LETTERS TO PROGRESS IN PHYSICS

On the Explanation of the Physical Cause of the Shnoll Characteristic Histograms and Observed Fluctuations

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Interpretations are given herein regarding the very visionary and important Pu-239 histogram work of Shnoll, and calling attention to background research which was not fully described in that paper. In particular, this Letter gives results of our theoretical and experimental research of gravitational anomalies during total solar eclipses and planetary line-up, and compares interpretations of the data with the work of Shnoll.

I am writing this Letter-to-the-Editor in reference to the very luminary paper authored by S. Shnoll [1], published in this journal, because of the far-reaching impact of the implications of this paper in describing nature, and because I have corresponded scientifically with the author on the subject of his repeat-pattern histogram work [2, 3] since 2001 when I first conveyed to Shnoll that his very meritorious radioactive decay findings of periodicities was an element of a larger and more ubiquitous external-particle net-transfer-of-momenta model and theory in which the origin of gravity due to collision-induced phenomena, was the initial cornerstone [4]. At that time Shnoll reported that the cause of the periodicities in his radioactive decay histograms was unknown but must be due to "profound cosmophysical phenomena" [2, 3]. The cited references within [1] do not convey the full background of the work leading to that paper [1] which Shnoll refers to as a survey, but in my opinion is far beyond a simple review-of-the-literature paper, and is instead a very significant archival work. Additionally, within the text itself [1] there are no references to the private communications References 40 and 41 cited in the list of references in [1]. For these above reasons, I wish to clarify various elements of the paper [1].

I also advised Shnoll in 2003 and 2004 to search out his earlier Pu-239 alpha decay data that were taken at the time of a total solar eclipse [5], doing so because I was impressed with his work during 2003 on characteristic histograms during the New Moon, observed simultaneously independent of location and latitude [6]. As stated, although my work, and that of colleague, Frank Lucatelli, is referenced as private communications in Shnoll's paper [1], as Refs. 40 and 41, those references are not cited in the text, but instead only in the bibliography, and thus most readers would be unaware of our input into Shnoll's paper of [1]. I also conveyed to Dr. Shnoll our own work whereby at my request, colleagues had measured a dip in the radioactive decay of Co-60 in south-eastern Kansas, and in Po-210 in the Boston area at the time of the total solar eclipse of 4 December, 2002, when the "umbra" passed closest to the isotope sources [7]. We predicted that this effect would be observed based on the data of Allais [8], and of Saxl and Allen [9] showing decreases in gravity associated with the eclipses of 1954 and 1959, and the eclipse of 1970, respectively, and also based on the dip in gravity which I observed using a dual Newton-cradle pendula system during the planetary line-up of Earth-Sun-Jupiter's/magnetosphere-Saturn on 18 May 2001 [10]. This prediction was based on my postulate that if gravity were a result of external particle impingement on mass particles, then the other three axiomatic "forces" should also depend upon, or be influenced by the external particle flux.

In this Letter-to-the-Editor, I wish to address points regarding Dr. Shnoll's interpretation of his decades of data, and of the data of others.

Shnoll has conducted very excellent collimator studies, which showed that when the collimator was pointed north toward the pole star, the near-daily-periods in the repeat histogram patterns of Pu-239 decay were *not* observed, contrasting the data showing repeat histograms when the collimators were oriented east, and when they were oriented west. Shnoll interprets these data stating that … "Such a dependence, in its turn, implies a sharp anisotropy of space." I suggest that a better and more correct manner to interpret these data is in terms of the Earth-Moon-Sun system, spinning and orbiting in the east-west ecliptic plane interrupting, through capture and/or scattering, elementary particles (probably neutrinos) that would otherwise impinge upon the radioactive source and perturb the weak interaction in unstable nuclei. This is not a proof of heterogeneity and anisotropy of space time in a general sense, but indication of celestial body orbits that exist in the general plane of the ecliptic — the external particles being omnidirectional, and the heterogeneity arising generally from supernovae explosions and their consequences. Shnoll earlier in the paper rightfully states, referring to daily, monthly, and yearly periods in repeat forms of the histograms, that "All these periods imply the dependence of the obtained histogram pattern on two factors of rotation — (1) rotation of the Earth around its axis, and (2) movement of the Earth along its circumsolar orbit", thus supporting the above explanation. Shnoll alludes to this explanation by stating that a heterogeneity in the gravitational field results from the existence of "mass thicknesses" of celestial bodies, and this then must relate to the capture cross-section between nucleons of the mass bodies. Stanley [11] has described in detail the properties of mass that relate to gravity, and treated mathematically the flux of externally impinging neutrinos [11] as related to gravitational interactions. Shnoll invokes a "wave interference" and relates it to a gravitational effect (which associates with our use of interruption and capture, but in our case the phenomenon is particle-based rather than wave-based).

In Section 10 of [1], the author describes the observations of characteristic histogram patterns for the occurrence of the New Moon, and the total solar eclipse. The author writes that the specific patterns do not "depend on position on the Earth's surface where the Moon's shadow falls during the eclipse or the New Moon." We have found, however, that the decrease in gravity signature during a total solar eclipse *does* depend upon the latitude of the location of totality and of the measurements [12], and this is clearly proven in comparing the different data signatures during eclipses in different locations, most notably the work of Wang et al. [13, 14] during the eclipse of March 1997 in China. The work of Stanley and Vezzoli [12] has been able to mathematically describe from first principles the detailed gravimeter data of Wang et al. [13, 14] for the above eclipse, including the parabolic dips in gravity at first contact, and at last contact. The dependence upon latitude of the location of the measurements and of totality is due to the elastic scattering properties of the three-body problem. Shnoll then interprets the overall data in association with the fractality of space-time — a conclusion that we have also reached in our gravity research [11, 15] and that is also described very recently by Loll [16]. Shnoll notes that he also observes a chirality in histograms, which we have shown is fundamental in the nature of materials and the aggregation of mass to form compounds [17].

It is interesting to note that in [1], Shnoll concludes that there is a spatial heterogeneity on the scale of 10^{-13} cm. This is the value that we calculate for the inter-neutrino spacing of the neutrino flux, corresponding to a collision cross-section with nucleons of $\sim 10^{-38}$ cm^2, and a particle density 3.7×10^{28}–10^{34} particles per cm^3.

Our work, and our interpretation of the Shnoll work [1, 2, 3], and many other works by Shnoll, correlates very well with the positron annihilation work of Vikin [19] showing that the production of positronium from Na-22 undergoes a maximum near the time of the New Moon, and a minimum near the time of the Full Moon. At the time of the New Moon, the Earth laboratory (whether measurements are of gravitational interactions or of radioactive decay phenomena) faces in the general direction of the line of the Moon and the Sun for a short period of the day, and then rotates such that the laboratory faces free and open space and distant stars during the duration of the day, so that a large complement of neutrinos falls uninterrupted onto the measuring device; also neutrinos that are emitted by the Sun may be scattered by the Moon to affect the data. During the Full Moon, however, the Earth laboratory is always between the Moon and the Sun, and hence the overall collision physics is considerably different.

Shnoll sums the interpretation of the work that he describes within [1] by stating "Taken together, all these facts can mean that we deal with narrowly directed wave fluxes", which he refers to as beams that are more narrow than the aperture of the collimators of the apparatus (0.9 mm). Our model and theory of gravity [11] is based on a flux of particles, and the "narrow beam" is interpreted due to very low-angle elastic scattering of external particles by the nucleons of the celestial bodies [11, 12], particularly the Moon (near body in [12]) and Sun (far body), such that some particles never reach the detecting apparatus such as pendula, gravimeter, or radioactive source-detector system.

Fundamental to Shnoll's work is his assertion that these periodic characteristic histograms relate to a wide variety of phenomena ranging from bio-chemical phenomena, to the noise in a gravitational antenna, to alpha decay. This is in agreement with my own work and that of others, and I have found that anomalies in gravity, radioactive decay of Po-210 (and Co-60), and changes in plant growth, orientation, and physiology, as well as embryonic centriole-centriole separation phenomena, and even DNA and its sheathing H_2O, are affected by the Earth-Moon-Sun relationship [10, 11, 12, 14, 19, 20, 17]. It has been shown by Gershteyn et al. [21] that the value of G varies at least 0.054% with the orientation of the torsion pendula masses with the stars, and that G is periodic over the sidereal year [21] — this periodicity arguing for a strong link between the Shnoll radioactive decay data and gravity. Furthermore the Shnoll work [1] cites the possibility of a space-time anisotropy in a preferential direction, and refers to the drift of the solar system toward the constellation Hercules. Our theoretical work in collision-induced gravity shows that G is a function of collision cross-section of the neutrino-nucleon interaction [11], and experimental work indicates that G is a function also of at least temperature, phase, and shape [22, 10]. Our very recent experimental work determined that $G = 6.692\times10^{-11}$ cubic meters per kg sec^2 [15] which compares very favorably with the slightly earlier work of Fixler et al [22] using precision a interferrometric method in conjunction with cold Cs atoms and a known Pb mass, yielding $G = 6.693\times10^{-11}$ cubic meters per kg sec^2 — these values being considerably larger than the normally utilized value of 6.67×10^{-11}. These data are in accord with an increasing trend in G that could possibly be related to other trends such as that cited by Shnoll [1].

Shnoll reports [1] that the subject histograms have a fine structure that shows what he refers to as "macroscopic fluctuations". We have reported gravitational fluctuations [10] that appear at random, and are associated with time intervals of ∼0.13 sec, indicating another correlation between gravity data and radioactive decay data. The gravitational fluctuations that we detected were observed in the form of two Newton cradle pendula dwelling near each other for prolonged periods of time, but occurring in an unpredictable manner. We tentatively correlated these events with signals arriving from supernovae events that had occurred somewhere in the vastness of the universe. We also had detected on 27 August 2001 a peak in the radioactive decay of our Po-210 source, far in excess of two-sigma Poisson statistics, and later correlated with the arrival of radiation from supernovae explosion SN 2001 dz in UGC 47, emitting energy in all neutrinos of the order of 10^{46} joules.

All of the above points to the ubiquity of a model of nature based on elementary impinging momentum-transferring external particles that can be interrupted by mass particles, rather than nature being based on the conventional four axiomatic forces and their respective field theory. Furthermore, in an external particle based model for gravity, there is no need to invoke a purely mathematical "fabric" to space-time curvilinearity according to geodesics or warping, nor is it necessary to invoke Riemanian space, nor Minkowski space, but instead space-time is considered to be of a fractal geometry, and the trajectory of mass particles and photons through space is curved because of collisions with neutrinos (WIMPS). Although the collision cross-section of the neutrino with the photon is extremely low, the flux density of the neutrino in our region of the universe is extremely high, and we postulate that the bending of light is due to that interaction. It seems that astrophysics is now poised to affirm modifications to Einstein's theory of General Relativity, and this is not unexpected in that many recent findings have indicated that gravity is quantized [24, 25, 15, 16, 26]. Understanding the nature and details of this quantization is one of the very major challenges and objectives in physics of this new century.

See also [27] for corroboration by private communication of periodic behavior of radioactive decay data during New Moon.

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References

1. Shnoll S. Changes in the fine structure of stochastic distributions as a consequence of space-time fluctuations. *Progress in Physics*, 2006, v. 2, 40–45.
2. Shnoll S., Kolombet V., Pozharski E., Zenchenko T., Zvereva I., and Konradov A. Reallization of discrete states during fluctuations in macroscopic processes. *Physics-Uspekhi*, 1998, v. 162(10), 1129–1140.
3. Shnoll S., Zenchenko T., Zenchenko K., Pozharski E., Kolombet V., and Konradov A. Regular variation of the fine structure of statistical distributions as a consequence of cosmophysical agents. *Physics-Uspekhi*, 2000, v. 43(2), 205–209.
4. Private communication from G. C. Vezzoli to S. Shnoll, October 2004.
5. Private communication from G. C. Vezzoli to S. Shnoll, 2004.
6. Shnoll S., Zenchenko K., Shapovalov S., Gorshkov S., Makarevich A., and Troshichev O. A. The specific form of histograms presenting the distribution of data of alpha decay measurements appears simultaneously in the moment of New Moon in different points from Arctic to Antarctic. arXiv: physics/0412152.
7. Vezzoli G. C. Radioactive decay of Po-210 and Co-60 at two U.S. observation stations in the path of the umbra/penumbra of the total eclipse of the Sun of December 4,2002 in Southern Australia. *Infinite Energy*, 2005, v. 11(61), 48–53.
8. Allais M. Movement of paracononical pendulum and total solar eclipse of 30 June 1954, 1957. *Proceedings of the French Academy of Sciences*, 1959, v. 18, 46–49.
9. Saxl E. and Allen M. 1970 solar eclipse as "seen" by a torsion pendulum. *Phys. Rev. D*, 1971, v. 3(4), 823–825.
10. Vezzoli G. C. Gravitational data during the syzygy of May 18, 2001 and related studies. *Infinite Energy*, 2004, v. 9(53), 18–27.
11. Stanley W. and Vezzoli G. C. Induced gravity model based on external impinging neutrinos: calculation of G in terms of collision phenomena and inferences to inertial mass and atomic quantization. arXiv: astro-ph/0102109.
12. Stanley W. and Vezzoli G. C. Derivation of anomalous weight signal during total solar eclipse using collision-induced gravity. Submitted to *Gravitation and Cosmology* (in refereeing process).
13. Wang Q., Yang X., Wu C., Guo H., Liu H., and Hua C. Precise measurement of gravity variations during a total solar eclipse. *Phys. Rev. D*, 2000, v. 62, 041101R.
14. Yang X. and Wang Q. Gravity anomaly during the Mohe total solar eclipse and new constraint on gravitational shielding parameter. *Astrophysics and Space Science*, 2002, v. 285, 245–253.
15. Vezzoli G. C. A philosophy of space-time leading to understanding the fundamental mechanism of gravity through the study of physical phenomena. Submitted to *J. Phil. of Science* (in refereeing process). Vezzoli G. C. The fabric of space-time. *Infinite Energy* (in press).
16. Loll R. The emergence of spacetime. arXiv: 0711.02773.
17. Vezzoli G. C. Role of Fe, chirality, and multivalence in water-DNA Interaction. Submitted to *J. Physics Condensed Matter* (in review process).
18. Vikin B. P. Gravitational perturbations as a possible cause for instability in the measurements of positron annihilation. *Progress in Physics*, 2002, v. 2, 76–77.

19. Vezzoli G. C., Tse A., Ng C., and Rigeur K. Geotaxis in pea and bean seedlings. *J. Gravitational Physiology*, 2003, v. 10(1), 17–18. Vezzoli G. C. Nanomolecular gravitational interactions causing increased probability of birth defects in humans during period from conception to early fetus formation. *Computational Nanoscience and Nanotechnology*, 2002, 81–84.
20. The botanical species that we studied include: lima bean seedlings; the heavy cordate vine Aristolochia macrophylla (Dutchman's Pipe); Swedish ivy; Mimosa pudica L.; and cactus.
21. Gershteyn M., Gershteyn L., Gershteyn A., and Karagioz O. V. Experimental evidence that the gravitational constant varies with orientation. *Gravitation and Cosmology*, 2002, v. 8, no. 3, 243–246.
22. Vezzoli G. C. Physical consequences of a momenta-transfering particle theory of induced gravity and new measurements indicating variation from inverse square law at length scale of $\sim$0.1 mm: statistical time properties of gravitational interactions and analysis thereof. arXiv: physics/0104018.
23. Fixler J. B., Foster G. T., McGuirk M. M., and Kasevich M. A. Atom interferometer measurement of the Newtonian constant of gravity. *Science*, 2007, v. 315, 74–77.
24. Nesvihevsky V. N. et al. Quantum states of neutrons in the Earth's gravitational field. *Nature*, 2002, v. 413, 297.
25. Vezzoli G. C. Materials properties of water related to electrical and gravitational interactions. *Infinite Energy*, 2002, v. 8(58), 44–54.
26. Kitada H. Private communications, 2002–2008.
27. In private communications, Professor N. Goleminov (Moscow) had corresponded data to me in in the summer of 2006, showing that the standard deviation in his radioactive decay data was oscillatory, giving a minimum at the time of the New Moon, and a maxima in standard deviation occurring prior the New Moon, and another maxima subsequent to the New Moon. In the light of what I have conveyed in this Letter, Goleminov's work can be interpreted to a scattering by the moon of particles emanating from the Sun (during the New Moon), that would otherwise affect the radioactive decay data and cause a higher standard deviation at times other than the New Moon period. This interpretation would also be allied to Shnoll [1] using the term "interference" of flux. Goleminov's data also correlates indirectly with the positron annihilation periodicity work cited in this Letter.