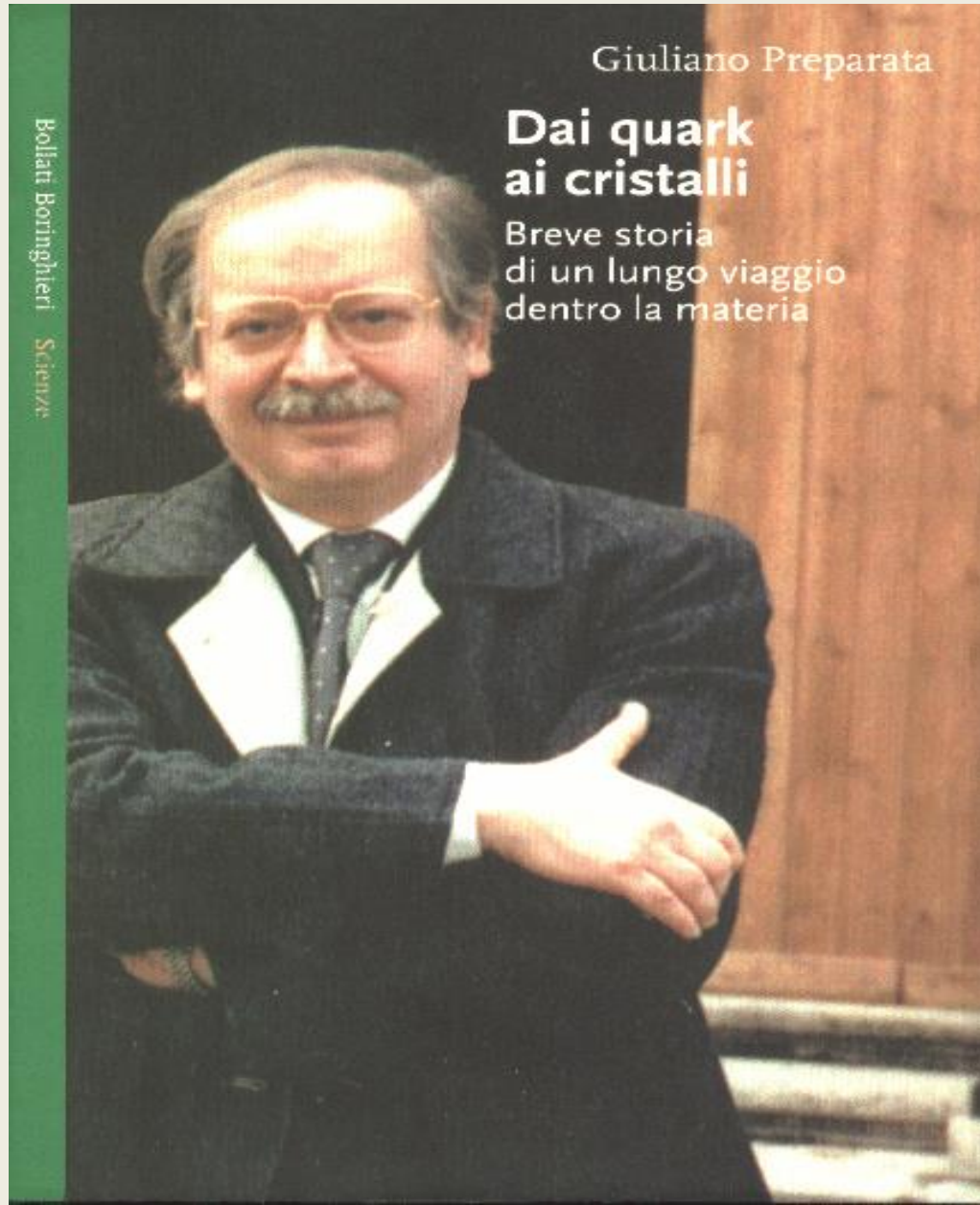


Grazie
a
Prof.ssa
Francesca
Nardi
Preside
Liceo
Ambrosoli
per la sua
ospitalità

Copertina del libro **Dai Quark ai cristalli** publicato da Bibliopolis Napoli



Giuliano Preparata



A pioneer in

1. Operator Product Expansion
2. Structure of Water
3. Memory of Water
4. CF/LENR
5. Free Electron Laser
6. Markov Chain in Biological Evolution

A Born Teacher



Much beloved by his students



Two aspects of GP Research

- 1. What makes water quintessential to life?

Laser like properties

Coherence & superradiance

Ferro-electric

Memory of Water

recent developments: water battery

- 2. Nuclear effects from Smart Materials:

Piezo-electrics

recent developments: pyro-electric fusion

Water as a Free Electric Dipole Laser

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(Received 23 May 1988)

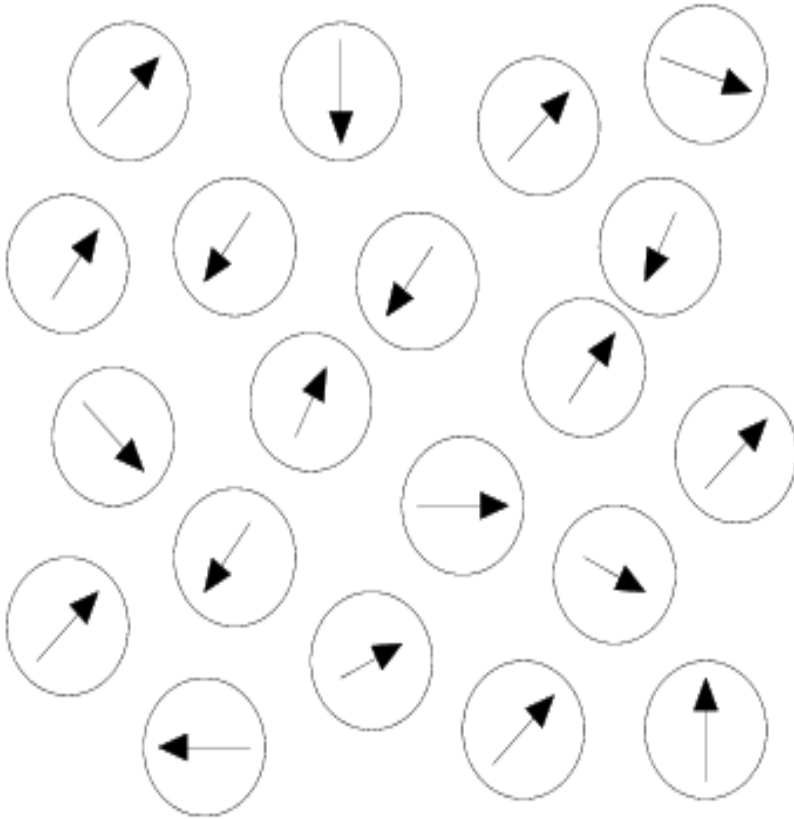
We show that the usually neglected interaction between the electric dipole of the water molecule and the quantized electromagnetic radiation field can be treated in the context of a recent quantum field theoretical formulation of collective dynamics. We find the emergence of collective modes and the appearance of permanent electric polarization around any electrically polarized impurity.

Two Phases of Water I:

Bulk Water

&

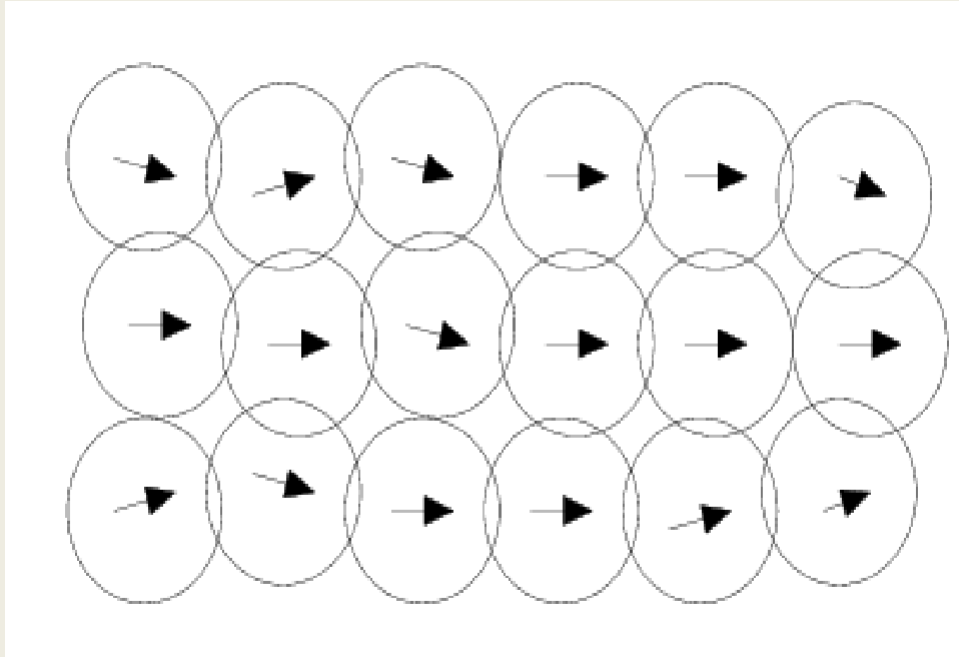
E(xcluded) Z(one) Water



Bulk Water is a Fluid Colloidal Suspension of Polarized Domains Floating Within a Background of Normal Water with no Net Ordered Polarization.

Skim Milk is a Dilute Colloidal Suspension of Fat Domains in Bulk Water

Two Phases of Water II:



**Interfacial Water is a
Liquid Crystal
Ferro-electric With
Overlapping
Polarized Domains that
Yield a Net Polarization**

**Cream is a Dense Colloidal
Suspension
of Fat Domains in Bulk
Water**

Two Phases of Water III:

Milk from a Cow

Phase Separates into Cream Floating on Top of Skim Milk.



Two Phases of Water IV:

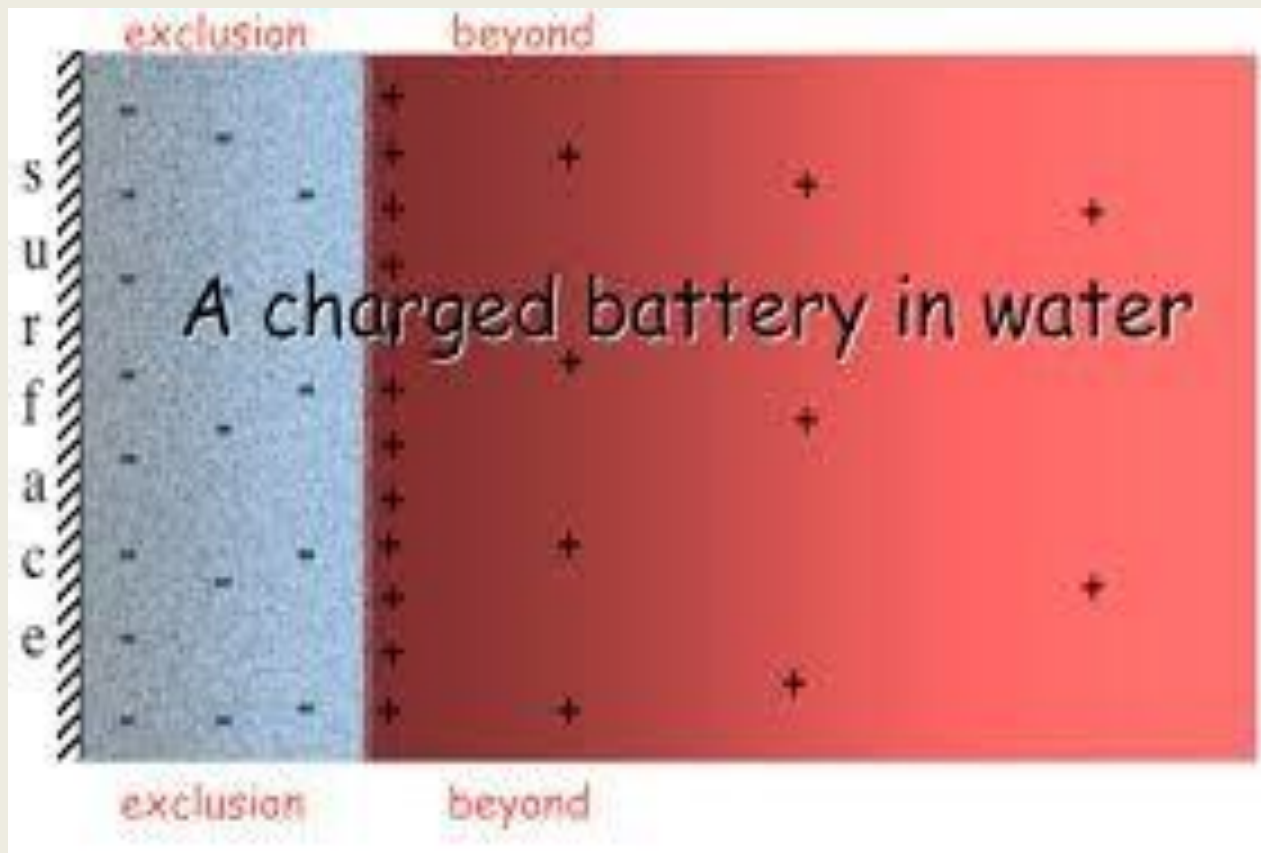
Interfacial Water Floats on Top of the

Normal Water Emulsion

A Copper Coin Floats on Top of the Interfacial Water



Pollack's Water Battery



EZ Water

Separates charges
And thus current
can flow

Between negative
and

Positive charges:
A Water Battery
[powered by the
Sun]

Comments

- If by any means pressure waves of sufficient intensity are created, our previous work has shown that large electric fields are created just the vehicle needed to ignite LENR via Fermi/Majorana weak interaction fusing an electron with a proton to form a neutron and a neutrino or, if the field is even stronger two deuterons (or other ions) can overcome their Coulomb repulsion and cause fusion.

From our Maxwell pressure tensor paper in Phys. Rev. E80 (2009) 016301

- the central result of this section
- $P + (1/2) \rho v^2 + \rho g z - \varepsilon(E^2/8\pi) = \text{const.} \quad (56)$
- This directly relates the pressure P in water to the electric field E ; ε is the dielectric constant

GP: Nuovo Cimento:104(1991)1259.

*A new look at solid state fractures, particle emission and
``cold fusion''*

LENR through Smart materials:

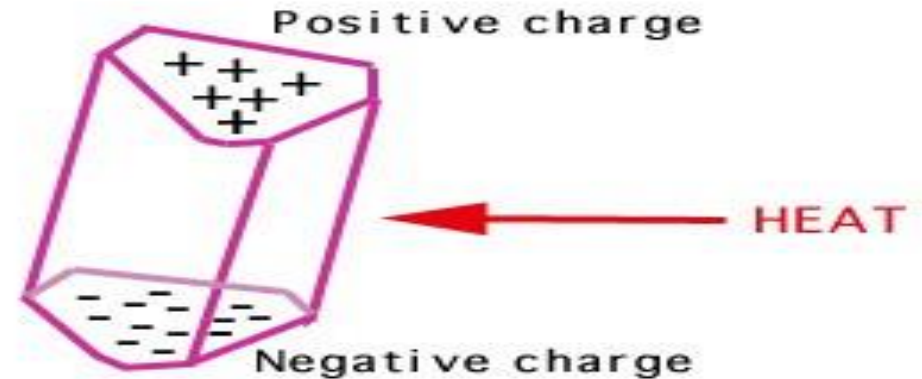
- Piezo-electrics [GP]
- Pyro-electrics [UCLA 2004-]
- Ferro-electrics

Smart materials can create large electric fields that can accelerate electrons and ions to cause nuclear reactions.

Two Smart Materials

1. Pyroelectric crystals:
when heated or cooled
produce electric fields

Pyroelectric property



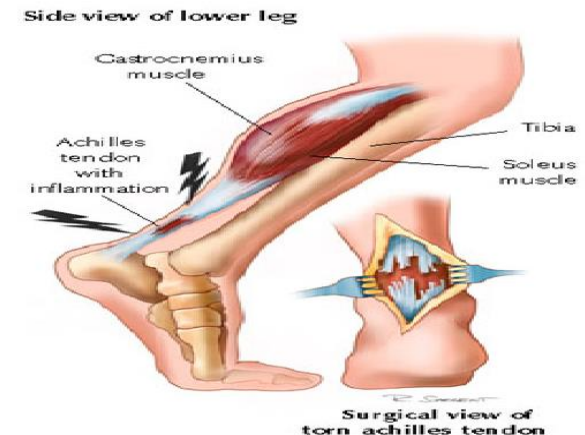
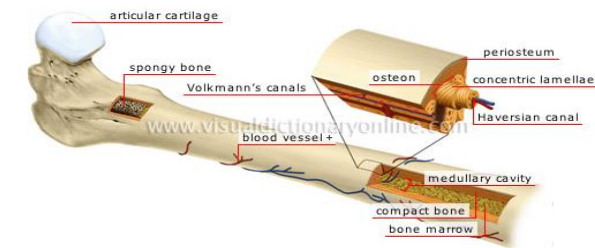
2. Piezoelectric crystals
when crushed produce
electric fields



LENT in Smart Materials I: Pyroelectrics

A pyroelectric crystal develops an electric field due to (adiabatic) changes in its temperature and its opposite: an applied electric field causing an adiabatic heating or cooling of the system is called the electrocaloric effect.

- Examples of natural pyroelectric crystal are: tourmaline, bone, tendon.
- It was experimentally shown that pyroelectric crystals when heated or cooled produced nuclear dd fusion evidenced by the signal of 2.5 MeV neutrons.



Pyroelectrics IV

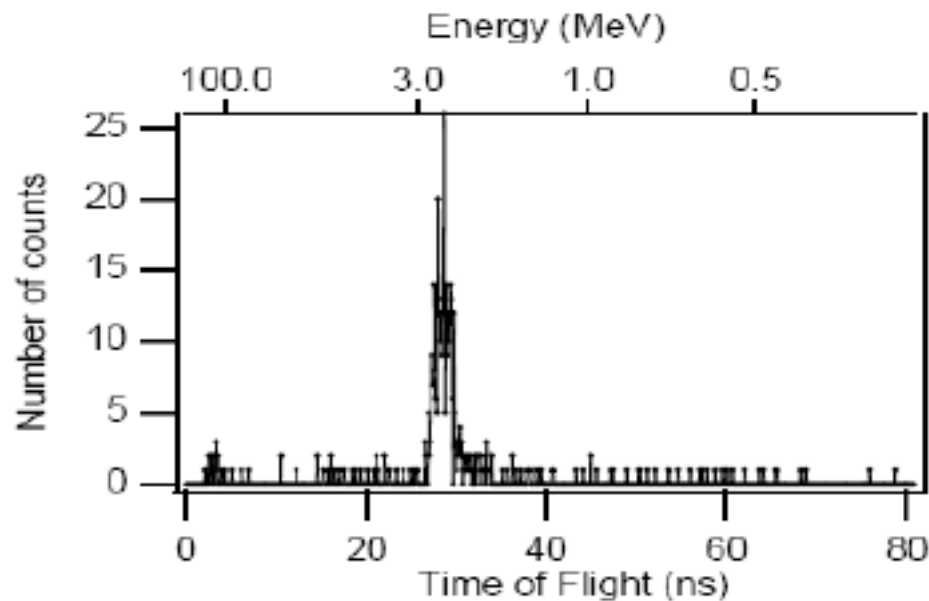
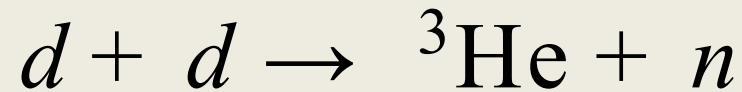
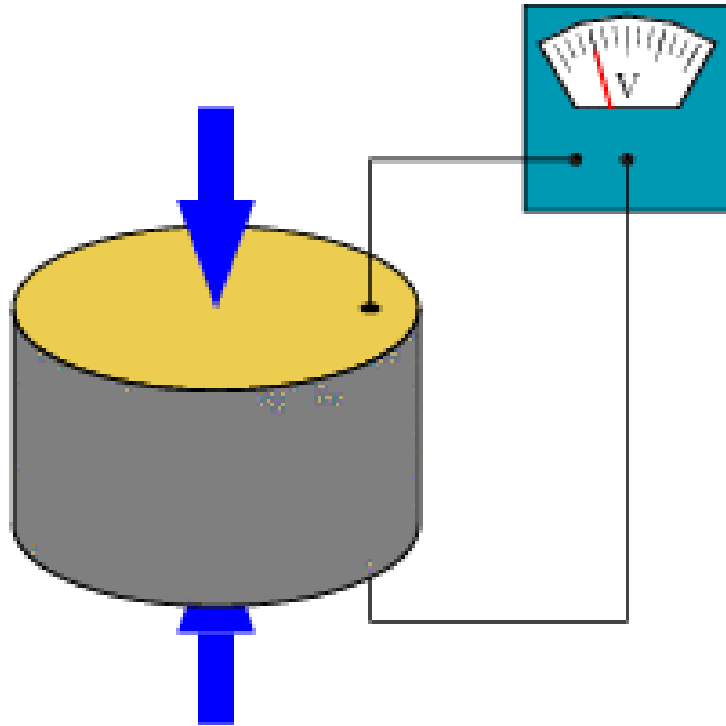


FIG. 1. Neutron time-of-flight spectrum. Neutrons were detected 62 cm from the target using a 7 mm thick plastic scintillator. The peak occurs at 2.45 ± 0.2 MeV, characteristic of DD fusion.

Piezoelectric Solids



**Strains in a crystal
produce voltages
across the crystal
and vice versa.**

Electro-strong LENT I

Electro-strong Nuclear Disintegration in Matter

J. Swain, A. Widom and Y. Srivastava

arXiv: 1306.5165 [nuc-th] 19 June 2013

arXiv: 1306.6286 [phys-gen ph] 25 June 2013

Real photons and virtual photons [from electron scattering] have been used for over 50 years to disintegrate nuclei through giant dipole resonances.

In the past, accelerators have produced the needed [10–50] MeV photons for breaking up nuclei.

Our suggestion: accelerate electrons up to several tens of MeV through lasers and “smart” materials to cause electro-disintegration

Conclusions

There is no biology without water

Why?

Water is very complex: it is a ferro-electric
hence it can make ferro-electric chains & trees

Water is also a piezo-electric.

This means that when a stress is applied, it can produce
electric fields and vice versa

The bones in our body are piezo-electric

The tendons are pyro-electric.

This means that if there is a change in temperature, there is
an electric field produced and vice versa.

We are at the beginning of a marvelous adventure in
understanding the true implications of water in biology

**Thank you
for your attention
and
your patience**

Further Slides

Nuclear reactions induced by *smart* materials I

- As usual -far ahead of his time- in a relatively unknown paper [Il Nuovo Cimento, 94 (1991) 1259], GP recognized that novel phenomena could be generated in smart materials:
- Under stress, a piezoelectric material generates an electric field.
- If the electric field is sufficiently large, then nuclei can be accelerated so much so that they can overcome the Coulomb barrier to cause nuclear fusion.
- This brilliant notion has since then been generalized to include other smart materials such as pyroelectrics and ferroelectrics.
- Nuclear fusion of (i) two deuterons into helium-3 and a neutron and (ii) fusion of a deuteron and a triton into helium-4 and a neutron have now been experimentally achieved through the employment of (1 cm)³ Lanthanum Tantalate (pyro-electric) crystals.
- Ferro-electrical and other applications are under development.

LENR: a continuing controversy

GP was much criticized by Italian physicists and maligned in the press for his cold fusion work with Fleischmann & Pons.

When these scientists filed a defamation case against a particularly virulent article in *Repubblica*, the Italian judge ruled in their favour asking *Repubblica* to pay damages to Fleischmann & Pons but not to GP & Emilio del Giudice on the grounds that GP & EdG did not have much prestige to lose!

A bizzarre judgment reminding us of a famous Samuel Johnson quip:

The Law, Sir, is an ass

arXiv 1211.0924v1 [phys gen-phys] October 27, 2012

Allan Widom, John Swain, YS

Our Basic Result:

All fundamental interactions

Gravitational, Strong, Electromagnetic & Weak

Lead to LENR both in Nature and in the laboratory.

The debate should no longer be about their veracity.

The challenge now is to use modern technology to find new practical applications of the Standard Model of Particle Physics.

This was the goal of the Preparata Project at Perugia

Conclusions:

Overwhelming experimental evidence and sound theoretical arguments now exist that all four fundamental interactions lead to LENR both in Nature and in the laboratory.

If before you were only convinced, now you can feel certain.

Hence, it is time to assemble and use modern technology to achieve further sorely needed applications of the Standard Model of Particle Physics. We must in the words of T. S. Eliot – a consummate academician himself- stop indulging in



“a tedious argument of insidious intent”