WAVE FUNCTION COLLAPSE IN RETINAL STRUCTURE UNDER AIDED/UN-AIDED CONDITIONS

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ABSTRACT: Photon-rhodopsin interaction is investigated within the context of information transfer at a distance. John von Neumann's idea of wave function collapse (WFC) forms the framework for the process of information transfer via a single light quanta along with human intention between pairs. Mathematical formalism relating to the density matrix is studied to distinguish the collapse phenomena from absorption and decoherence thus isolating more clearly the possible dynamics of a photon wave function via intention. Our main hypothesis consists on the assumption that the interaction of distant intention and photon-rhodopsin pair will result in a swift from a simple and straight forward absorption process to that of a single entry in the density matrix representation thus leading to case of wave function collapse (WFC).

KEYWORDS: Wave function collapse; Non-local information transfer; Brain to brain communication; Human intention.

1.1 INTRODUCTION

In 'Brain to Brain Communication Between Humans', Ref ([31], [32]) the process of wave function collapse (WFC) was proposed as a source of information transfer between two subjects at a distance. In the present work, WFC, as a process of information transfer, is further investigated. We are concerned, as before, on time scale of collapse within the visual system aided and un-aided by intention of distant observer.

However, in this present work, WFC, being directly associated to consciousness, is investigated in the retinal structure of 'rhodopsin' in vitro. We study rhodopsin interaction with single photon and wave packet of light; in the classical and quantum cases, appropriately, aided and unaided through distant intention.

In the classical limit, photon(s)-rhodopsin interaction is more closely associated to the phenomenon of absorption rather than transmission in the form of tunneling. In the quantum mechanical treatment, photon(s)- rhodopsin interaction will be associated to the existence of 'off-diagonal' terms in the density matrix representation, which are responsible for pre- serving coherence in the molecular structure of rhodopsin. This interaction, when acted upon by consciousness agent, results in the retaining of one of the diagonal elements in the density matrix representation.

The resulting interaction of photon(s)-rhodopsin can thus be experimentally determined by analyzing the time and frequency domain of resulting absorption and emission spectra after a single photon - rhodopsin set up has been achieved. The preparation of the latter will require an entangled pho- ton pair produced through down parametric conversion guiding one single photon to single rhodopsin interaction as will be presented in explanatory model.

Our main hypothesis lies in the assumption that when distant intention has been sent to photon-rhodopsin pair, the phenomenal effect will swift from a simple and straight forward absorption process to that of a single entry in the density matrix representation thus leading to case of wave function collapse (WFC). From thus hypothesized selection, exact time of collapse can be demonstrated and further applied to information transfer at a distance between pairs of subjects.

2. WAVE FUNCTION COLLAPSE (WFC), COHERENCE, DECOHERENCE AND ABSORPTION: AIDED/UN-AIDED THROUGH HEALER INTENTION.

2.1 Occult Chemistry

Wave function collapse, aided and un-aided, lies within the regime of occult chemistry. When considering the measurement problem, John Von Newman postulated that 'Mind' or consciousness is responsible for the collapse of the wave function through concept of the 'cut' as well as Process I in his explanatory descriptions of measurement Ref [1]. The larger idea of 'Mind' as a 'collapse' agent does not only find itself in the abstract writings of foundational of quantum theory, but also in texts related to Buddhist thought as well as alchemy. At the core of Buddhist teachings, it is believed that our physical reality is essentially a projection of our internal thought pro- cess, at an individual and communal level(s). In alchemical texts, 'Mind' is associated to the consciousness agent or creator of the localized and unlocalized realities of pure potentiality, Ref([3], [4]). Many alchemical texts are not only based in laboratory thinking, but alchemy is deeply associated to the experience and purification of consciousness at large.

This interaction between matter and consciousness brings up several questions: what is the substance of that which is transformed? and are there any traces of such transformation process within the physical structure of the body?. These are questions that exist also intrinsically in physics when we investigate consciousness and matter interaction. The most eminent of such examples is WFC as a consciousness aided process. In other words, consciousness is treated as a primary agent of transformation in the particle/wave duality, and thus in the measurement problem. Further, consciousness is responsible for reality as we see it, thus having a fundamental role not only at the level of origin but a the level of interaction. Alchemists, as well as Buddhist, shared this perspective by seeing a direct link between the atom, chemical processes and consciousness.

Occult chemists are said to be a synonym for alchemists. They proposed that the structure of chemical elements can be affected by the intervention of clairvoyant interaction, which is primarily associated to the existence of a 'third eye' in humans used to see that which is not ordinarily visible. Probably some of the most famous occult chemists emanate from the theosophical society, such as Annie Besant and Charles Leadbeater. In 1895, Besant and Leadbeater's clairvoyant observations of hydrogen, nitrogen, and oxygen appeared in the article entitled 'Occult Chemistry'. At such time, the basic unit of matter was still thought to be 'atoms', but even at the first observation periods of Besant and Leadbeater, hydrogen was not clairvoyantly seen as a unity, but was thought to be composed of 18 smaller units Ref [2].

The smaller units observed were termed 'ultimate physical atom' (UPA), subsequently, named 'Anu', a Sanskrit term. The same clairvoyant method was used for the observation of oxygen and nitrogen elucidating even a more complex composition. It is said that Beasant and Leadbeater ascertained the correct atomic weight of the rest of the periodic table through the new entity, UPA. In their observations, Leader and Beasant express ' The whole atom spins and quivers, and has to be steadied before exact observation is possible'. This is a remarkable statement given that the term spin was only brought about until 1925 by Ralph Kronig, George Uhlenbeck, and Samuel Goudsmit at Leiden University. UPA was seen in their clairvoyant visions as being created by a force which originated in a higher dimensional plane. The latter remark, on higher dimensional space, appears to attest to some that they were becoming aware of multidimensional space as is well known currently by modern science.

Stephen Phillips while a graduate student at University of California be- came interested in occult chemistry presented by Beasant and Leadbeater. His understanding and further study led him into the creation of his book : The Extra-Sensory Perception of Quarks, in which he creates a model based on sub quarks as the UPA, Ref [7]. Phillips also is the author of the book entitled 'Evidence of a Yogic Siddhi: Remote Viewing of Particles', in which he describes how in the Vedas siddhis (psychic powers) can be acquired through a dedicated practice of meditation. He furthers describes the eight siddhis presented by Patanjali in the Yoga Sutras created about 400 BC Ref [5], Ref [6]. In the Yoga Sutras, a yogi is capable of accessing knowledge from the most hidden, small, large and distant.

Beasant and Leadbeater were successfully able to see properties of the atomic structure of the atom and other elements in the periodic table and hypothesized the UPA as a fundamental unit. Stephen Phillips formulated a the existence of entity like 'sub-quarks' as fundamental property of matter which were accessible to interaction of consciousness. In this present work, we propose simply that the very act of interaction of mind with physical matter serves as an example of its predominant presence as a fundamental property in manifested reality. As such, we attempt to explore 'signatures' of its interaction with bio-complex structure as a manner of understanding localized 'Mind' and its manifesting properties. This investigation is further linked to information transfer through the acquisition of the parameter previously necessitated of 'time' length of collapse of wave function in the retinal structure.

2.2 Theory WFC

Since the main subject of interest is the collapse of the wave function in photon-rhodopsin interaction through the intervention of consciousness as a distant agent, let us first initiate our discussion through a more exact understanding of WFC at a conceptual and mathematical level.

Wave function collapse (WFC) is the phenomenon whereby a wave function, representing a quantum system and thus expressed in the linear sum of its eigenstate basis, appears to single out one eigenstate thus reducing the otherwise linear supposition into one single term. Mathematically, a quantum system can be described by a wave function Ψ which is written as a linear superposition of eigenstates ϕ as expressed below:

$$\Psi >= \sum_i c_i|\phi > \qquad (1)$$

WFC implies the apparent selection of one single eigenstate:

$$\Psi \rightarrow \phi_i \qquad (2)$$

There exists many interpretations for the meaning of a preferred basis. One such interpretation is that while a quantum probability of being in one particular state is generally represented as the square of the quantity below:

$$c_i = < \phi | \Psi >$$

However, when one speaks of WFC the interpretation is different. WFC does not imply that the probability of the wave function to be in particular state, $\phi >$, is given by the square of c_i. But the actual interpretation of this preferred basis is that the wave function, Ψ, is to be found or 'cast' on the ϕ. Under such concepts, the observance of WFC due to continuous spectrum operator forms such as position, momentum, and scattering Hamiltonian, is not a feasible outcome due to the fact that the corresponding eigenfunctions are not normalizable. The expectation is these cases is that the collapse will occur amongst a small set of eigenstates which correspondingly will involve a set of eigenvalues related to the imprecision of the apparatus. Thus more precision of measurement device corresponds to a smaller set of eigen-states/values.

WFC has given birth to essentially all various interpretations of quantum mechanics. Arising in the measurement problem in quantum physics as a source of explicating the wave/particle duality of light through the double slit experiment. WFC has been also ascertained through various mathematical representations. On the one hand, the Schrodinger equation with modification (non-linear Schrodinger equation) and/or the density matrix operator have been some primary mathematical tools to assess collapse. John von Neumann combined both the process of collapse as a non-local, irreversible event and the Schrodinger equation, a reversible and local event, Ref [1].

However both, von Neumann's account and non-linear Schrodinger fall under the group of the many existing interpretative view points of quantum theory. One can thus state that the density matrix representation is, at least mathematically speaking, devoid of interpretative weights. Therefore, the density matrix representation is chosen as a more objective comprehension of WFC mathematically, Ref [8], Ref [9].

In von Neuman's perspective, a quantum system exists as a linear super- position of eigenstates, until measurement. Post-measurement, the system exists in one of the basis states from the perspective of the observer Ref [1].

The way in which to understand such basis, and the single selection pre- supposed by WFC a la von Neumann, it is necessary to then understand WFC within the density matrix formalism. To this end, we have summarized below the density matrix formalism and addressed what WFC represents within this construct.

2.3 Density Matrix

The density matrix is a matrix representation of the quantum states given a quantum system. It is analogous to a probability distribution in phase space of position and momentum. It constitutes also a reasonable way to represent decoherence as opposed to WFC and lends itself as a possible venue for further understanding the process of absorption through the linkage to Electron Transfer processes. The density matrix can be constructed through the density operator, $\hat{\rho}$. Assuming c_1 to represent the probability of finding a quantum system in the state $|\psi_1>$, c_2 in the state $|\psi_2>$ etc., the density operator is defined as:

$$\hat{\rho} = \sum_i c_i |\psi_i>< \psi_i| \qquad (3)$$

Using an orthonormal basis a_α, the density matrix can be constructed as:

$$\rho_{\alpha,\alpha'} = \sum_i c_i < a_\alpha|\psi_i>< \psi_i|a_{\alpha'} > \qquad (4)$$

The density matrix can help us understand WFC. In order to do so, a poignant point lies in the simple understanding of how coherence and de- coherence is diagrammatically expressed in this representation. Coherent terms are all the off-diagonal terms and, as such, decoherence occurs when all such off-diagonal terms disappear. The particularities for the canceling of the off-diagonal terms characterizes the specific decoherence phenomenon undergone by the system in question. However, a fully de-cohered system will contain only the diagonal matrix terms. In contrast to WFC, there will only be 'One' such diagonal term left in association to the particle preferred basis state in the reduction of the full quantum state at hand. Thus, in this work, the aim is the recognition, not only theoretically, as we have generally depicted in this document, but also the experimental avenues as for distinguishing between these two processes. The main reason for this distinction lies in our preferred studied on consciousness associated phenomena vs. dissipative systems or de-cohered systems. In the latter, the density matrix representation is said to de-cohere not to consciousness related activity but to exposure to the environment in general which acts as a dissipative medium of quantum coherence. WFC, being more closely associated to consciousness interaction, is the main goal and the phenomenon of interest. In particular, associating WFC as it relates to a medium for information transfer, we aim at the particular parameter of 'time' associated to collapse. In this way, we are in essence establishing a deeper link between the previously presented work on 'Telepathic Communication and Wave Function Collapse', through the more detailed investigation of a rhodopsin bio-complex sample exposed to distant intention.

When dealing with the phenomena of absorption, it is important to understand that it differs from wave function collapse, which as expressed above, corresponds to the singling out of one element in the diagonal of the density matrix representation. Absorption in molecular systems has been dealt, at large, through the treatment of electronic state transitions between ground and excited states. As such, the resulting density matrix representation is anything but simple, constituting of coherent, thus off-diagonal terms, as well as well established diagonal terms.

Mino Yang in his article: 'A reduced density-matrix theory of absorption line shape of molecular aggregate' Ref [10] discusses details of absorption of molecular aggregates in condense phase utilizing the density matrix approach.

After considering electronic state couplings, Yang numerically solves the kinetic equation :

$$\frac{d}{dt}|\sigma^l(t)>= -k(t)|\sigma^l(t)>$$

where k(t) corresponds to the transition rate matrix.

$$\sigma^I(t) = Tr_q(\rho^I(t))$$

i.e. the trace of the electronic density matrix at local time, $\rho^I(t)$ is the electronic density matrix. This last quantity is the primary expression for calculating line shape of ab- sorption and it is non-zero, thus demonstrating, at least globally, that the process of absorption is not at all close to WFC but constitutes an in-depth understanding of the individual electronic excitations. In our case, the investigation of WFC constitutes the analysis of the various atomic structure making up rhodopsin, as a molecule, to its excited state, rhodopsin*. Thus our aim will be to particularly study this electronic state coupling and its association to action at a distant through mental intention and compare it with the more straight forward, but more difficult to achieve, WFC process. The understanding of WFC process in rhodopsin necessitates a general understanding of the retinal bio-complex thus described which is given below as an overview.

3. BIOLOGICAL INFORMATION ABOUT RHODOPSIN.

Rhodopsin is a photoreceptor pigment of the retina which initiates vision upon capturing of a photon by the chromophore 11-cis retinal, a retinal iso- mer. Thus rhodopsin is responsible for enabling perception of low light , or first events of light, Ref [11]. Mutation of rhodopsin gene is responsible for retinal diseases like retinitis pigmentosa which is produced by preventing disintegration of other proteins which leads to photoreceptor apoptosis - or programmed cell death. This latter constituting an example of the ability of rhodopsin to function as an information bio-complex medium, Ref [12].

Rhodopsin consists of a protein named opsin and retinal. Opsin is a light sensitive membrane interwoven in the retinylidene protein through G protein-coupled receptors. Opsins help convert a single photon of light into electrochemical signals. Retinal, also named retinaldehyde, is a polyene chromophore and is the basis for animal vision allowing the conversion of light into metabolic energy.

Vision begins through the photoisomerization of retinal . Photoisomerization is believed to be a molecular restructuring between isomers caused by photo-excitation, Ref [13]. More precisely, when an 11 cis-retinal (isomer of retinal) chromophore absorbs a photon, it isomerizes from 11-cis to all- trans state. Photoisomerization in rhodopsin has been stated to have an unprecedented quantum yield of 0.67. This means that two out of three photons absorbed trigger receptor activation. The reaction is believed to take in the order of 200 fs, rendering this process the fastest photochemical reaction thus ob- served, Ref [14].

There are many experimental studies of rhodopsin and light. We will concentrate here in the ones associated to single photon interaction, and those associated to 'many' photon or wave packet interaction studied in femto second spectroscopy. We begin the latter and conclude with the more involved single photon interaction.

3.1 Photo-reaction-rhodopsin : many photons interaction

In the photo reaction of rhodopsin, bathorhodopsin is an intermediary result, which has been studied with high time resolution femto second spectroscopy. Resulting data demonstrated its appearance with 200 fs at all wavelengths. Further oscillations were observed when probing the sample at 550 fs period, Ref[14]

These oscillations seem to emanate from coherence at the vibrational ground states of the photoproduct (bathorhodopsin). Such ground state oscillations are the response to the immediate excitation of the reactant. After the excitation, the corresponding excited-state wave packet, produced by probing the sample, moves away from the Franck-Condon region, retain- ing its coherent form, to the ground state of the photoproduct. The resulting wave packet oscillates back and forth on the ground state of the product's surface giving rise to the observed oscillations shown also in (Ref [14], Fig. 11 attached) and Ref [15].

When probed at 578 nm, Shidhida et al. Ref [14], decay times of 146 fs and 1.5 ps were observed . And at 635 nm, the spontaneous fluorescence results were that associated to 330 fs, and 1.7 ps. The conclusion was that the fast decay component was due to the excited stat population of the reactant acting coherently. The slow component was then associated to the vibrational states relaxation which dephased.

It is this coherent ground stat basis which through spontaneous fluorescence becomes excited into rhodopsin* and the associated decay time values where we inspect healer action at a distance will be evidently found. Thus, our hypothesis is that action at a distance, through mind intention, are found in the molecular structure and rearrangement therein of excitation results. Thus, given various probing wavelengths, and after spectroscopic analysis, our expectation would be that such decay times change due to intention. This is the place where quantum mechanics plays its most important role, i.e. when dealing with excitations emanating from the group state of the reactant.

3.2 Reasoning for transition many photons to single photon - rhodopsin Interaction

As mentioned previously, 'Telepathic communication and Wave Function Collapse (WFC)' required two parameters of primary importance: time of wave function collapse and time of perception or collapse. These constitute two primary parameters in our theoretic pursuit for an explanatory model of the mechanisms of telepathic communication between subjects. Due to restrictions implemented for experiment with human subjects, only the latter parameter is possible, while the former can only be inferred. The parameter of WFC is difficult to obtain because it requires the analytic investigation of light - rhodopsin interaction that would be difficult to perform using actual human subjects. However, analysis of WFC becomes more feasible when dealing with in vitro bio-complex sample of vertebrae rhodopsin. It is this investigation, WFC within rhodopsin (in vitro) upon photon interaction, that constitutes the main body of the present proposal.

Similarly, in our previous work, photon-rhodopsin is replaced by photon wave packet instead of single photon. The eye, while sensitive to single pho- ton interaction, requires 5-7 photons for a single window of integration time (100 milli-sec. for average humans) to cause a conscious response Ref([16], [17], [18], [19]) . HSP analyzed results demonstrating that if x number of photons arrived at the cornea, cx of them would be absorbed in the retina and set in motion the conformational change of rhodopsin.

Then the actual probability of seeing such photons can be calculated more explicitly if the rhodopsin excitation follows Poisson statistics Ref ([20], [19]). There- fore, while considering a single photon-rhodopsin interaction as our goal, our first attempt is to study an ensemble of photons at a time impinging on rod cells (in vitro) which cause a conformational change in the rhodopsin to its excited state rhodopsin*.

In general, spectroscopic characterization of excited rhodopsin, and its excitation has been studied by many authors Ref([21], [22], [24]). Following and extending upon general procedures described by the above, we present below a theoretical platform which leads to an intricate exploration of the interaction between conscious intention in relation to coherence phenomena, zero point energy, and potential energy surfaces structure, through the study of transition of rhodopsin to its excited state.

4.0 SINGLE PHOTON-RHODOPSIN INTERACTION.

Electrophysiological experiments demonstrate that rod cells are able to respond to single photons, Ref ([34], [18], [35]), even though 5- 7 photons per integration window are required for conscious response, Ref ([18], [17]). However, the absolute number of photons to stimulate single rod cells in experiments has always been in question, Ref [36]. On of the main difficulties lies in that the noise intrinsic to the rod cells becomes indistinguishable to the noise of the light stimuli, whether this source be a laser, an LED etc. Therefore, emphasis is placed upon improvement of experimental techniques to produce actually single photons at a time and to then interpret data of single photon-rhodopsin interaction.

The specific technique that we will describe here is spontaneous parametric down-conversion (SPDC) in order to produce an entangled photon pair. In this process, a non-linear crystal is used to split photons into pairs which together abide to the energy conservation principle. Vacuum fluctuations stimulate the photon pair production in which, out of approximately 1012 photons is responsible for the single entangled pair, Ref [37]. Each of the produced entangled pair of photons can be guided. Nam Mai Phan et al., Ref [38], names accordingly the entangled photon pair as signal and idler. A single-photon avalanche photodiode (APD) confirms single photon production and an acousto-optic modulator (AOM) is triggered to divert the idler photon through an optical fiber interfaced with the rod cell. Thus, the point is that if the APD does not detect a single photon, signal photon, then the AOM is not activated for further interaction with rod cell (see Fig. Single- Photon.pdf). Once the AOM is triggered, then the idler photon is allowed to interact with the rod cell in the microscope chamber. Subsequently the resulting electrical signals from the rod cell are detected by a suction pipette.

A way of characterizing single photon sources is through a second order correlation function, Ref [38]:

$$g^2 = 1 + \frac{VarN - < N >}{< N >^2}$$

The parameters $< N >$ and $< VarN >$ correspond to the mean and the variance of the number of photons respectively. For a well stable laser, this correlation function, $g2 = 1$. But for a perfectly single photon source, $g2 = 0$. Using SPDC, Phan et al. obtain $g2 = 0.08 +/- 0.06$, Ref [38]. Data acquisition from the membrane current of the rod cell is performed via suction electrode technique in, Ref [35]. Generally speaking, after trigger- ing of the AOM via signal photon by APD, the idler photon is guided to a fiber optic taper, magnifying the output signal onto the microscope chamber. The current waveforms and pulses from the APD, including those for single and no photons are thus recorded at the amplifier as shown (see Fig. Single-Photon.pdf). Additionally, an auxiliary laser is used for responsive rod cell selection and functionality.

P. Brumer et al. in their article: 'Molecular response in one-photon ab- sorption via natural thermal light vs. pulse laser excitation', Ref [39], has explored single photon-molecule interaction in the case of natural light vs. laser coherent light source. In one of such treatments, the single photon ab- sorption is treated using quantized radiation fields. This treatment demonstrates that single photon absorption through coherent radiation source results in coherent molecular dynamics in contrast to using natural light where coherent dynamics is not thus stimulated. As a result of this observation, it is concluded that the single photon carries information about the radiation field from which it was emanated. Brumer et al. conclude that due to this observation, there is an incompleteness about quantum measurement theory.

It is noticed that there also exist different kinds of coherence(s) in association to the particular characteristics of the off-diagonal terms of the density matrix representation. For example, in one such case, the off-diagonal terms evolve coherently with energy representation basis as

$$\exp(i(E_j - E_k)t/\hbar)$$

where E_i' s are energy eigenvalues of the system. An alternate example of coherences refers to the span of stationary energy eigenstates through sub- components Ref [39]. Simultaneously, changes in the populations of eigen-states of a system which do not involve the time dependent evolution of the off-diagonal density matrix states are also studied and are termed 'incoherent dynamics'.

Brumer calculates the associated initial and final quantum states prior and after single photon from the quantized radiation field interacts with molecule. The final state is an entangled superposition of the states of the molecule and the radiation field itself, Ref [40]. However, the main interest lies in extracting information from the final state rather than the final state itself via the density matrix formulation by tracing over the radiation field resulting in the density matrix of the molecule. The result from this analysis is that single photon absorption emanating from a coherent source, such as a quantized radiation field, produces a coherent superposition state in the molecule. This superposed state evolve coherently in time with frequencies in the energy representation : $(E_k - E_{k'})/(\hbar)$. The energy associated to this superposition state is composed of many energy related eigenstates : $|E_{k,m}\rangle$, and as such is not sharply defined. Of final interest is that this energy uncertainty is intricately tied to the fact that the absorption took place due to a coherent light source. This final conclusion for this case appears to also be due to the fact that the initial state of interaction (light-matter interaction state) was the result of a sums of superposition of product number states (Eq. 1, Ref [39]).

Assuming that we carry similar steps as Brumer for single photon-rhodopsin interaction, we should thus be able to notice and appropriately detect through measurement the evolved superposed coherent state phenomena. In our case, the results will need to be parametrized not only as 'light-matter' interaction, but, also as well as 'mind-light-matter' interaction. In this new setting, we search for any alteration in the coherence phenomena hereby de- scribed as well as population eigenstates variations, which would most likely correspond to variations in the diagonal elements of the density matrix representation. In accordance to section 2, 'WFC, coherence, decoherence and absorption', we are trying to ascertain if it is indeed possible to have a natural mind-matter selection of a single density matrix diagonal element and that such would then correspond more directly to the measurement problem analysis as well as delivering exact timing for such potential collapse function thus rendering the variable needed of 'time of collapse' for WFC process.

5.0 CONCLUSION

In conclusion, we have introduced the problem of WFC aided and un-aided through, single and multi-photon interaction, in an attempt to investigate consciousness interaction in bio-complex stratum. Results therein are to be utilized for the further determination of time length of collapse, which is a parameter necessitated from previously presented work on 'Brain to Brain Communication between Humans'. We extended this problem to the analysis of Mind-Matter interaction in biology to ascertain more precisely the role and dynamics of conscious intention at a distance. This latter process is established as being correlated to an intricate understanding of molecular dynamical systems in which signatures of conscious interaction will be attempted to be found and dynamics will be searched within the biological sample hereby mentioned as rhodopsin. Our aim will be to further investigate information transfer at the molecular level by tracing photon-biocomplex interaction and have a primary understanding for telepathic communication at a distance at this micro-dynamical level.

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