New Nuclear Reactions:
Neutrons and Nuclear Metamorphosis

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In the last tenths of years, our team obtained nuclear reactions without using large size reactors.

Their occurrence was deduced by two main reasons:

1. Detection of nuclear components (neutrons, alpha particles) emitted from the treated materials
2. Detection of elements different from those present in the samples before treatment.

Both these facts indicate that the obtained reactions are not of chemical nature but nuclear.

In any case, no gamma radiation was produced: this fact is astonishing as the dangerous gamma radiation is usually a direct consequence of the most of nuclear reactions.

Also, the direction and time characteristics of these reactions are different from those of the up-to-now know nuclear ones.

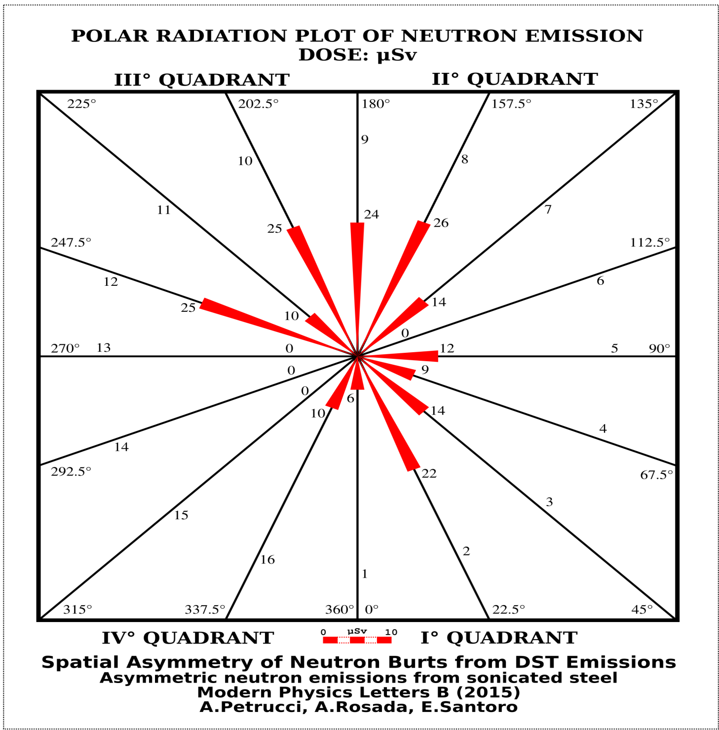

Fig.1
Neutron energy distribution. The length of the central lines is proportional to the reported dose (µSv) registered in the corresponding detector. The evaluated incertitude varies between 0.2 µSv (at 0 µSv) and 3 µSv (at 26 µSv). A possible calibration error only induces a systematic factor. The direction of the local terrestrial magnetic field is also reported.
The directions of maximum intensity (detectors number 2 and 10) and minimum intensity (detectors 6 and 14) are mutually perpendicular.

Due to their unusual characteristics, the peculiar name of Deformed Space-Time (DST) reactions was given to them, thus making reference to the DST-theory (Ref. 1, 2 and 3), which can justify their occurrence.

Unusual emissions: the case of Neutrons

As an example of the spatial anisotropy and asymmetry of the DST-reactions, fig.1 reports the dose of neutrons emitted from a cylindrical bar of AISI 304 Steel submitted to three-minute irradiation of ultrasound (Ref. 4).

Beside the general anisotropy and asymmetry of the emitted intensity, one can note that the direction of maximum intensity (detectors number 2 and 10 of fig.1) is normal to the direction of minimum intensity (detectors 6 and 14).

Not only the spatial distribution of neutron beams but also their time distribution is not uniform (Ref.5). In fact, in all the performed experiments, they are intense bursts of short duration in different directions. These properties make them difficult to detect, as the position of the detector must not correspond to a zero of intensity while the standard methods of signal elaboration eliminate them together with noise impulses, due to their impulsive character.

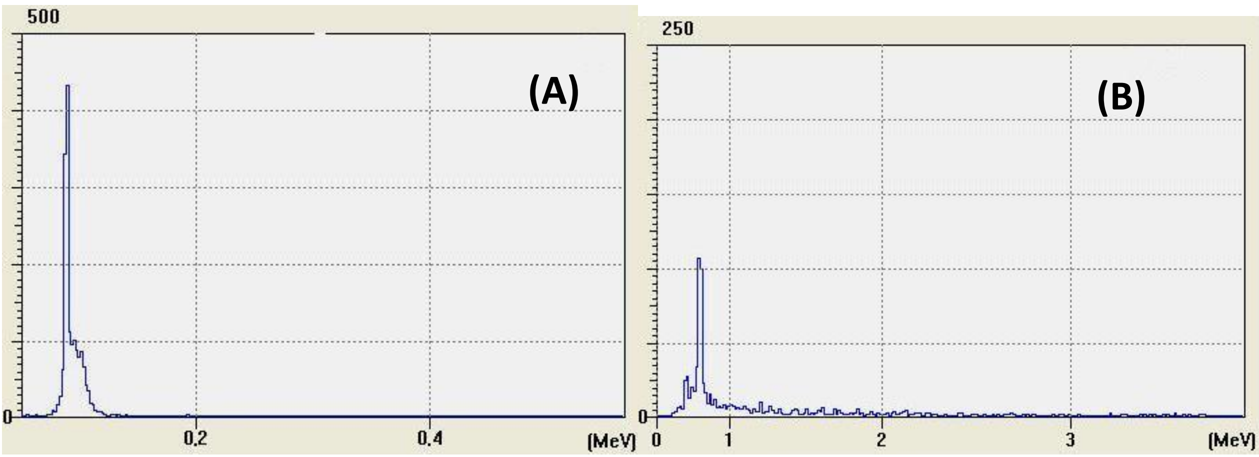

Fig.2 Deformed Space Time (DST) neutron spectrum:
(A) 0 – 0.3 MeV - Helium-3 gas detector,
(B) 0.3 – 3 MeV - NaI(Tl) liquid scintillator detector.

Measurements of energy distribution were performed in Ref. 6. The main results are reported in figures 2 and 3 in terms of energy spectra and neutron fluence. The formers are measured in the range between 0 and 0.3 MeV by using a Helium-3 gas detector and in range from 0,3 and 3 MeV by a NaI liquid scintillator (figure 2). The energy spectra and the fluence in the range from 0 to 20 MeV (figure 3) were measured by using a BTI MICROSPEC2 Neutron Probe which is a complex detector containing both a liquid scintillator and a Helium-3 proportional counter.

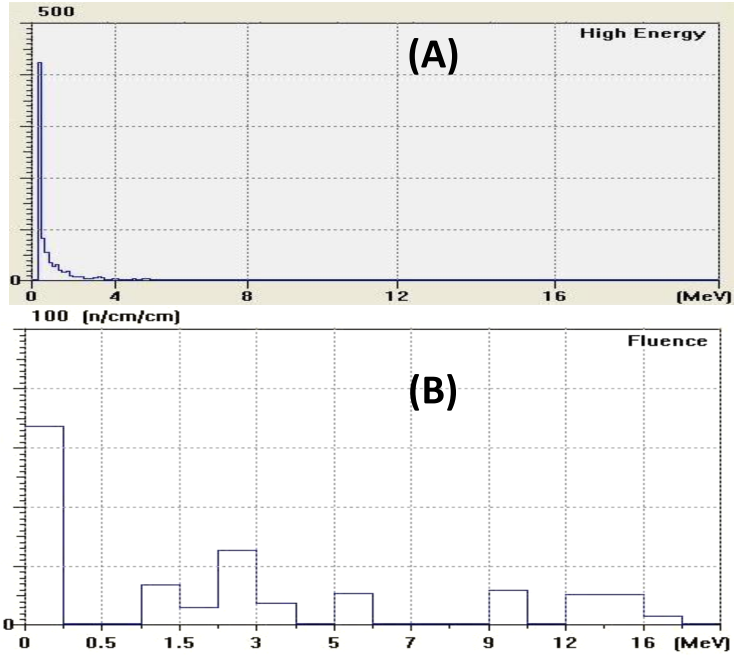

Fig. 3.
Energy spectrum (A)
and fluence (B)
of DST neutrons
in the range from 0 to 20 MeV.
(MICROSPEC2 Neutron Probe)

Nuclear Metamorphosis in Mercury

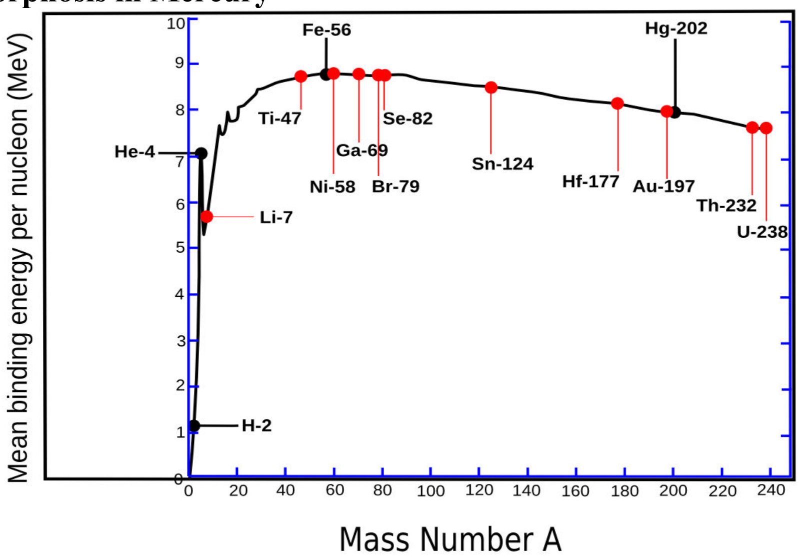

Fig.4 The continuous line reports the mean binding energy per nucleon as a function of the mass number. Reactions products obtained in Mercury (ref.5) are indicated as circles with a line either pointing down or to the right.
Some reference elements are also reported: Hydrogen (H-2) with the lowest binding energy; Helium (He-4) corresponding to a characteristic "knee" in the curve; Iron (Fe-56) with the highest binding energy and the initial material Mercury (Hg-202).

The above reported anisotropic emission of neutrons was attributed to the breakdown of Local Lorentz Invariance (Ref. 3). An experiment was conceived (Ref. 7) aiming at reproducing this breakdown, in order to induce unusual reactions in a mole of Mercury.

As these conditions were supposed to be attained, the most striking effect detected was that different elements were found before and after the treatment. Their atomic mass was both heavier and lighter than Mercury. Usually, fusion reactions can produce heavier nuclei but the starting elements and those produced are lighter than Iron; fission reactions, on the other hand, produce lighter elements but they only concern elements heavier than Iron. On the contrary, the reaction products in Mercury were either lighter or heavier of Iron and also of Mercury, as one can see in figure 4.

An element was considered as a reaction product if it was detected by at least two different techniques and it was not present in the initial pool of Mercury, in the container or in the used devices.

This cut is very severe as an element is excluded also when it is present as a different isotope; it is also excluded when detected by different instruments used by different investigators in different laboratories if they make use of the same technique.
A subsequent paper (Ref. 8) announced that the results were confirmed by a laboratory enabled to release official certifications having legal value.

Nuclear reactions were also supposed to occur in the case of treated solutions containing Thorium (Ref. 9). In that case a diminution of radioactivity is more likely to be attributed to a change of nuclear composition rather than to a reduction of the mean-life.

For a more extensive information about these experimental results, the related theoretical explanation and other experimental results concerning DST-reactions one can consult Ref. 10, which is ever updated.

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