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RESEARCH ARTICLE

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Abstract

Paul Kazuo Kuroda, the first nuclear scientist to examine Hiroshima's ruins in August 1945, became a patriarch of humanity who discretely risked his life to exposefalse nuclear modelsafter WWII that isolated humanity from reality, violated Einstein's 1905 hypothesis and Aston's 1922 confirmation: Atomic rest mass (***m***) indelibly records nuclear energy (***E***), including neutron repulsion in cores of heavy elements, like the uranium atoms powering nuclear reactors and atomic bombs, ordinary stars like the Sun, galaxies and the currently expanding universe. After Kuroda's 2001 death, BBC reported Kuroda had secretly retained a copy of Japan's WWII atomic bomb design.

Introduction:-

Einstein (1905) proposed and Aston (1922)measured atomic rest masses and received the 1922 Nobel Prize in Chemistry for confirming that the mass (*m*) of ordinary atoms is stored energy (*E*),$E = mc^2$. Aston reported atomic masses in units of nuclear *"packing fraction"* (***f***), where f = M/A -1, when M is the measured mass in atomic mass units (amu) and A is the atomic mass number.

After Chadwick (1932a.b) discovered the neutron,Weizsacker (1935) andBethe and Backer (1936)developed a semi-empirical neutron-proton model of the nucleus to calculate values of *"nuclear binding energy"* that subtly disagreedwith the implications of Einstein's 1905 equation and Aston's 1922 nuclear *"packing fractions."*Calculated values for *"nuclear binding energy"* of many neutron-rich radioactive atoms are greater than the calculated values for *"nuclear binding energy"* of their stable decay-products, e.g., ^{3}H *vs.*^{3}He, ^{14}C *vs.*^{14}N, *etc.*,becausecalculated values of *"nuclear binding energy"* are systematically higher for neutron-rich atoms than for proton-rich atoms by 0.782 MeV per neutron (Manuel, 2016a,b).

Kuroda's genius became evident eighty years earlier, following Aston's lecture on nuclear *"packing fractions"*at the Imperial University of Tokyo on *13 June 1936*, when Kuroda was a 19-year-old student.Young Kuroda noticed,and later recorded in his autobiography,theinability of a physicist in the audience to grasp Aston's concept of nuclear *"packing fraction"*(Kuroda, 1992, page 7).

Nine years later, in *August 1945*, Kuroda wasthe faculty member at the Imperial University of Tokyo sent to examine the ruins of Hiroshima. There, Kuroda realized, *"The sight before my eyes was just like the end of the world,but I also felt that* ***the beginning of the world may have been just like this****"* (Kuroda, 1982, last line of page 2).

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Eleven years later, in*April 1956*after immigrating to the United States in 1949,Kuroda went to the Annual Spring Meeting of the American Geophysical Union (AGU) to suggest that natural, self-sustaining nuclear fission reactors burned spontaneously on Earth about two billion years (2 Ga) ago.Kuroda's report - implying that self-sustaining nuclear fission reactions had occurred spontaneously, without access to the technical "nuclear secrets" used in building atomic bombs and the first man-made, self-sustaining nuclear chain reactor at the University of Chicago on 2 Dec 1942 - was not well-received at AGU. Kuroda's report was limited to a single page publication (Kuroda, 1956). Kuroda's 1956 hypothesis was, however, confirmed sixteen years later by a group of scientists working for the French Atomic Energy Commission (1972). The group fortunately included a keen analytical chemist (H. Bouziges) who had insisted on finding out why ^{235}U abundance in a routineanalysis of uranium from the Oklo Mine was only 0.7171 ± 0.0007 %, versus the expected value of 0.7202 ± 00006 % (Braun, 2013).

The author met Kuroda in*May 1960*, four years after Kuroda's 1956 suggestion ofnatural, self-sustaining nuclear fission reactors in the early Earth had been openly criticized as impossible at the AGU meeting, and Manuel wasconvinced to accept Kuroda's research assignment on the *"Origin of the solar system and its elements"*afterKuroda sharedthe following surprising, new unfolding informationwith the author:

- Reynolds (1960a)discovery that the Richardton meteorite contained excess radiogenic ^{129}Xe from *in situ*decay of extinct, 17-Ma year^{129}I,synthesized shortly before the meteorite formed,
- Reynolds (1960b) report that the entire abundance pattern of the nine stable isotopes of primordial xenon in meteorites was distinct from that in air, and
- A preprint of Kuroda's (1960) paper suggesting the spontaneous fission of extinct 82-Ma year^{244}Pu,produced shortly before Earth formed, may have generated the excess heavy xenon isotopes in air.

All three of these1960 papers were consistent with Kuroda's 1945 insight into the beginning of the world in an explosive nuclear event, like the destruction of Hiroshima (Kuroda, 1982, last line of page 2) and element synthesis almost coincident with the birth of the solar system, shortly beforesolid grains ofmeteorites and planets began to condense. All of these 1960 paperswere confirmed by subsequentanalyses of meteorites (e.g., Rowe and Kuroda, 1965; Manuel et al., 1972; Lee at al, 1996), terrestrial samples (e.g., Alexander et al., 1971; Boulos and Manuel, 1971) and planets (e.g., Manuel et al., 1998).

Results and Discussion:-

Anerror in the definition of "*nuclear binding energy"* is illustrated by plotting atomic rest mass data from the Brookhaven National Laboratory (Tuli, 2000) in the manner shown in Figure 1.

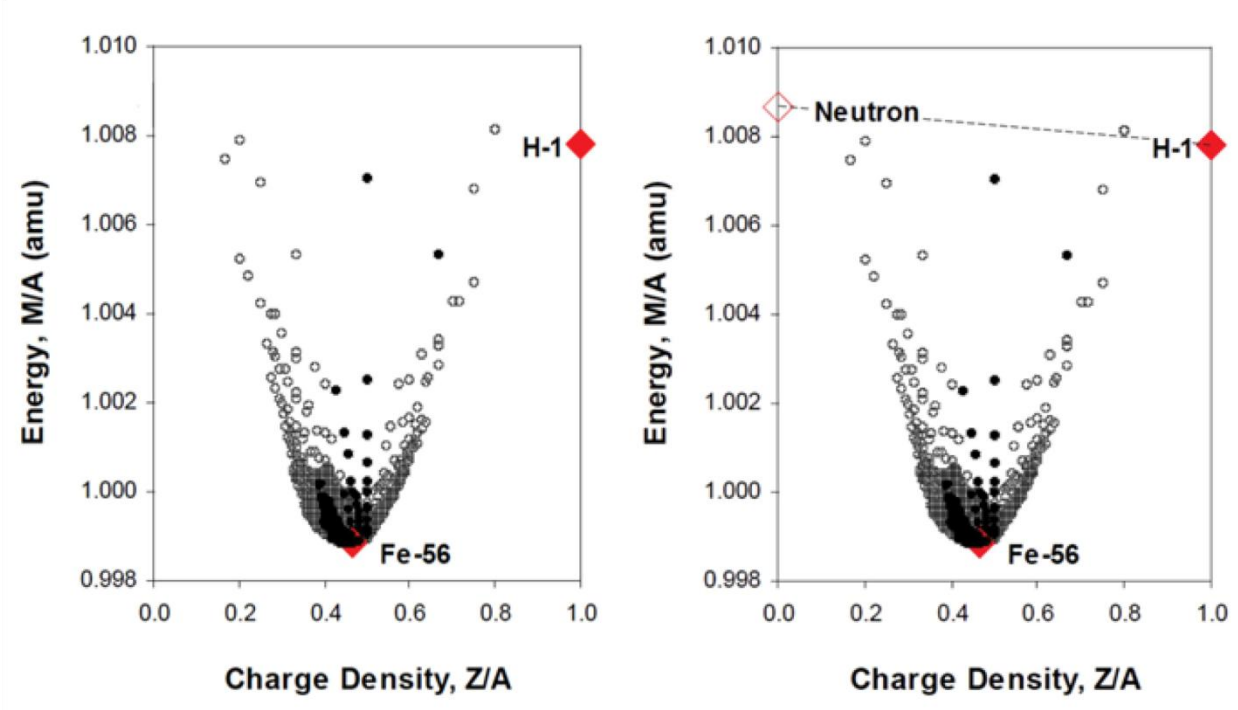

Fig. 1: The figure on the left shows energy (mass) in each atom, in the manner suggested by Einstein (1905) and measured by Aston (1922). After Chadwick (1932a,b) discovered the neutron, the figure on the right shows the sloping baseline from which Weizsacker (1935) and Bethe and Bacher (1936) calculateddeceptively high values of *"nuclear binding energy"*in neutron-rich atomsand obscured neutron repulsionas the source of energy that explosively destroyed Hiroshima and Nagasaki from atoms of uranium and plutonium, respectively.

Neutron repulsion is the primary source of energy in the pulsar core of the Sun that created and sustains atoms, lives and planets in the Solar System. Neutron repulsion is empirically verified in ordinary atoms as extrapolated values of least-squares atomic rest parabolas at Z/A = 0 (See Figure 3 in Manuel, 2016b):

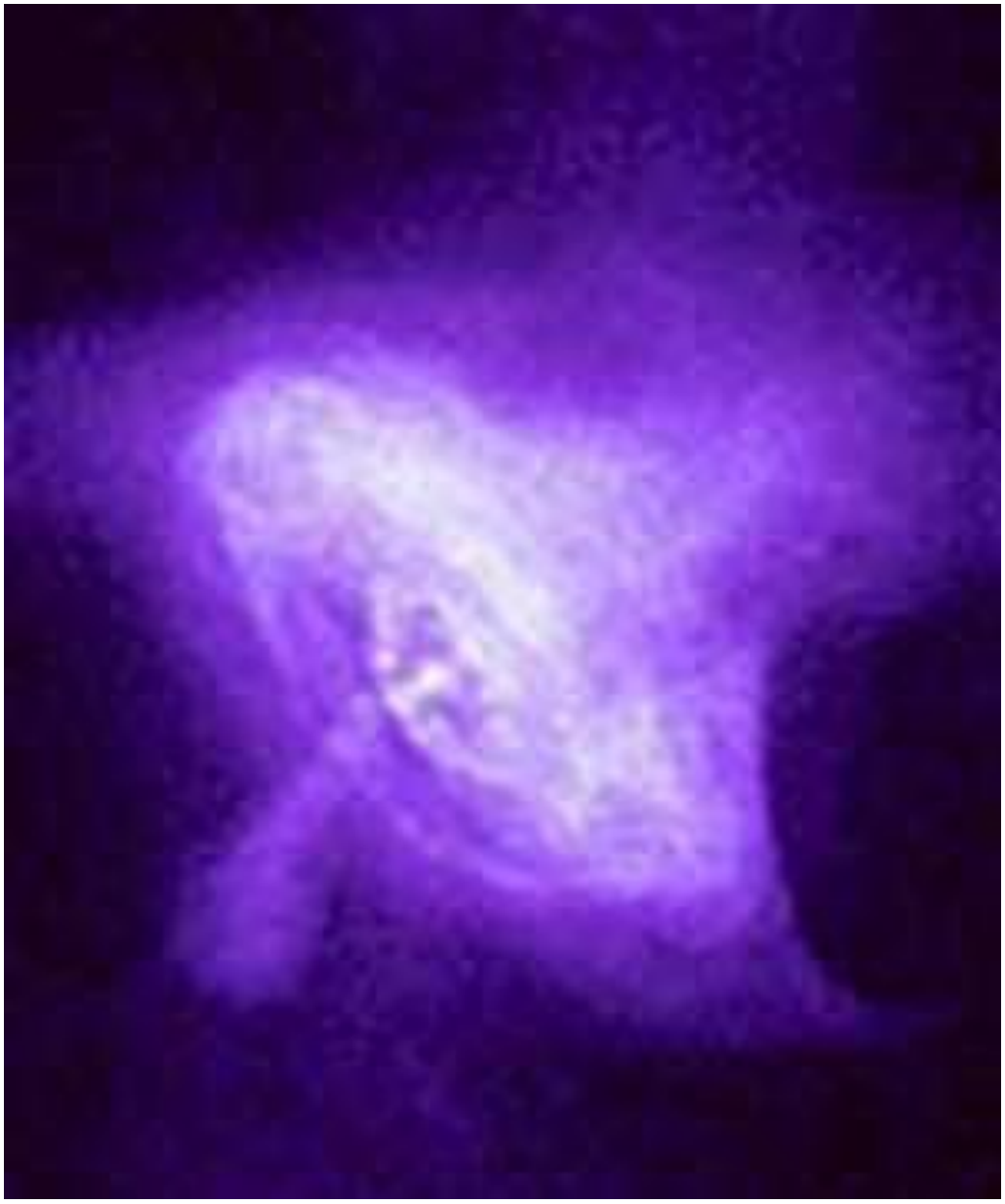

Fig. 2: Einstein (1905) predicted and Aston (1922) confirmed that atomic rest mass (***m***) is stored energy (***E***), $\boldsymbol{E = mc^2}$. They provided the framework to understand the origin of the Solar System and its elements five billion years (5 Ga) ago and the forces that control human destiny and Earth's climate, including abrupt solar eruptions that may periodically reset civilization (Karoff et al., 2016; Clery, 2016; Persson, 2016).

Conclusion and Acknowledgements:-

Kuroda died in 2001 (Manuel 2001a,b). Then BBC News (2002) reported that his widow returned the design for Japan's WWII atomic bombs that Kuroda had secretly retained after immigrating to the United States in 1949. As a Japanese national, Kuroda *"was not eligible to work on nuclear studies that involved U.S. national security"* (Manuel 2001a), but Kuroda's knowledge of the working of atomic bombs and nuclear reactors was the key to identifying the error in nuclear binding energy that isolated global humanity from reality after WWII.

During his career, Kuroda (1982, 1992) repeatedly drew attention to an***enticing promise*** and ***grave warning***in the last paragraph of Aston's 1922 Nobel Prize Lecture: *"Should the research worker of the future discover some means of releasing this energy in a form which could be employed, the human race will have at its command powers beyond the dreams of scientific fiction; but the remote possibility must always be considered that the energy once liberated will be completely uncontrollable and by its intense violence detonate all neighboring substances. In this event the whole of the hydrogen on the earth might be transformed at once and the success of the experiment published at large to the universe as a new star"*(Aston, 1922). We do not know if fear of worldwide nuclear annihilation contributed to the misunderstanding of nuclear energy after WWII. We know only a little. More will be revealed, if we adhere to the basic principles of science.

This paper is dedicated to all those who wish President-elect Donald J. Trumpsuccess in restoring integrity to government science and humanity's contact with reality. Numerous friends, anonymous scientists and bloggers encouraged publication of this summary of the heroic efforts of the late Professor Paul Kazuo Kuroda (1917-2001) to prevent the misuse of nuclear secrets to isolate humanity from reality, including two well-known geo-ethicists, Drs. Nils-Axel Mörner and VáclavNěmec.

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