Rotational Frequency Matching of the Energy of the Changing Angular Velocity Magnetic Field Intensity and the Proton Magnetic Moment Produces a Ten Fold Increased Excess Correlation in pH Shifts in Spring Water

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ABSTRACT

Changes in pH in spring water placed in the center of specific temporal parameters of rotating magnetic fields with changing angular velocities separated by 10 meters displayed conspicuous evidence of excess correlation. Serial microinjections of a proton donor into one (increased acidity) of the two volumes were associated with small increased shifts in alkalinity in the other volume that received no treatment. The powerful effect occurred when the specific magnetic field intensity multiplied by the proton magnetic moment produced a quantum energy that matched the rotational frequency of the fields. Higher or lower intensities did not produce this effect. The "entanglement" was observed only for 25 cc but not 50 cc paired volumes. The quantity was consistent with the cumulative magnetic energy from the rotating magnetic fields available to the protons of the hydronium ions and was equivalent to the energy from the neutral hydrogen line per molecule. These experiments may be the first to demonstrate the physical bases and a potential method by which to produce excess correlation in simple "acid-base" reactions at the macroscopic level. The 10-fold increase of the excess correlation at the specific intensity when interacting with the proton magnetic moment occurred when the frequency from that quantum energy matched the rotational frequency of the magnetic field. One interpretation is that when the cumulative energy per H^+ during the experiment reaches that of the hydrogen line entanglement occurs. However, when the cumulative energy approaches the equivalent of ~2.72°K (~10^{23} J per molecule), dissipation into the black body medium that defines the Cosmic Microwave Background prevents the excess correlations from increasing or continuing.

Key Words: excess correlation, entanglement, neuroquantum effects, pH, rotating magnetic fields, proton magnetic moment, quantum tuning

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Introduction

The measurement of excess correlation between the dynamics of two chemical systems separated by non-traditional distances could suggest that "entanglement" may be demonstrable within macrosystems (Julsgaard *et al.,* 2011). "Excess correlations" between processes separated by non-traditional distances have also been described as entanglement and has been considered one of the most important phenomena of the twenty-first century. Until recently such manifestations of "excess correlation" (Aczel,

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2002; Vaziri *et al.,* 2002) were assumed to occur only at quantum levels and to involve pairs of photons.

The general presumption is that if two photons are "entangled" a shift in the polarity of one of the pair results instantaneously in the shift in polarity of the other member of the pair regardless of the distance between them and without attenuation as a function of the inverse square law (Hotta *et al.,* 2014; Megidish *et al.,* 2013). Although the occurrence may be instantaneous (Hu and Wu, 2006a, b; 2013), its manifestation within matter may require a critical time coupled to emerging from the origin of the entanglement velocity and the actual time involved with the occurrence of the properties of matter (Persinger and Koren, 2013). This is at least one orbital time for an electron from which quantum numbers, Planck's constant and the most elementary expression of magnetism arise.

There is now empirical evidence that excess correlation after experimental induction of "entanglement" occurs in complex systems separated by non-traditional spaces if they simultaneously share the same rotating magnetic fields with changing angular velocities in a specific order of presentation. Burke et al (2013) was the first to demonstrate coherent changes within the brains of two human subjects who shared these fields but who were separated by 500 km when one of the two was exposed to a specific tone without the other person's awareness. Recently Scott et al (2015) showed specific phase-correlations of discrete power densities within the right temporal and parahippocamapal regions of five pairs of participants with each member of the pair separated by the Atlantic Ocean (~6000 km). The evidence of the excess correlation occurred only during the portion of the magnetic field stimulations that had been shown to produce: 1) doubling of photon emissions for photon reactions (Dotta and Persinger, 2012) between two loci and 2) parity in experimentally induced shifts in pH in spring water (Dotta *et al.,* 2013).

We have been pursuing the assumption that protons within water may be centrally involved with experimentally-induced excess correlation in complex systems such as the current patterns of deep structure brain activity or alterations in pH within physiological-like spring water. Koren and Persinger had developed a system about 25 years ago (Ruttan *et al.,* 1990) that allows programmable discrete durations of phase-modulated magnetic fields to be generated around a circular array of eight solenoids at specific rates of changing angular velocity. This novel circuit involved opto-couplers and Triac devices (Koren *et al.,* 2015) so that photons would be a component of the current propagation to the solenoids. For example, if the field creation is for 20 ms at the first solenoid in the circular array and then decreases by 2 ms in each of the other adjacent solenoids as the pulsing field "rotates" around the circle. The angular velocity mediating a pattern within this specific type of geometry can be considered as "accelerating". We have termed the bulk movement of the field around the array as the "group velocity" and the temporal configuration of the irregular, frequency-shifting pattern that is being generated within this bulk movement as the "phase velocity".

We borrowed these terms of group and phase velocity as metaphors from Tu et al (2005) who reviewed the technical literature and concluded that for photons to exhibit non-zero upper limits for rest mass the group and phase velocities must be uncoupled or at least differ. As a result, different phenomena would emerge, such as the longitudinal photon, the non-local effects for nongauge fields for the Aharonov and Bohm phenomena and altered access to Casimir sources. One of the features of the Aharanov-Bohm effect is the flux, although endless, can be curved into a finite toroid. We considered these emergent properties as potential conditions whereby non-locality as reflected by excess correlations of physical reactions could occur.

For our original experiments with photon flux densities from chemiluminescent reactions we found that conspicuous excess correlation between two loci occurred only when both reactions shared the same field but only if the they were first exposed to an accelerating group velocity containing a decreasing phase modulated, structured field followed by a second field that exhibited a decreasing group velocity but an increasing phase-modulated structured field. All other combinations were not effective. The effective combination if the angular velocity was fixed, that is neither accelerating nor decelerating, was also not effective.

There are experimental results that strongly support the occurrence of "excess correlation" at the macrochemical level. For example, Dotta and Persinger (2012) placed chemical reactions in two separate rotating

magnetic fields programmed to produce the same changing angular velocities. Simultaneous injection of small aliquots of H_2O_2 into NaClO within the two volumes housed separately at distances of up to 3 km elicited photon flux densities that were double the expected values. In other words, the quantity of energy behaved as if the two sites had been transiently superimposed into the same space and hence had been injected with twice the volume. This could be considered an example of superposition and superimposition.

Later Dotta et al (2013) employed the same experimental procedure involving two loci containing spring water. When they implemented the same protocol that produced the "excess correlation" of photon emissions they found that the serial injection of small aliquots of proton donors into the water within one locus was associated with a much smaller incremental increase in alkalinity in the spring water in the other locus. The shifts in pH were consistent with the proportion of hydronium ions present within the volume of water and the magnetic energy available from the applied fields.

In the pursuit of mechanism by which this "macro" excess correlation might be explained and utilized for practical application, we have selected the magnetic moment of the proton to be the focus at which the phenomena occur for several reasons. First, the universal ratio for the magnetic moment of a proton ($1.4 \cdot 10^{-26}$ A·m^2) divided by the unit charge ($1.6 \cdot 10^{-19}$ A·s) results in a diffusion term which is $0.88 \cdot 10^{-7}$ m^2·s^{-1}. When applied to the average viscosity of water around 25°C ($8.94 \cdot 10^{-4}$ kg·m^{-1}·s^{-1}) the force is $7.87 \cdot 10^{-11}$ kg·m·s^{-2}. If this force is applied across the distance of two O-H bonds ($1.92 \cdot 10^{-10}$ m) the resulting energy would be $1.5 \cdot 10^{-20}$ J (Karbowski and Persinger, 2015). This order of magnitude is a universal value (Persinger, 2015) that emerges from a variety of cosmological calculations and reflects the energy when the total universal force per Planck's voxel (the cubic Planck's Length) is spread across the distance of the neutral hydrogen line (21 cm).

The importance of the hydronium ion in this relationship becomes apparent when its lifetime (DeCoursey, 2003; Thamer *et al.,* 2015) which has an empirical range of 0.24 to 3 ps (median 1 ps), is multiplied by the magnetic moment/unit charge ratio. The resulting area is $8.8 \cdot 10^{-20}$ m^2 or $2.97 \cdot 10^{-10}$ m (0.297 nm). The actual distance between water molecules is considered to be 2.9 A or 0.29 nm. In other words, the duration of the hydronium ion is coupled to the diffusivity of the dynamics of the H_3O^+ ion and this property. Diffusivity implies an intrinsic velocity by which the expansion occurs. The relevance of proton properties to weak, patterned magnetic field effects was shown quantitatively by Persinger and Koren (2007) and verified experimentally (Koren *et al.,* 2014).

Simple quantum models depend on Planck's constant to discern optimal frequency. In our experimental protocol that produces the excess correlation between photon emissions from peroxide-hypochlorite reactions the critical parameters for the continual, serial creation of the magnetic fields around a perimeter was a 20 ms base duration followed by a deceleration of 2 ms at each of the subsequent 7 solenoids in the ring of 8 solenoids that created the fields. The total time for a completion of one circular sequence was 216 ms. Hence the rotation of that field around a 60 cm perimeter would be 4.6 Hz. This was the frequency of rotation within the circular array of solenoids within the second (effector) phase in the Dotta and Persinger (2012) experiments that produced the robust excess correlation.

To obtain the later from Planck's constant ($6.626 \cdot 10^{-34}$ J) the energy must be $3.4 \cdot 10^{-33}$ J. The division of this value by the proton magnetic moment ($1.4 \cdot 10^{-26}$ J·T^{-1}) is $2.18 \cdot 10^{-7}$ T. This magnitude is easily generated within the laboratory. To test the validity of the prediction we designed a series of experiments where shifts in pH in two separate volumes of spring water that shared the same rotating magnetic field configurations were measured as a function of different intensities of the computer generated fields in discrete steps between 0.16 μT and 2.7 μT (the upper and lower boundaries of the field strength generated by the software and hardware). Here we present evidence that excess correlation in experimentally-induced acidity in one volume of spring water was associated with an increased alkalinity in the second (not injected) volume of water but only if the magnetic flux density was coupled with the predicted "quantum frequency" applied to a macrostate.

Method and Materials

The essential paradigm is shown in Figure 1. Two arrays of 8 paired solenoids equally spaced around perimeters of 60 cm served as the source of the rotating magnetic fields. Each canister

containing the two reed switches was separated by 45 deg. The software (and hardware, US Patent 6,312,376 B1, Nov. 6, 2001; Canadian Patent No: 2214296) that created and operated the temporal patterns of the field was programmable at three levels: 1) the point durations for the patterns, 2) the time between the patterns, and 3) the parameters for accelerating or decelerating the activation of the serial pairs of solenoids that produced the magnetic fields around array in a counterclockwise (from the top) direction.

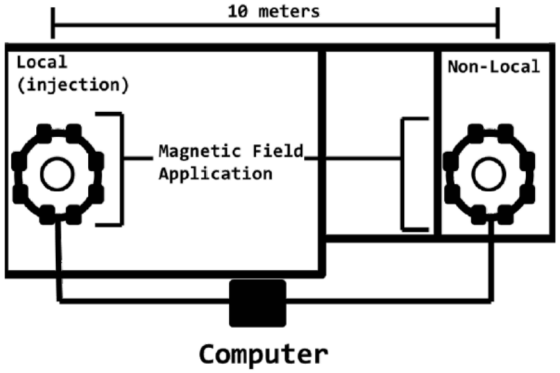

Figure 1. Schematic of the positions of the beakers containing the two volumes of spring water (small open circles), the circular array of 8 solenoids and distance between local (where the aliquots of protons were injected) and the non-local spaces. pH shifts were measured in both localities.

The patterns were generated from rows of numbers from 1 through 256 that were transformed to between -5 and +5 V with 127= 0 V through a custom-constructed digital to analogue converter (DAC). The two patterns were asymmetric temporal configurations that have been shown to elicit powerful physiological and cellular effects. They are shown in Figure 2. They were composed of 859 and 230 points or integers, each between 0 and 257. In previous experiments the optimal point duration has been 1 ms. This is the duration each of the numbers that compose the configuration is activated by the software. Because the software is generated by 286 IBM computers (because of their reliable DOS timing) there is a slight expansion because of the port time. The time between the configurations was also 1 ms.

The second derivative component (assuming the circular rotation is always accelerating and is a "first derivate") was programmed by adding +2 ms or -2 ms to the base duration of 20 ms. For the accelerating angular velocity (20+2 ms) this meant that the duration the field was generated changed through 20, 18, 16, 14, 12, 10, 8, and 6 ms before it began again at 20 ms. The total circuit time was 104 ms. For the decelerating angular velocity (20-2 ms) the duration at each pair of solenoids was 20, 22, 24, 26, 28, 30, 32, and 34 ms before starting again at 20 ms. This duration was 216 ms and was the phase in which "entanglement" effects were conspicuous. Because the circumference of the array of solenoids was 60 cm and the total time before the cycle began again was the sum of the 8 durations (216 ms) the averaged rotational frequency was between 4.6 Hz.

The basic procedure was identical to that reported by Dotta et al (2013). After 4 min had elapsed after activation of the first (phase 1, primer) field, 50 µL of 0.83 M acetic acid (the proton source) was injected into the local beaker that was situated in the middle of one coil in one room (a Faraday cage within an acoustic chamber). Immediately after the onset of the second field (phase 2, effector) which was 8 min after the beginning of the experiment 50 µL was injected into the active beaker once every min until the 16th min (9 injections). Each volume of water in each room contained the sensor for pH detection (Dr. DAQ System) that was sensitive to the nearest 0.01 unit. The serial changes in pH were recorded in real time by computer software on laptop computers.

The injection of protons into the active volume produced the obvious decrease (increased acidity) of pH. The presumed demonstration of "excess correlation" was the shift over time of the pH towards alkalinity in the second (non-local) matched volume of water that was situated in the center of the second array of solenoids. These latter volumes of water were never touched. The difference in pH shift between the end (18 min) and beginning of the experiment for each of the 60 experiments (10 intensities, 2 volumes, 3 replicates) within the water contained within the beakers in the non-local space were obtained as the value for the treatment. To ensure there was no drift in the pH sensor additional sham operations were completed whereby only 18 min of pH measurements were completed. The shift over time was less than 0.02 pH units.

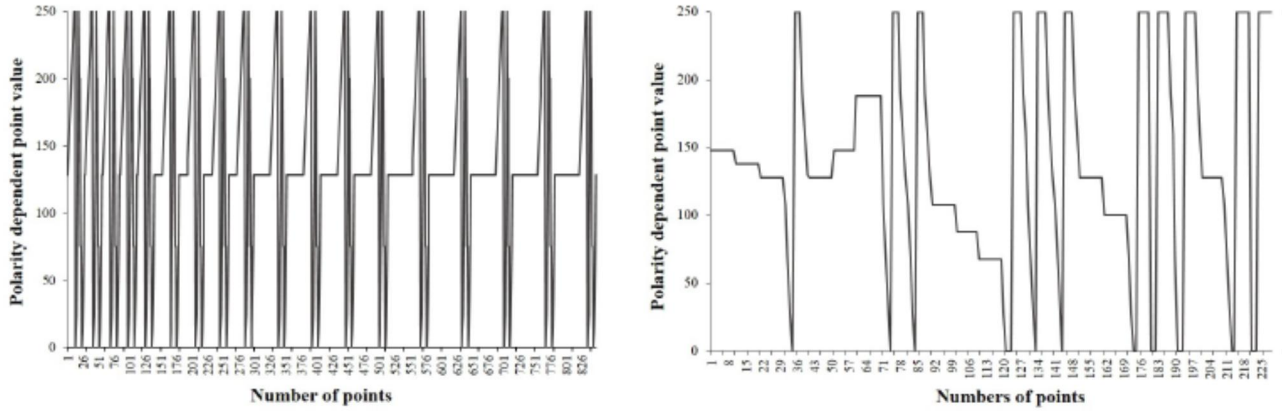

Figure 2. The shape of the two wave patterns that were required to be presented in a specific temporal sequence to elicit the excess correlation. On the left is the decelerating phase modulation (Thomas pattern), on the right is the accelerating phase modulation (Burst-x). Vertical bars refer to the numbers that were transformed to -5 to +5 V. The horizontal axis refers to the numbers of points in the pattern.

The intensity of the magnetic field was controlled from the computer software. This contained a programmable attenuator that ranged in this study from 1, 0.9, 0.8 until 0.1 and then 0.01 as well as 0 where the software was operating but no current was being generated from the DAC systems. Intensity of the magnetic field at the center of the circular array of solenoids, associated with each value of attenuation, was measured by a power meter and verified by a MEDA magnetometer. In decreasing order for 1 these values were 2.73 μT, 2.44 μT, 2.29 μT, 1.95 μT, 1.73 μT, 1.39 μT, 0.94 μT, 0.54 μT, 0.22 μT, 0.14 μT, 0.16 uT, and (sham) 0.16 uT. In other words, the intensity of the field was titrated until the setting was below the background currents being direct through the circuit to the solenoids. Each experiment involved only one of these intensities.

Results

The results are shown in Figure 3. The major intensity-dependent effect for the amount of shift in pH within the non-local water located within the second circular array of solenoids in which no proton donor was injected was greatest for the 25 cc solutions exposed to the 0.22 μT intensities. This increase in pH within the volume of spring water that received no treatment when the pH decreased in the other volumes of water sitting within the second coil due to the direct injection of proton donors (the weak acid) defines the excess correlation (20120. This parity (opposite change in property, in this case pH) is characteristic of one form of entanglement and has been shown within this system for both pairs of random number generators (Juden-Kelly *et al.,* 2015) and spectral power densities in coupled human brain function (Scott *et al.,* 2015).

The energy associated with a proton each with a magnetic moment of $1.40 \cdot 10^{-26}$ J·T^{-1} (A·m^2) within an intensity of 0.22 μT would be $3.08 \cdot 10^{-33}$ J. When divided by Planck's Constant ($6.626 \cdot 10^{-34}$ J·s) the equivalent frequency is 4.7 Hz. This is within the range of measurement error for the rotational frequency of the decreasing angular group velocity field around the circular array during the effector or "entanglement" phase of the exposure to the magnetic fields. The energy available within the volume of space occupied by the 25 cc of spring water based upon the relationship:

$$E=[B^2(2\mu)^{-1}] \cdot m^3 \qquad (1),$$

where B is the strength of the field ($2.2 \cdot 10^{-7}$ T) , μ is magnetic permeability of free space ($4\pi \cdot 10^{-7}$ N·A^{-2}) and m^3 is volume (25 cc=$2.5 \cdot 10^{-5}$ m^3) would be $4.82 \cdot 10^{-13}$ J. Over the approximately 900 s before the effect approached an asymptote the cumulative energy would be $4.34 \cdot 10^{-10}$ J. For comparison the energy associated with mass equivalence of a proton is $1.5 \cdot 10^{-10}$ J. A maximum shift of 0.2 pH units towards basic from a reference point of pH=7.4 would be equivalent to $2 \cdot 10^{-9}$ M.

Hence the numbers of molecules (accounting for 18 cc per M of water) would be $\sim 1.66 \cdot 10^{13}$ H$^+$. Within the first second after the initiation of the primer field the energy per proton would have been $2.91 \cdot 10^{-26}$ J. However, at the point where the effector field was activated at 4 min (240 s) the cumulative energy would have

been about $7 \cdot 10^{-24}$ J per molecule. The value would have been about $2.62 \cdot 10^{-23}$ J per molecule range when the effect achieved asymptote at about 900 s after the initiation of the fields. The temperature equivalence, obtained by dividing this value by the Boltzmann constant ($1.38 \cdot 10^{-23}$ $J \cdot T^{-1}$) would be ~1.9 °K. The most proximal universal value associated with this temperature is the 2.72°K associated with the cosmic microwave background.

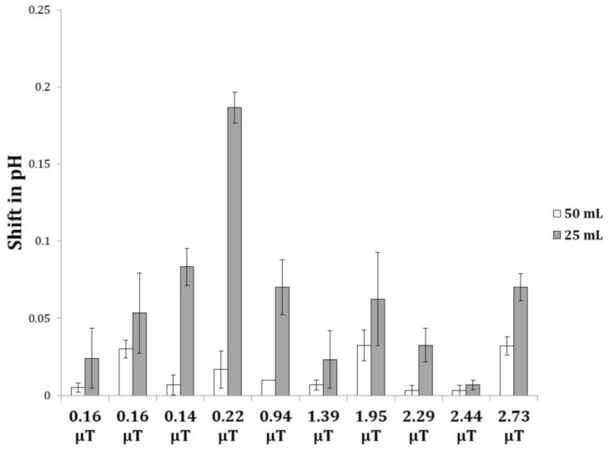

Figure 3. The absolute shift in pH towards basic within the "non-local" volumes of water (50 mL, open squares; 25 mL, closed squares) that were coupled by the same rotating shifting angular velocities as the volumes 10 m in distance and that received the proton injections during the entanglement phase. Vertical bars indicate standard errors of the mean.

Discussion

To our knowledge this is the first experimental production of a powerful demonstration of excess correlation at the macroscopic level of matter. Similar evident for excess correlation in distal pH reactions have been found for a different technology involving changing angular velocity pulsed fields within toroids that diminished the E-W values of the geomagnetic field by about 5 nT (Rouleau *et al.,* 2014; Rouleau and Persinger, 2015). In our present experiments when the rotational frequency of the circular magnetic fields within which two volumes of spring water had been placed matched the frequency of the product of the magnetic field intensity and the proton's magnetic moment, the excess correlation of a shift towards alkalinity increased by a almost tenfold within the non-local condition. Even though there were no injections into these non-local volumes of water while small aliquots of a proton donor were injected into the other ("local") volume 10 m in distance, the shift in pH was conspicuous. This remarkable enhancement was not evident when the strength of the field was either slightly less or greater. The narrow band of the effect is consistent with a type of "tuning" that is frequently seen at quantum and atomic levels.

That this specific intensity and rotational frequency is relevant to the non-local effects of entanglement is further supported by the temporal positioning of the effective frequency or rotation. The value of 4.6 Hz characterized the parameter of the second phase of the "entanglement" procedure within which the demonstrations of excess correlation between photon emissions during chemical reactions and parity responses between two random number generators have been measured. In recent studies in order to provide consistency with other technologies that also produce excess correlations between human cerebral EEG activities when two subjects were separated by thousands of kilometers this portion of the field (about 6 minutes after the onset of the fields) has been called the effector field. On the other hand, during the first six minutes of exposure (the phase 1 or primer field) when the rotational frequency was 9.6 Hz (the intensity remained the same), the demonstration of excess correlation was not apparent.

The quantitative values associated with the pH of the spring water and the time involved with the demonstration of excess correlation to approach asymptote during the effector phase may explain the limited nature of the effect. We have found, based upon about 100 trials (experiments) that the excess correlation effect is most optimal when the initial pH of the spring water is between 7.2 and 7.4. When the values were outside of this range the experimental elicitation of the effect was attenuated or did not occur. This specific band of pH within 25 cc of spring water could contain the optimal number of protons for which the quantity of magnetic energy could be effective.

The asymptote of the excess correlation effect after about 900 s following the initiation of the field would be congruent with the amount of energy per molecule, that is, $\sim 2.6 \cdot 10^{-23}$ J per molecule. The temperature equivalence of this quantum of energy per molecule is about 2°K. This is very similar to the Cosmic Microwave Background temperature. It presumes the properties of a black body spectrum. By definition this means that it absorbs all incidental radiation regardless of frequency or angle of incidence. If

our experimental conditions created the excess correlations with the universal space that has been assumed to be their substrate, then this convergence could explain the limiting manifestation of the shift towards alkaline pH.

Although there are several potential mechanisms, some less exotic than others, the shift towards greater pH in the water volume entangled with the one in which small aliquots of proton donors were being injected suggests that OH^- molecules were relatively increasing in the non-local volume. If this latter effect is significant then the ammonation (NH_3) of $CO(OH)_2$ to produce $CONH_2OH + H_2O$, which contains the essence of the amine (NH2) and carboxyl groups (COOH) that define amino acids (the components of proteins) may require more thoughtful consideration. If even a component of the source of OH^- is aqueous systems is non-local, then abiogenesis and asymmetric chirality may have alternative explanations.

Previously Dotta and Persinger (2012) who first described the excess correlation between photon emissions between two chemiluminescent reactions separated by 10 m queried the source of the transience of the duration of this "entanglement effect". The results of our present experiment with proton energy ratios might offer an explanation. Once the cumulative energy from the applied effector field per "free" proton molecule (the one contributing to pH) exceeded the cosmic microwave background temperature any additional energy that would have contributed to the magnitude of the entanglement was absorbed into that universal space. Hence, at the macro-level, the duration of exposure to the specific intensity magnetic field and proton magnetic moment that is most tuned, as well as the magnitude of the excess correlation, will be limited. The universal implication of this local demonstration has been shown experimentally by Koren et al (2014).

The excess correlation does not occur in our experimental paradigms if the first phase or "primer" field is not first presented. It is very specific and involves an increasing group angular velocity within which a decelerating phase modulation is contained. The calculated estimate for the energy per H^+ (proton) within 25 cc of water at the beginning of the primer field was $2.91 \cdot 10^{-26}$ J and after 4 min would have been about $7 \cdot 10^{-24}$ J. This value is revealing. The energy associated with the neutral hydrogen line is $9.4 \cdot 10^{-25}$ J. In other words, after about 30 to 50 s of exposure to the primer field the cumulative energy per H^+ molecule would converge upon the frequency of the energy associated with the hydrogen line. In Dotta and Persinger's original work they found that "primer durations" of only about 1 min was required to produce the doubling photon effect.

When these lower and upper boundaries are integrated, a potential explanation for the importance of the primer and effector emerges. First the protons within the hydronium ion that mediate pH are the central unit to the excess correlation phenomena we have measured. When the cumulative energy from exposure to the primer field reaches the energy associated with the neutral hydrogen line per H^+ the conditions are set to display the excess correlation. The subsequent presentation of the effector field precipitates this excess correlation until the cumulative energy per H^+ approaches the equivalent of the Cosmic Microwave Background level at which point it dissipates into pervasive black body absorption. For the double photon experiments the capacity to produce the transient bursts of summed emissions stops. For subtle pH shifts within water, in the present study, the values remained static after they approached an asymptote.

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