

XVI МЕЖДУНАРОДНАЯ КРЫМСКАЯ КОНФЕРЕНЦИЯ

КОСМОС И БИОСФЕРА
COSMOS & BIOSPHERE

**Some Biotech Development on Biological Antennae for
Electromagnetic Communication in Quantum Chemistry
Regulation, Diagnostics and Therapy**

Cosmos and biosphere Krym october 2025

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Some Biotech Development on Biological Antennae for Electromagnetic Communication in Quantum Chemistry Regulation, Diagnostics and Therapy

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Cosmos and biosphere Krym

october 2025

Brain Electromagnetic waves

- **Pioneering research by OM Calamai in the 1980s in the aeronautical field on the suitability of military pilots for combat revealed how Evoked Potentials can be detected along with corresponding brain e.m. waves as manifestations of functional consciousness activity Fig 1.**
- **An underground international cooperation has developed Calamai's initial work, maturing technologies that today are capable of performing diagnostics and treatments.**
- **Numerous research groups have worked on the nature and sources of these brain waves, including the group led by Vescovi Pizzi, and Degli Antoni from the Department of Computer Science at Milan [1], Petri with its Neural Networks, Koroktov from St. Petersburg with the development of Kirlian, and V. Nesterov who, as Calamai states, has humanized his primitive algorithms into diagnostic manifestations, that connect various organs down to DNA with corresponding brain activations highlighted by Calamai 40 years ago.**

Brain Electromagnetic waves

- **An electrical system, well beyond the fundamental systems ECG, EEG, and EMG, seems to flow synergistically with the nervous system in the human body along those circuits, that Eastern traditions had identified as Meridians and Nadis, which have been studied theoretically in a recent work by Vitiello Brithz and colleagues [2], following the pioneering works of the German engineer Reinold Voll that have recently been revisited in a review by the Scalia and Valenzi Group [3] .**



Heliantheae
IKG Voll Diagnostics Device - Helian...

Brain Electromagnetic waves

The origin of these biological electromagnetic fields has been extensively studied at the Crimean Magnetobiology Center by Natalia Temuriansky, and in the last 20 years by Allan Widom and colleagues, who in a paper published in the International Journal of Quantum Chemistry explained with numbers how a biological wireless system can exist and how it can orient homeostatic processes along the body's electrical circuits similar to superconductive systems that are regulated by the Josephson effect, as he has elaborated more extensively in a posthumous paper currently in press [3-4].



Brain Electromagnetic waves

The contribution of Giuliano Preparata and Emilio Del Giudice with their School has enlightened us on how variations in coherent states in both inanimate and animate matter, can be influenced not only by high and low intensity electromagnetic fields, but also by the Vector Potential, which, without transporting energy but only information, can vary the phase of present coherent systems with superconductive or resistive electrical implications [5].



This conditions the life and efficiency of powered systems (from the heart to the brain, to the television remote control), just as it does in traditional electrical appliances from remote controls to old tape recorder

Vector Potential

If theoretical, experimental, and technological developments in the last forty years have made great strides, thanks to the contributions of leaders like Brian Josephson, Jacques Benveniste, Luc Montagnier [7], Edward Trukan [8], Mikhail Zhadin, and John Eccles, there remains an objective difficulty in interpreting how these electromagnetic and quantum phenomena interfere and regulate biochemical and biological processes. This fact brings us back to the necessity of a superior interdisciplinary quantum chemical effort, essential for deciphering and implementing the industrial and agri-food processes



Resonance Peak in the Current through the Solution (Zhadin Effect)

ZHADIN M.N., NOVIKOV V.V., BARNESF.S. PERGOLA N.F. (1998) *Combined action of static and alternating magnetic fields on ionic current in aqueous glutamic acid solutions.* Bioelectromagnetics 19: 41-45.

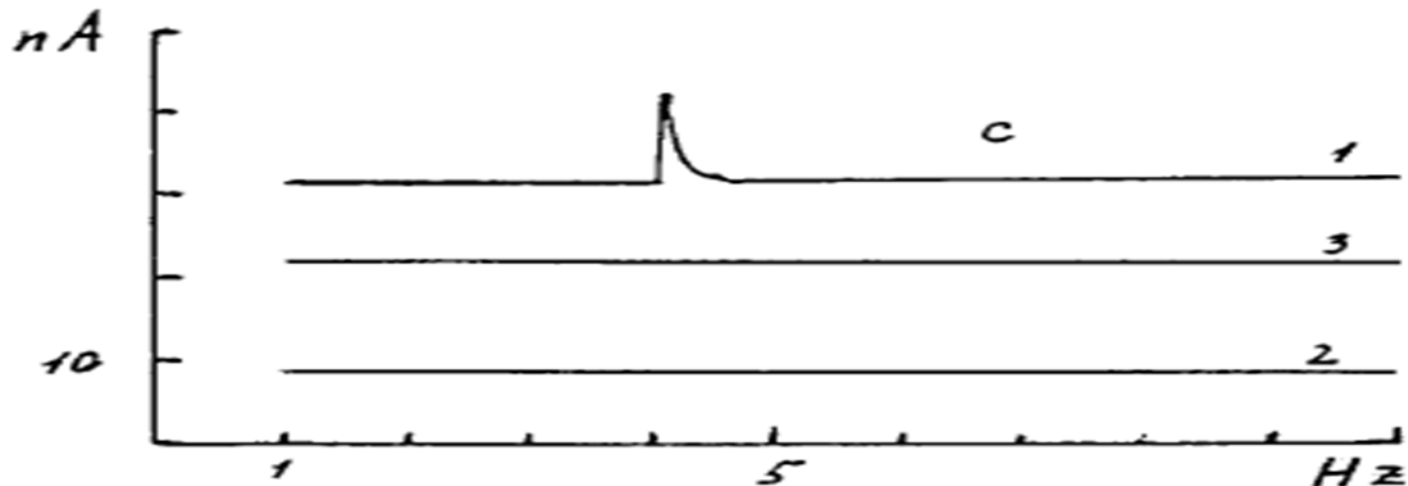


Fig. 2. Ionic current through aqueous glutamic acid (Glu) solution as a function of alternating magnetic field frequency at different values of static magnetic field. The alternating magnetic field frequency in Hz is plotted on the horizontal axis; the ionic current in nA is plotted on the vertical axis. The alternating field amplitude is $0.025 \mu\text{T}$; a: static magnetic field $B_0 = 20 \mu\text{T}$; b: $B_0 = 30 \mu\text{T}$; c: $B_0 = 40 \mu\text{T}$; 1: Glu solution with $\text{pH} = 2.85$; 2: Glu solution with $\text{pH} = 3.2$; 3: water with $\text{pH} 2.85$.

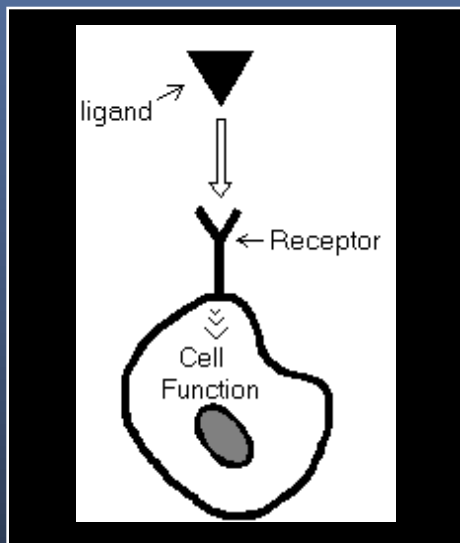
Vacuum and Coherence in Nature

Webnar, 25 July 2007



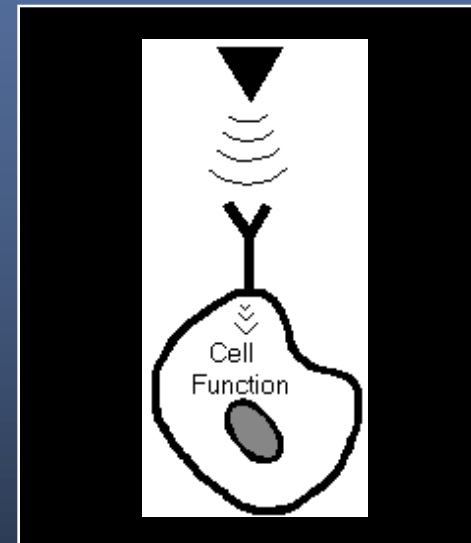
Molecular signaling

The Current Theory: "structural matching"



The 3D structure of ligand matches that of the receptor. Physical proximity induces receptor conformational changes which in turn triggers the cascade of events prompting cell function.

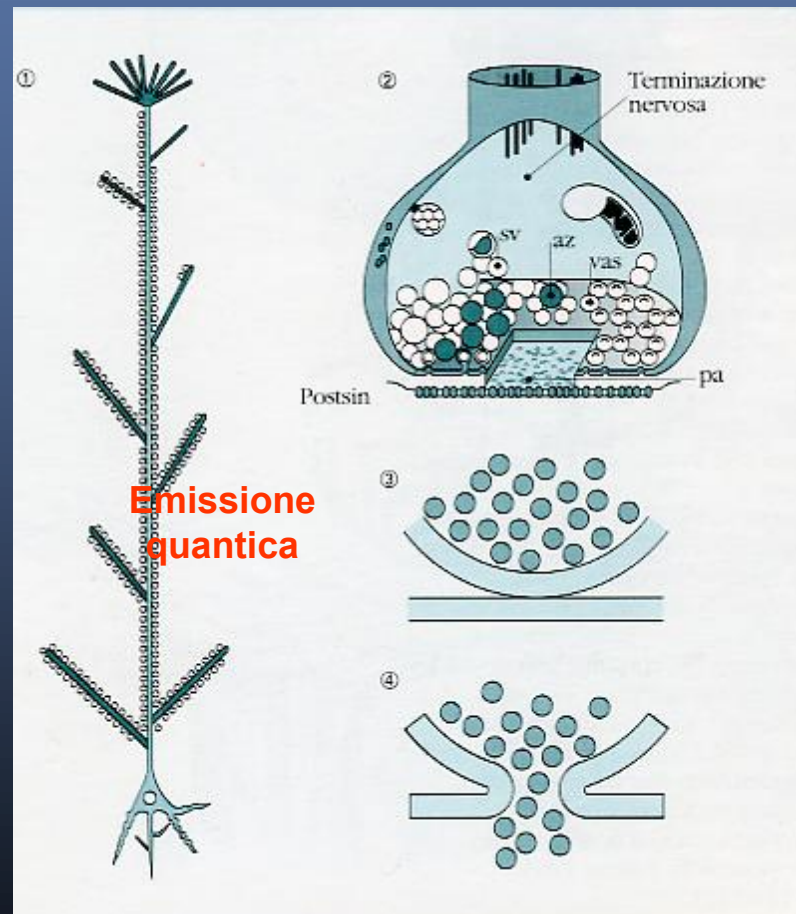
The Benveniste Theory: "electromagnetic signals"



Proximity favors resonance of ligand-receptor specific EM signals. Resonance serves as an iperconductive mechanism (vv) for activation changes which occur at all steps of the cascade inducing cell function.

“The psycone coordinates exocitoses by means of quantum probability fields”

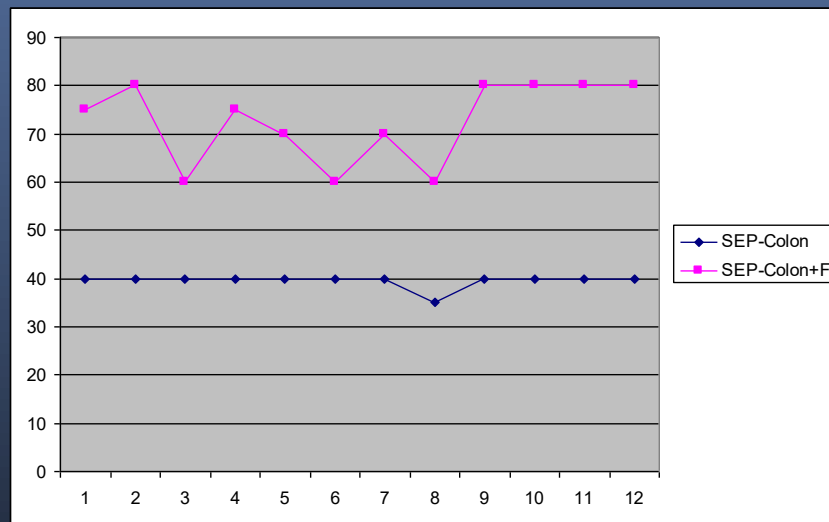
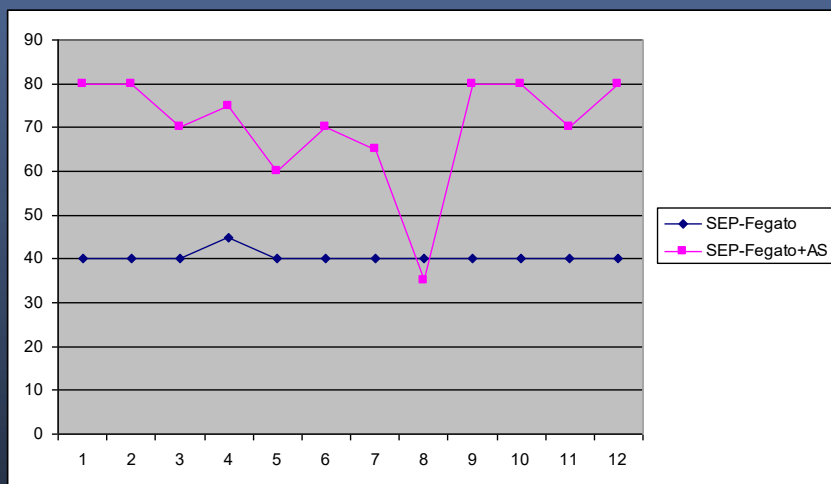
Sir John Eccles



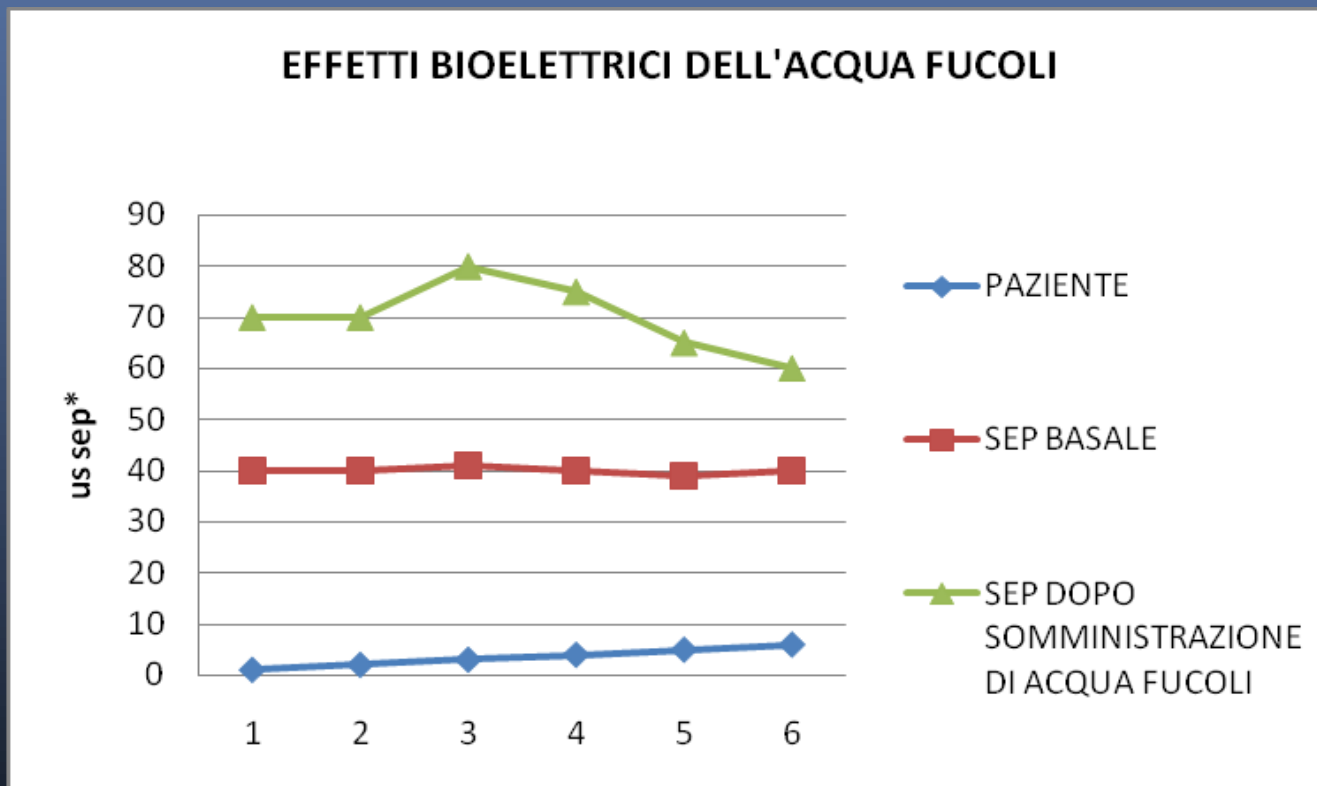
SEP variations on subjects with chronic constipation in hydropinic treatment with molecular signaling of water

A. Pisani, V.I. Valenzi, M.C. Lucchetta, M. Grassi, A. Serio, P. Avino, M.V. Russo, A. Fraioli

VII International Conference “Cosmos and Biosphere”, 1-6 October 2007, Sudak, Crimea



COHERENT EFFECTS IN THE WATER OF CHIANCIANO TUSCANY

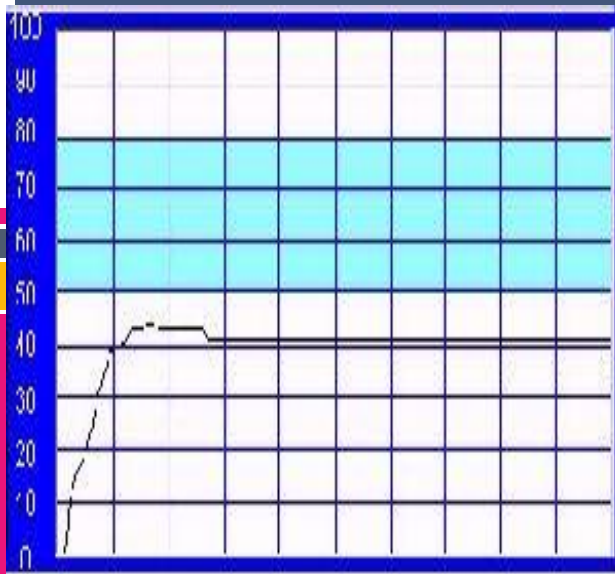


Skin Electric Parameters and molecular signaling of drug
*DRUG EFFICACY AND/OR INTOLERANCE IN METEOROPATHIC
OSTEOARTICULAR DISEASES WITH 8 FANS TESTED*

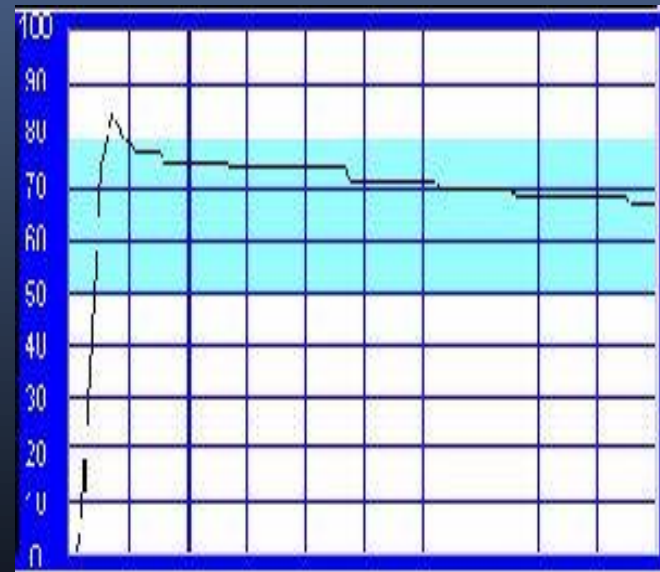
<http://web.tiscali.it/numedi/arc2002/0902/12.html>

V.I. Valenzi and M.L.Roseghini

Without drugs



After Nimesulide 1,5 cm max far from body

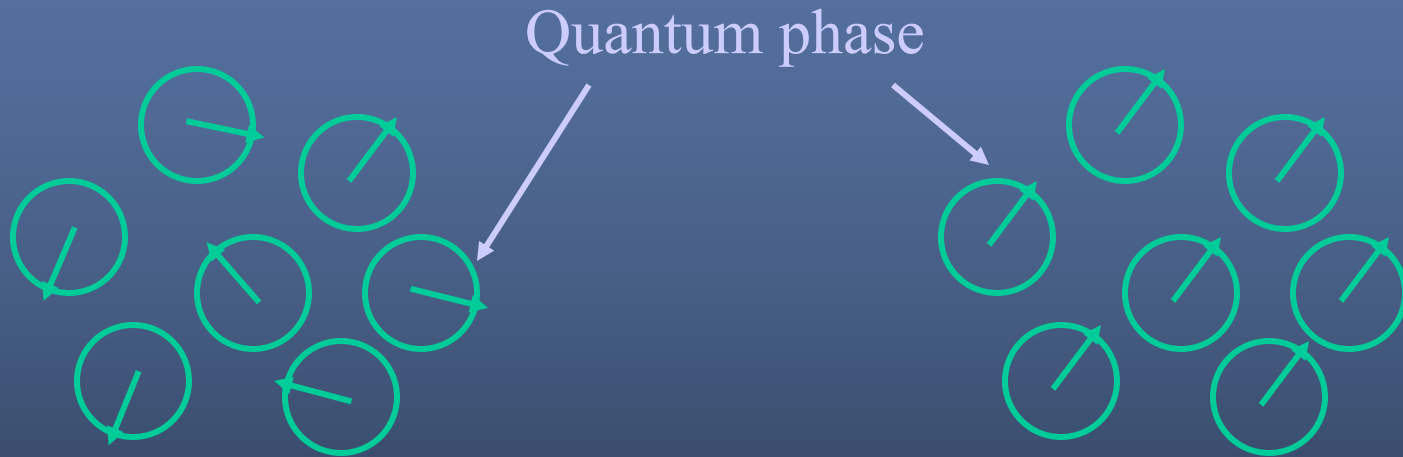


Quantum Coherent Interactions

Luca Gamberale

Pirelli Labs - Materials Innovation Advanced Research
(Milano, Italy)

N scatterers



Quantum incoherent

Cross section goes like N

Quantum coherent

Cross section goes like N^2

$N \sim 10^{23}$!!!

Potential Vector

The Potential Vector extends to a nearby large area, without transporting energy but just information, exerting a "fine influence", we could say "informatica", that alters the phase of the present coherent systems.

Giuliano Preparata & Emilio Del Giudice

(Scienza e Conoscenza, 17/2006)

The work continue with Josephson, Vitiello, Widom, Srivastava, Trukan, Von Gratosky, Koledov, and many others

Extremely Low Frequency Ion Cyclotron Resonances on the Surface Boundaries of Coherent Water Domains

Allan Widom, Jhon Swain,
V.I. Valenzi

<https://iopscience.iop.org/article/10.1088/1755-1315/853/1/012024>

Conclusion This work need more development in fundamental physics, and open to a new understanding of many strange biological phenomena, in particular not linear phenomena that influence, ad example mind brain body connections, effects of transdermic drug, that are without chemical reactions, as also very low dosis of drug, far from concentration in blood in the Benveniste Experiment. Bioelectrical function seems play a key role, not only in heart, with ECG, but also in all internals organs, that seems governed by electrical state of meridians connected, that change their electric parameters in answer to any kind of strong and very low signals as showed in the article and in the review by Scalia Valenzi et coll.

<http://ibb.kpi.ua/article/view/140255>.



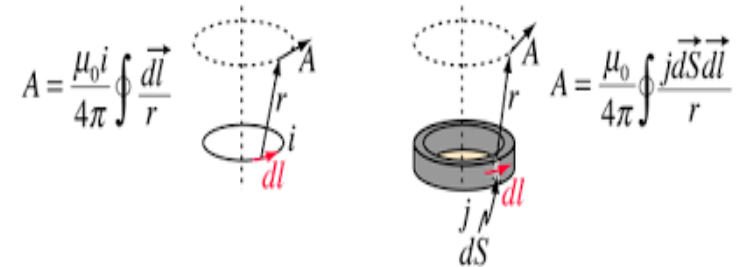
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To Whom It May Concern:
From professor **Allan
Widom**
Northeastern University

Brain Electromagnetic waves

These processes one can see us as victims of rampant industrial development with its multiple allergic variants that are easy to decipher and predict in some ways, such as for celiacs and lactose, and far more widespread and enigmatic pseudo-allergies that erode the quality of industrial products from wines to foods, from cosmetics to textiles, till drug [9-10-11] leading to the rampant development of allergies and pseudoallergies that threaten the quality of life and the health of the populations themselves.

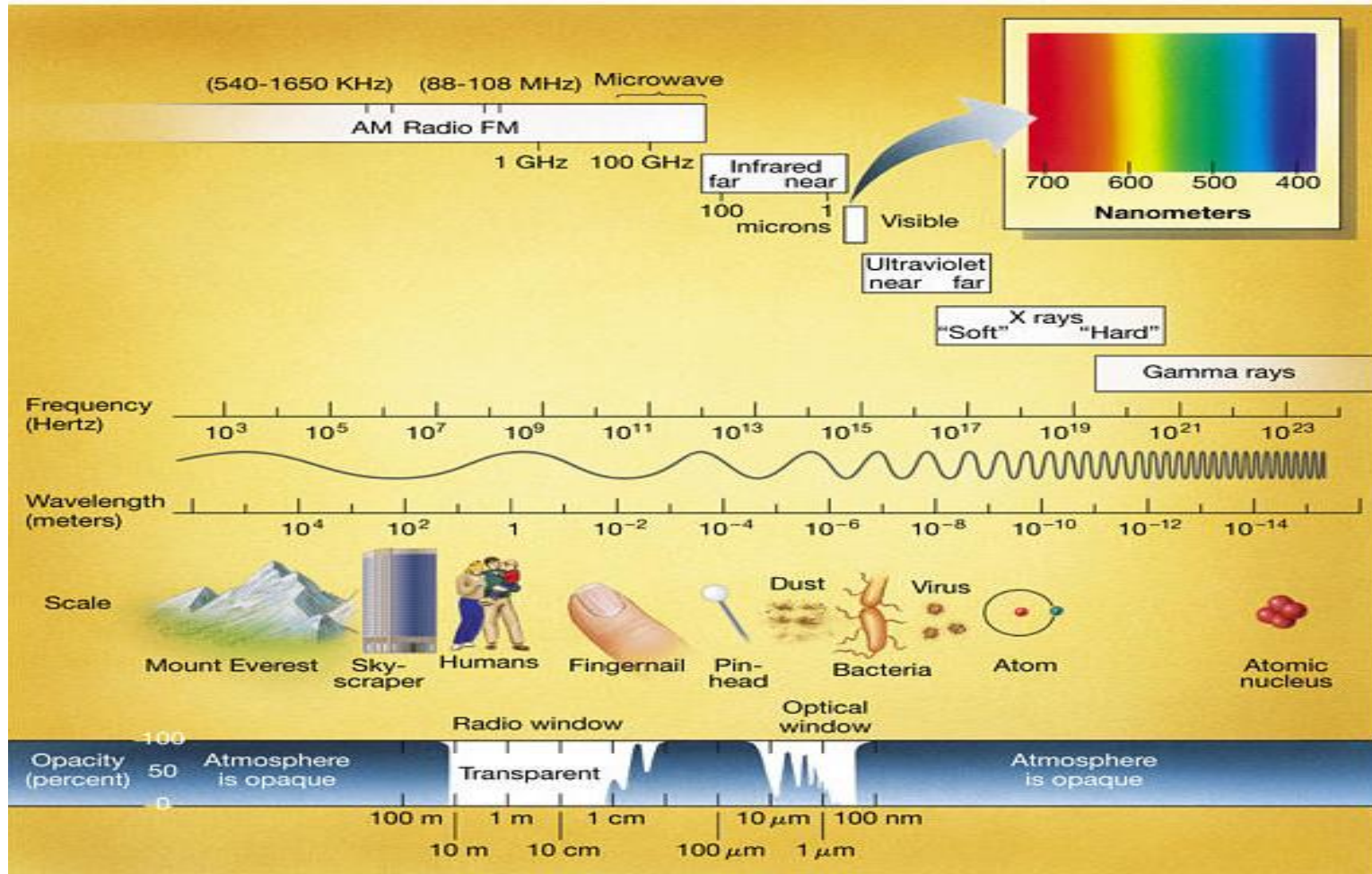


$$B_x = (\nabla \times \mathbf{A})_x = \frac{\partial A_z}{\partial y} - \frac{\partial A_y}{\partial z}$$

$$B_y = (\nabla \times \mathbf{A})_y = \frac{\partial A_x}{\partial z} - \frac{\partial A_z}{\partial x}$$

$$B_z = (\nabla \times \mathbf{A})_z = \frac{\partial A_y}{\partial x} - \frac{\partial A_x}{\partial y}$$

Electromagnetic spectrum

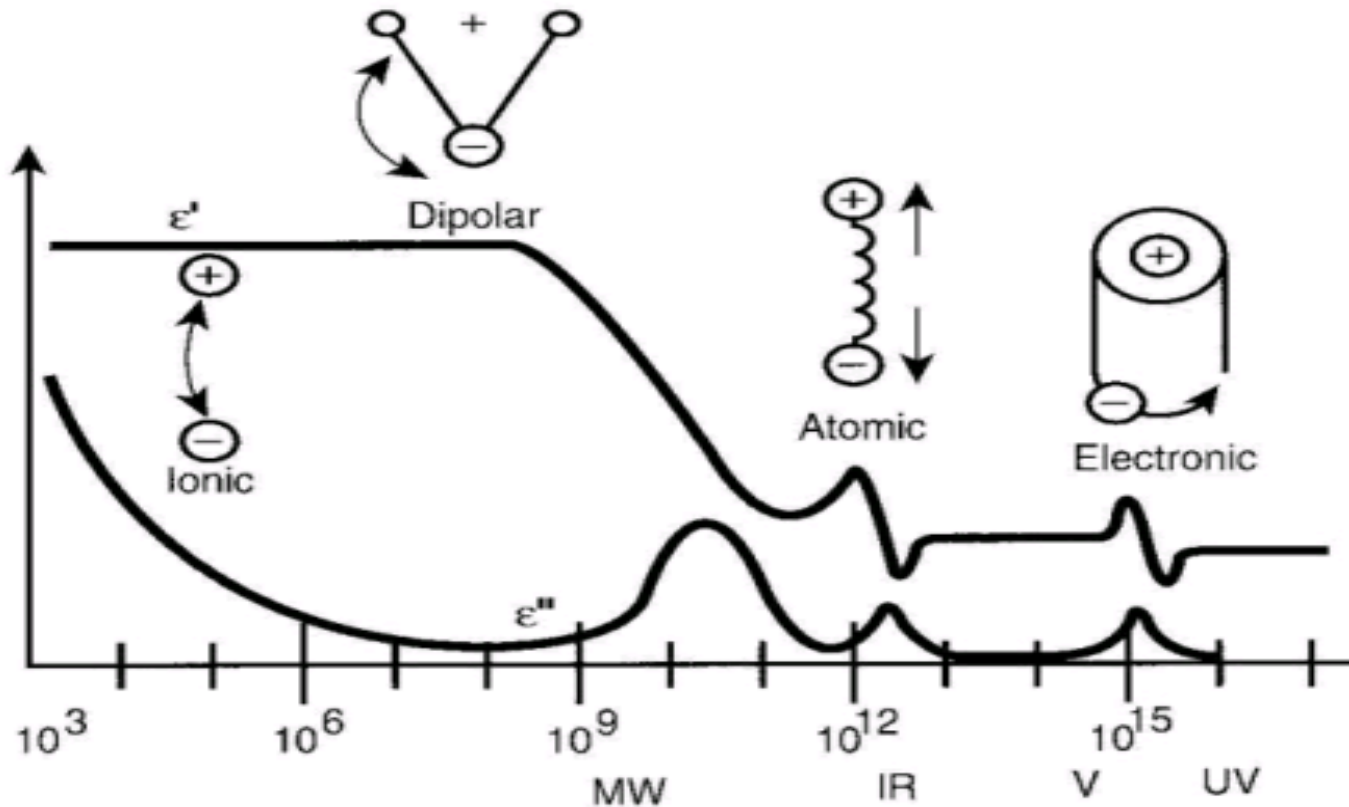


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MM wave frequency range

- **Millimetre wave 30-300 GHz and wavelength is 1 cm -1 mm**
- The global polarisation is consisted on five different dielectric mechanisms (electronic, atomic, orientation or dipolar, ionic polarisation and interfacial).
- The energy of rotational transitions corresponds to the microwave region of the electromagnetic spectrum. The typical frequency range of interest is 3 - 300 GHz (0.1 to 10 cm^{-1}).
- Thus polarization and relaxation in MM wave band are connected with excitation of the most small polar molecules or the most large polar groups.
- This is the latest instrumentally mastered range of electromagnetic waves

Polarisation frequency dependence



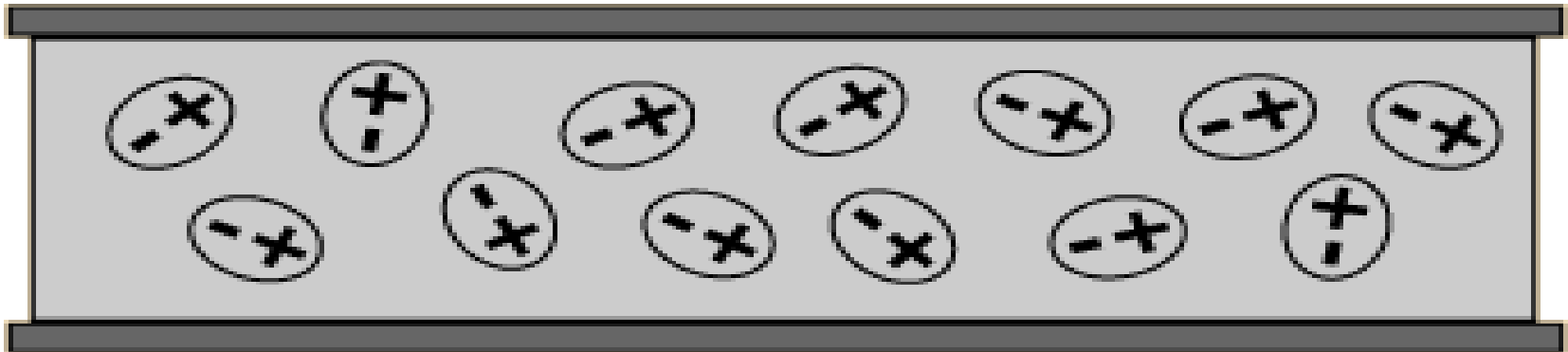
Microwave spectra are a result of two properties

Dielectric constant ($\epsilon_1(\omega)$) - Reduction in velocity

As the electromagnetic wave passes through the sample it causes an alternating polarization. This polarization and depolarization reduces the *wave velocity* across the chamber during analysis. The response of material under alternating electrical field E results in polarisation. The value of polarisation is connected with the **Complex Dielectric Permittivity**, that can be measured

Polarisation

Unpolarized

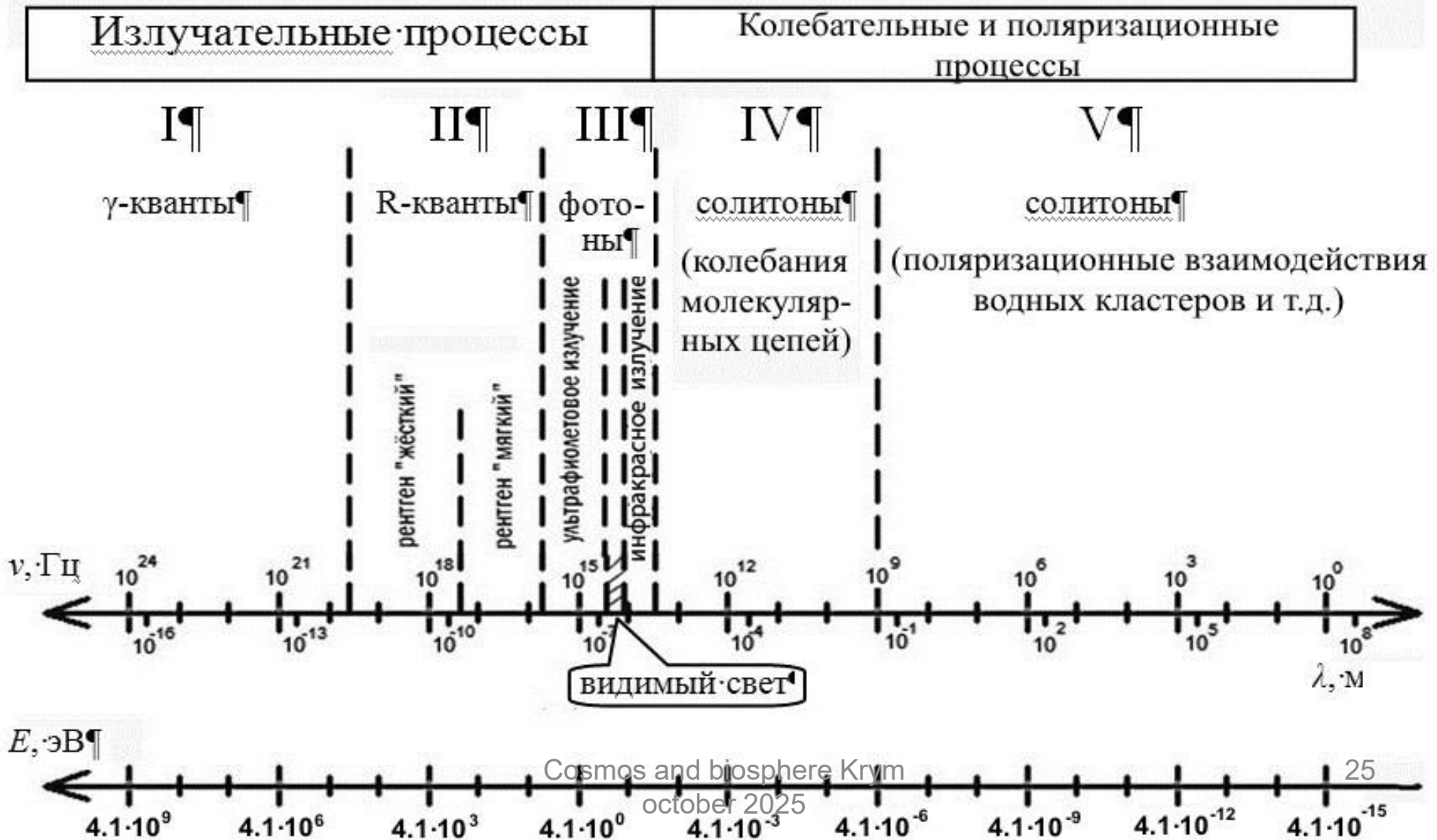


Polarized by an applied electric field.



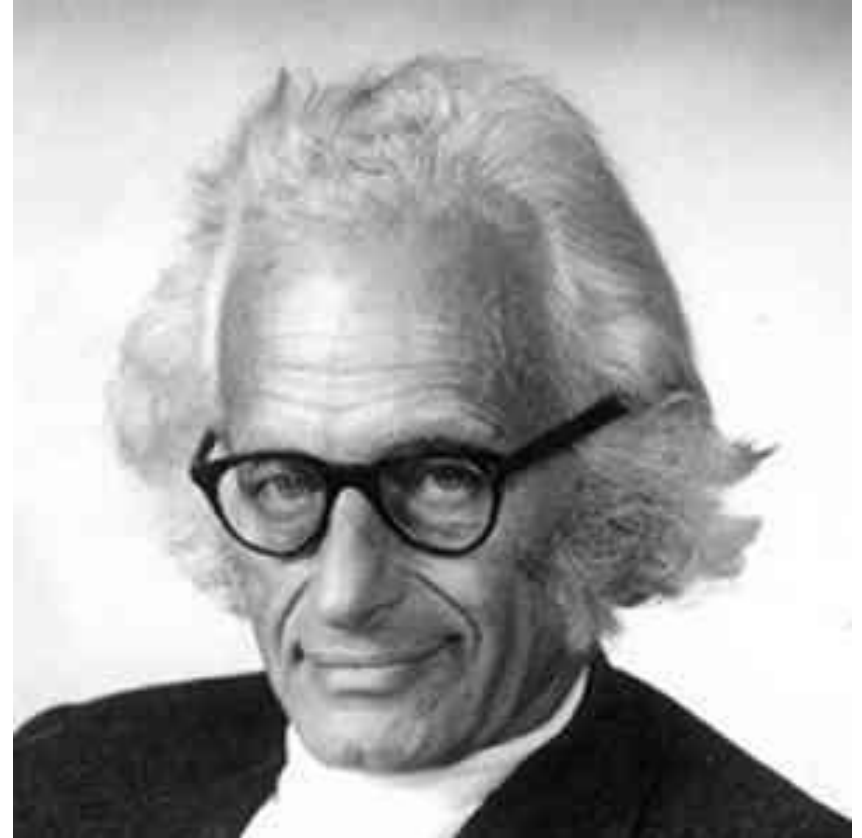
- **Dielectric loss ($\epsilon_2(\omega)$) - Reduction in magnitude**
- **As the molecules orientate in the electric field energy is lost to friction. This causes the waves magnitude to reduce across the sample or losses.**
- **Complex Dielectric Permittivity $\epsilon(\omega)$**
- **$\epsilon(\omega) = \epsilon_1(\omega) + i\epsilon_2(\omega)$**
- **$\epsilon = 1 + 4\pi P(\omega)$**
- **P is polarisation.**

Electromagnetic field



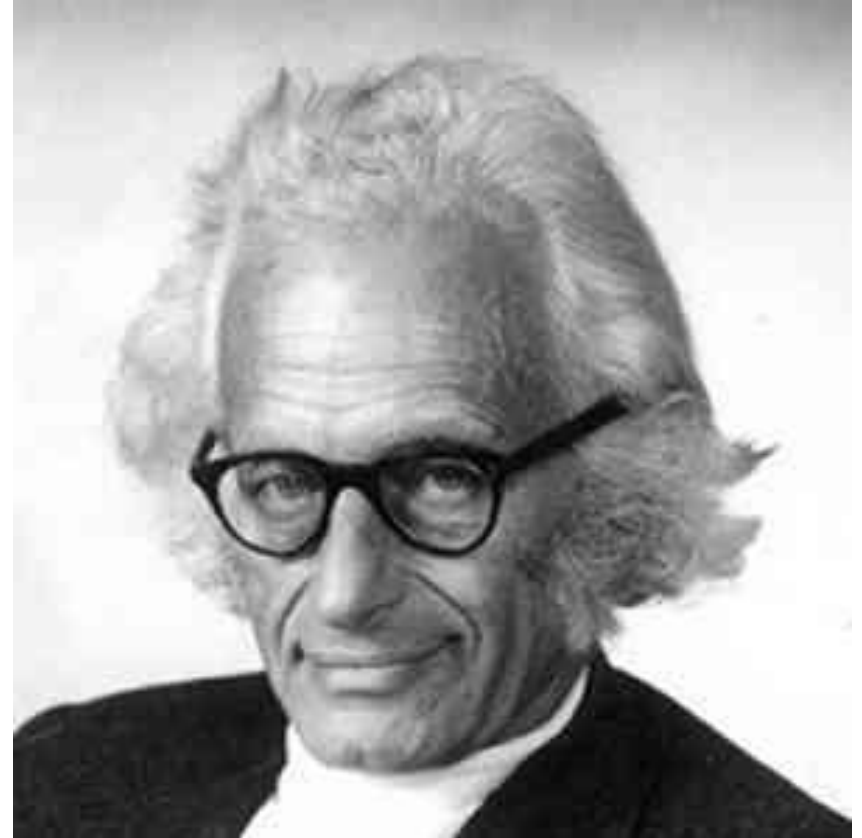
Herbert Fröhlich

War born 9 December 1905 –
pass away 23 January
1991). FRS[6] was a German-
born British physicist
In 1927, Fröhlich
entered Ludwig-Maximilians
University in Munich to study
physics, and received his
doctorate under Arnold
Sommerfeld in 1930.[7] His first
position was as Privatdozent at
the University of Freiburg. Due to
rising anti-Semitism and
the Deutsche Physik movement
under Adolf Hitler, and at the
invitation of Yakov Frenkel,
Fröhlich went to the Soviet
Union.



Herbert Fröhlich

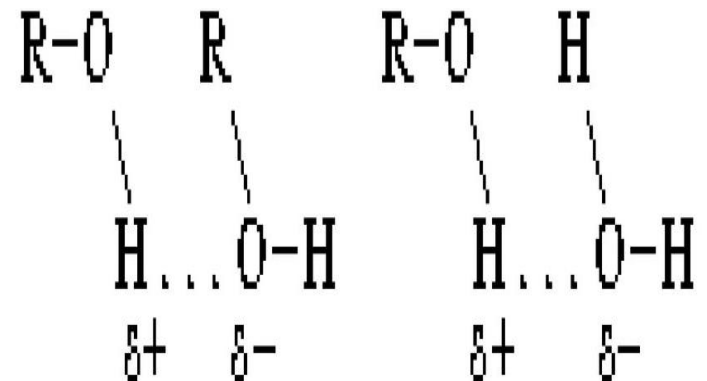
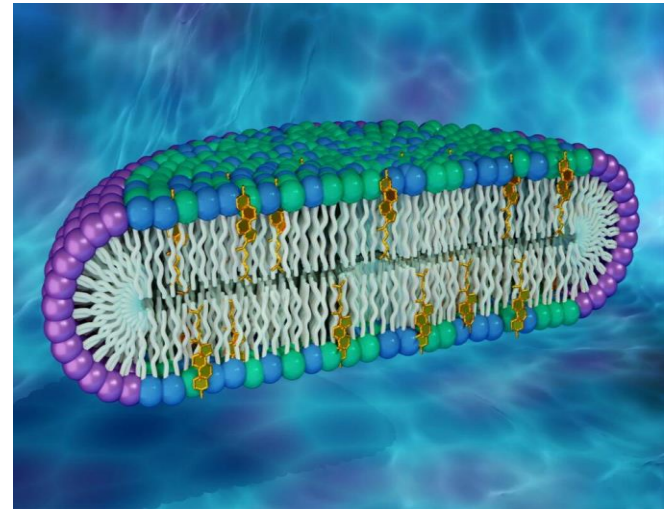
In 1933, to work at the Ioffe Physico-Technical Institute in Leningrad. He fled to England in 1935. Except for a short visit to the Netherlands and a brief internment during World War II, he worked in Nevill Francis Mott's department, at the University of Bristol, until 1948, rising to the position of Reader. At the invitation of James Chadwick, he took the Chair for Theoretical Physics at the University of Liverpool.



MM wave frequency range: Fröhlich Hypothesis 1968

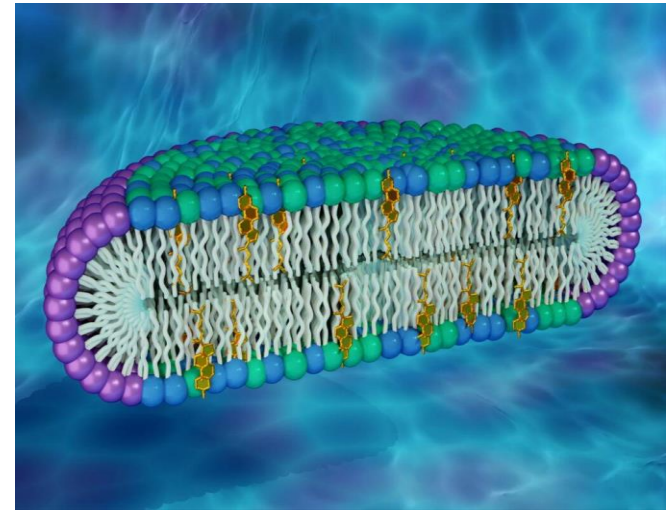
Biological systems are expected to have a branch of longitudinal electric modes in a frequency region between 10^{11} and 10^{12} sec^{-1} .

They are based on the dipolar properties of cell membranes; of certain bonds recurring in giant molecules (such as H bonds) and possibly on pockets of non-localized electrons. If energy is supplied above a certain mean rate to such a branch, then a steady state will be reached in which a single mode of this branch is very strongly excited. The supplied energy is thus not completely thermalized but stored in a highly ordered fashion. This order expresses itself in long-range phase correlations; the phenomenon has considerable similarity with the low-temperature condensation of a Bose gas.



MM wave frequency range: Fröhlich Hypothesis 1968

Cells have a membrane of about some microns. This thickness which maintains a very strong dipolar layer. From the point of view of physics complicated shape of a cell surface, local vibrations of a part of the cell membrane are feasible such that the positive and the negative part of a particular section of the membrane vibrate against each other leading to an oscillating electric dipole. Its frequency is of the order 10^{11} - 10^{12} sec⁻¹ if a sound velocity in the layer of order 10^5 - 10^6 cm/sec perpendicular to the surface is assumed.



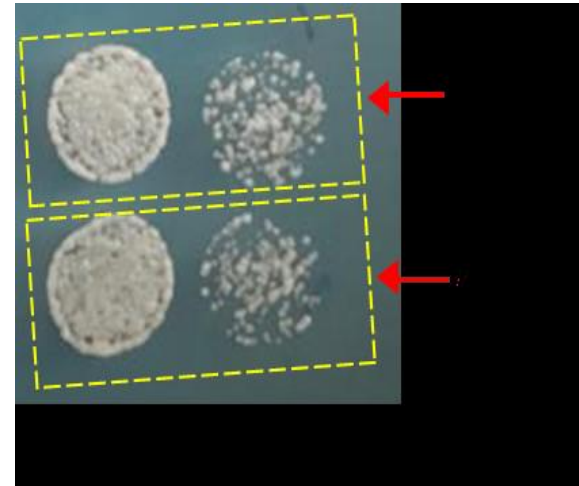
MM wave frequency range: Fröhlich Hypothesis 1975

In living organisms, due to the presence of metabolic energy,

can be generated coherent vibrations and the energy of chaotic thermal vibrations can be converted into the energy of coherent vibrations.

The existence of coherent electric vibrations in the 10^{10} - 10^{12} HZ region has now been established experimentally for biologically active microorganisms.

It is shown that such vibrations might play a decisive role in the control of growth of tissues.



Irradiated wild type (WT) cells. It can be seen from the figure that the colony growth rate of yeast cells the growth rate of WT yeast *Saccharomyces cerevisiae* could either be decreased (~29%) or increased (~15%) upon MMW exposure within 41.8-42.0 GHz

MM wave frequency range: Fröhlich Hypothesis 1978

The electric vibrations with frequencies of the order of 10^{11} – 10^{12} Hz should be excited coherently in active biological materials through metabolic processes. The given frequency range is to be considered as a very rough order of magnitude. It thus borders closely on the now accessible microwave range. Excitations of the proposed type could have far-reaching biological consequences, for they would lead to selective long-range interactions which probably are required to control growth in normal tissue and whose absence might lead to cancer.

$$\omega_{\pm}^2 = \frac{1}{2}(\omega_1^2 + \omega_2^2) \left[1 \pm \left\{ \left(\frac{\omega_1^2 - \omega_2^2}{\omega_1^2 + \omega_2^2} \right)^2 + \frac{M^2}{R^6} \right\}^{1/2} \right]. \quad (1)$$

Here, for given displacements of the oscillators, M/R^3 measures the ratio of the interaction energy between the dipoles and of their individual potential energies. Thus as long as the { } bracket is small compared to unity,

$$\omega_{\pm} = \left(\frac{\omega_1^2 + \omega_2^2}{2} \right)^{1/2} \left[1 \pm \frac{1}{2} \left\{ \left(\frac{\omega_1^2 - \omega_2^2}{\omega_1^2 + \omega_2^2} \right)^2 + \frac{M^2}{R^6} \right\}^{1/2} - \frac{1}{8} \left\{ \left(\frac{\omega_1^2 - \omega_2^2}{\omega_1^2 + \omega_2^2} \right)^2 + \frac{M^2}{R^6} \right\} + \dots \right]. \quad (2)$$

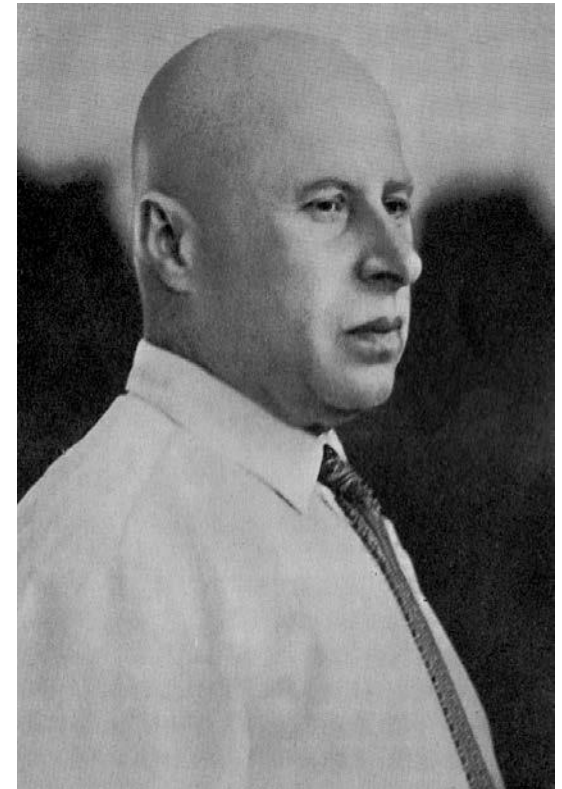
MM wave frequency range: Fröhlich Hypothesis 1978

- **Fröhlich hypoteses.**

The absorption length of photons with the frequencies of microwave and MM wave frequencies (10^{12} - 10^{13} Hz) corresponds to the intracellular distance at the cell density of $5 \cdot 10^8$ cell/ml. Fröhlich advanced Hypothesis states that cells are able to recognize each other at a distance and be attracted or repelled. Such photons may be involved in cell-to-cell communication according to the electromagnetic mechanism and in agreement with the prediction of Fröhlich that bio-systems support coherent excitations within frequency range of 10^{11} - 10^{12} Hz [8,18,23-26]. A second important part of the hypothesis is the vibrational model: trigger action of microwaves causing the excitation of coherent electric vibrations pumped by energy derived from metabolism. [8,18,23,26].

Alexander Sergeevich Davydov - "Davydov's soliton" 1973.

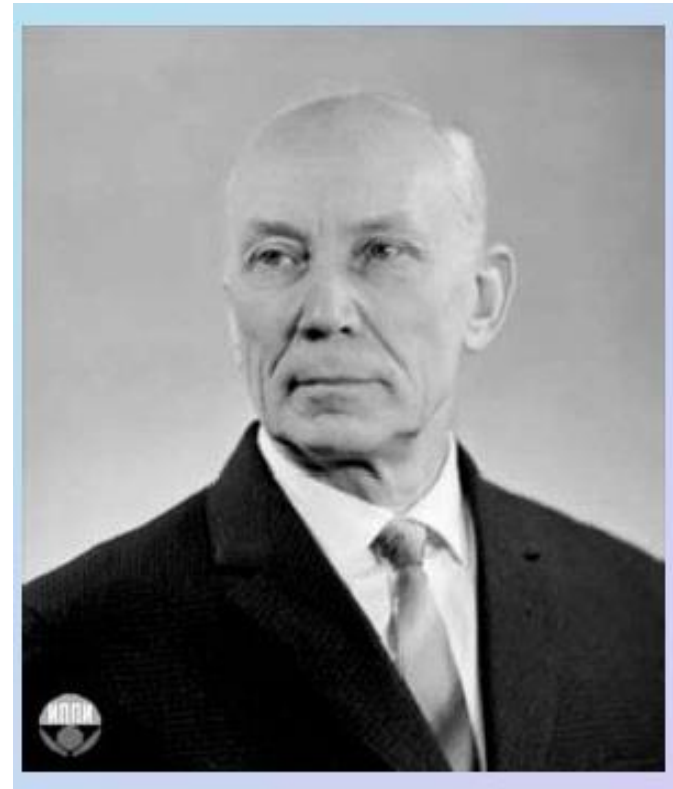
- Energy along the molecular chain of a protein is carried not by an electron, but by a soliton - a quantum of the electromagnetic field of the terahertz range. The vibrational energy of the molecular chain is converted into a soliton by linear oscillators in the chain - the atomic group AMID - I ($\text{C}=\text{O}$) in the peptide group, the energy
- vibrations 0.18 eV (absolutely close to the energy transferred by the ATP molecule).
- Solitons are transported along the molecular chain without interacting with it, i.e. without loss of energy.



The hypothesis of Holant Betsky Devyatkov wave range frequency for inter- and intra- cell communication

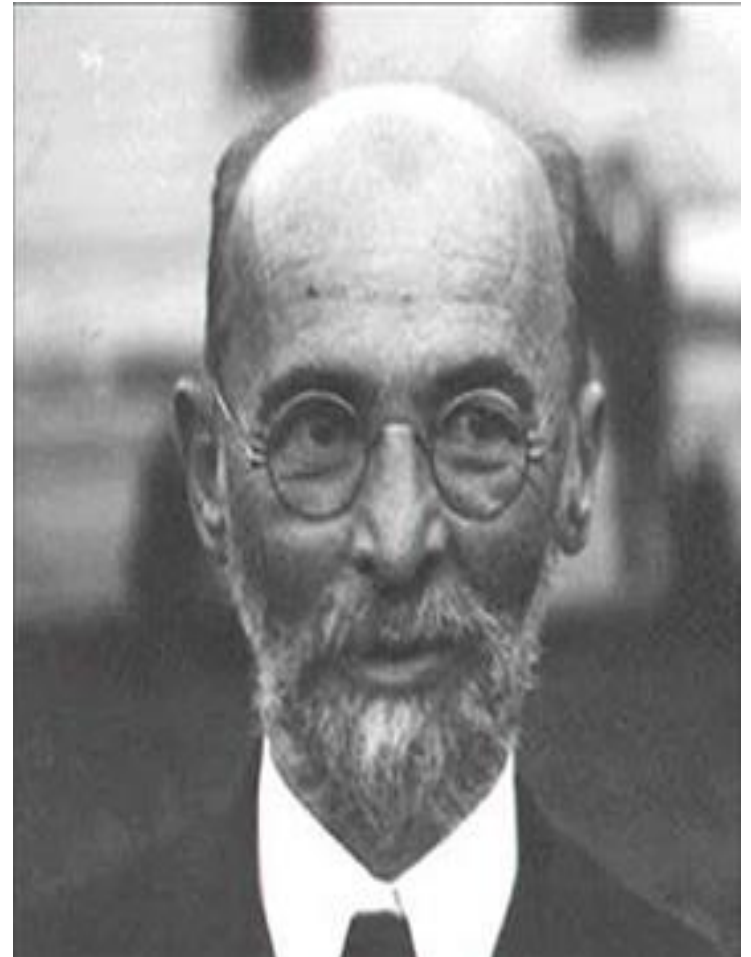
Natural background electromagnetic field

Natural sources of background electromagnetic field consist mainly of objects of cosmic origin: radio emissions from the sun and planets, relict radiation, and noise from atmospheric events. Background microwave radiation—Relict Radiation—is Cosmic Radiation with a spectrum of the background radiation of the Universe in the shortwave radio band (in cm, MM and sub-MM waves). The main contribution to the energy density is made by radiation with wavelengths from 6 to 0.6 mm), are observed at frequencies of 1.2, 3, 9.5, 35 and 70 GHz, raising the total activity by 30%. But electromagnetic field with Wavelengths less than 3 cm is absorbed by resonance in the atmosphere.



Gurwitsch mitogenic radiation

In 1912, Gurwitsch borrowed the term “field” from physics and applied it to biology in his published theory of embryonic development (Gurwitsch, 1912, 1922). Alexander G. Gurwitsch did experiments with onion roots (Gurwitsch, 1923). He monitored the number of mitoses in a set of chemically isolated onion root cells that were in the vicinity of a group of actively dividing cells (Gurwitsch, 1923, 1924; Gurwitsch and Gurwitsch, 1924). He observed a significant rise in the number of mitoses if detector roots were separated from actively dividing roots by quartz glass but not by normal glass. The fact that UV light can pass through quartz but not regular glass suggested the existence of a form of cellular radiation of an electromagnetic nature which he named “mitogenetic radiation”.



Gurwitsch mitogenic radiation

This study was the first to suggest that the emanation of light is not an incidental property of cells but one that might have relevance to signaling

При помощи биологических объектов возможно производить индукцию митозов на расстоянии, т. е. можно увеличивать количество митозов в биологическом объекте без непосредственного соприкосновения.

Митогенетические лучи (МЛ).

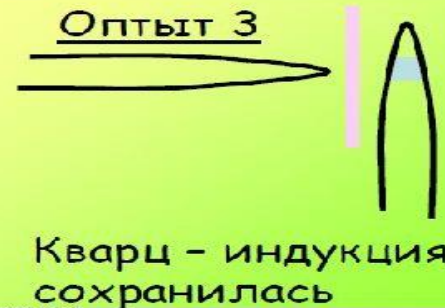
Опыт А. Г. Гурвича



Опыт 2



Опыт 3



The hypothesis of Golant Betsky Devyatkov wave range frequency for inter- and intra- cell communication

And radiation in the MM wave band penetrating from space through the windows of transparency can be considered to be the primary radiation.

During the evolution of all living bio-objects in Our Earth Cosmic radiation radiated our Earth with the all frequencies of electromagnetic spectrum, except some frequencies in MM wave range.

The absence of coherent oscillations in the MM wave range in the natural environment – the absence of noise – would make that frequency band convenient for inter-and intra cell communication [1,4,8,18,23-26].

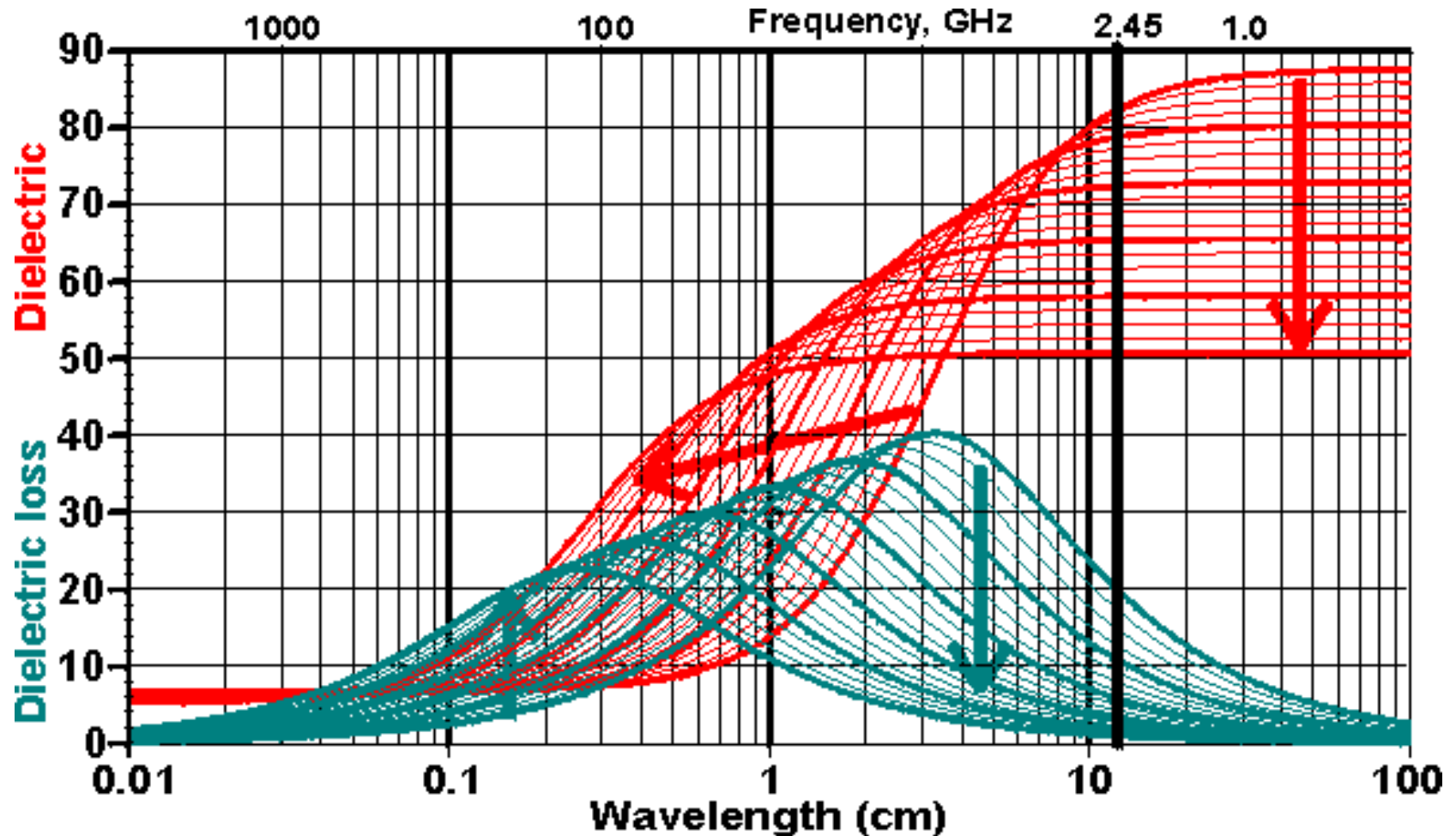
MM wave range frequency band is the most convenient for inter- and intra-cell communication.



Resonance frequencies of bio-objects in MM and subMM wave frequency ranges

- The approximate resonant frequencies in Hz have been determined experimentally for a few structures in living cells [126-128]:
- somatic cell – 2.39×10^{12} ;
- somatic cell nucleus – 9.55×10^{12} ;
- mitochondria from liver cells – 3.18×10^{13} ;
- human cell genome – 2.5×10^{13} ;
- interphase chromosome – 7.5×10^{11} ;
- metaphase chromosome – 1.5×10^{13} ;
- frequency of vibration of its own membranes, 10^{10} - 10^{11} Hz;
- erythrocyte – $(3.5-4.0) \times 10^{10}$,
- cytoplasm and extracellular medium relaxation time 10^{11} - 10^{12} Hz.

Water spectrum



Absorption of water in the MM wave range

- $P(z) = P(0)\exp(-\alpha z)$
- $\alpha[\text{dB/cm}] = 4.34 \alpha[1/\text{cm}] = 54.6 \text{kc/f}$
- $c = 3 \times 10^{10} \text{ cm/s}$
- $\alpha[\text{water}] = (200 - 400) \text{dB/cm}$ at frequencies $(3 - 15) \times 10^{10} \text{ Hz} = (30 - 150) \text{ GHz}$ (which corresponds to wavelengths of $\lambda = (10 - 2) \text{ mm}$)
- Electromagnetic oscillations of low intensity in the millimeter wavelength range have a significant impact on the vital activity of various organisms.
- The primary target for millimeter wave electromagnetic radiation is water molecules (H_2O), which strongly absorb millimeter radiation.
- Indeed, water performs extremely important functions in the vital activity of biological objects and the human body.
-

Dielectric properties and absorption of water in the MM wave region

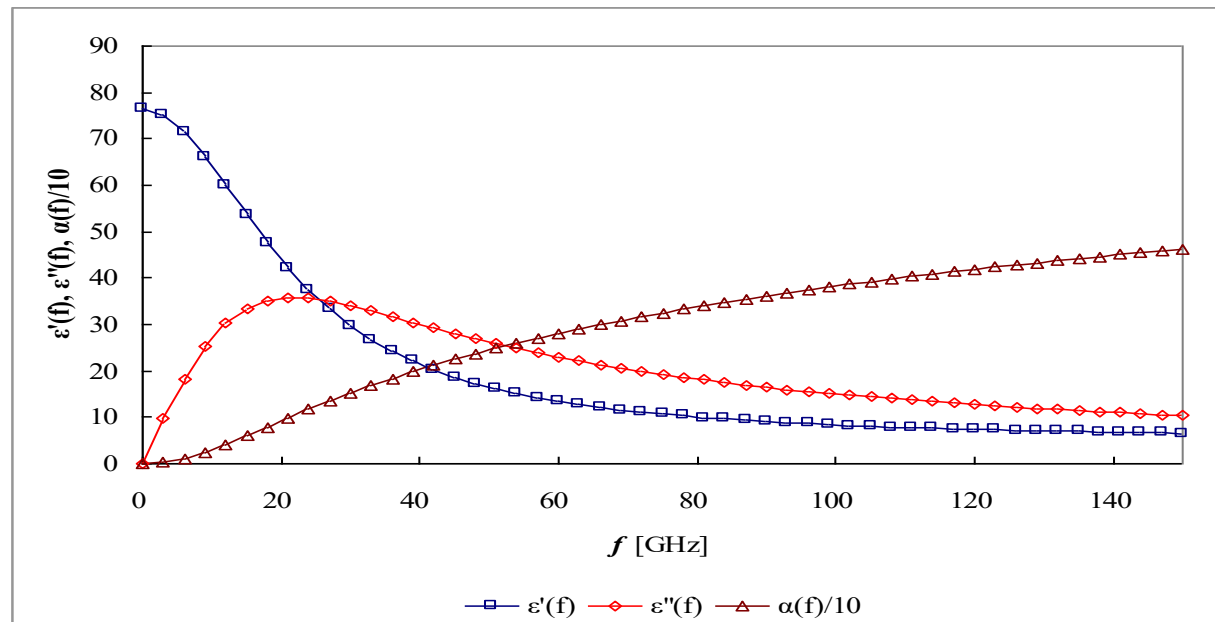


Fig.2 shows frequency dependencies of complex permittivity $\epsilon = \epsilon' + i \epsilon''$ and absorption coefficient $\alpha = [\text{dB/cm}] = 4.34 \alpha [1/\text{cm}]$ of water in the microwave and MM ranges. One can see that in the MM range absorption in water much more than in the microwave range: $\alpha = [\text{water}] = (200 - 400) \text{ dB/cm}$ at frequencies $(3 - 15) \times 10^{10} \text{ Hz} = (30 - 150) \text{ GHz}$ (which corresponds to wavelengths of $\lambda = (10 - 2) \text{ mm}$).

Water and MM waves

- The approximate resonant frequencies in Hz have been determined experimentally for a few structures in living cells [126-128]:
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- frequency of vibration of its own membranes, 10^{10} - 10^{11} Hz;
- erythrocyte – $(3.5-4.0) \times 10^{10}$,
- cytoplasm and extracellular medium relaxation time 10^{11} - 10^{12} Hz.

Evidence of those hypothesis

- H. Frohlich formulated a hypothesis stating that energy in cells was not thermalized but instead stored in molecular vibration modes.
- According to his theory, coherent dipole vibrations generate an electromagnetic field that is used for long-range interactions between cells using water as a medium.
- This effect should be visible at normal temperatures and occur in all living things.
- Specifically, Frohlich's Hypothesis states that cells are able to recognize each other at a distance and be attracted or repelled.
- A second important part of the hypothesis is the vibrational model: trigger action of microwaves causing the excitation of coherent electric vibrations pumped by energy derived from metabolism. [Fro81].
- Radiation of many biological effects with millimeter waves in the frequency region of 5×10^{10} Hz show sharp frequency resonances and have nonthermal effects on many biological activities. [Fro75].

Evidence of those hypothesis

- It was studied and shown that there are
- Physicochemical Effects
- Influence at the Subcellular, Cellular and Tissue Levels
- Effects on Human Erythrocytes
- Effects on Growth Rate
- Effects on Proteins, Chromosomes and Genes
- Effects on Membranes
- Influence at the Organism Level

MM wave therapy (MMWT)

- Most known and studied is low-intensity ($<20 \text{ mW/cm}^2$) MM wave therapy [1-7].
- Most sensitive systems in the human body: nervous, immune, endocrine and reproductive.
- MM wave therapy (MMWT) is a new and effective method for treatment of many diseases: cardiovascular, musculoskeletal system diseases, pathology respiratory and neuro-endocrinological diseases.
- Between neurologic, neuropsychiatric, neuro-endocrinological disease are: diabetic sensorymotor polyneuropathy [10], different pain syndrome [12-16], neuropathy of the facial nerve, trigeminal neuralgia, cerebral palsy [1-14,16,17,19,20], autonomic nervous system diseases, atopic dermatitis and psoriasis [21, 22] etc.
- **Application of MM wave for therapy many times more effective by application MM wave energy:**
- in **biologically active (acupuncture) points** is than in other parts of the skin [1-7,32,33].
- **within specific frequency windows: 51.62-51.84 GHz, 41.25-41.50 GHz that are exactly missing in natural background electromagnetic radiation [1-7, 18-22]**

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Why MM wave therapy can treat?

The medical effect of MMWT is not exactly known, but there are many investigations that show that therapy effect can be achieved through some different mechanisms:

- biochemical reception, that is a reception at a cell level, presupposes secreting the inner medicine [1-7].
- a sensory reception, that is a reception at an organism level, in aimed at optimum activity of one's brain [1-7]. .
- absorption of MM wave radiation by water molecules in human skin that result in biochemical reaction and further activation of neural receptors in skin [36].
- resonance absorption of MM wave energy by membranes or nerve ending
- the hypothesis of coherent excitement and interaction [18],
- the informational hypothesis [34],
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MM wave provide therapy and diagnostic over skin

- The skin provides a number of vital functions including protection, interaction with the environment, production of hormones, movement of electrical forces, and homeostasis. It keeps the body at a constant temperature and envelopes a volume conductor and resonant cavity.
- Skin appendages include nerves, hair, nails, sebaceous and sweat glands. Skin deforms and reacts neurologically in response to the application of forces and when removed, recoils.
- This helps the body interact with its environment. Therefore, a thorough understanding of both normal and abnormal skin presentations provides necessary support for clinical diagnosis and treatment.
- The human body is full of electrical signals which can be picked up on the skin and analyzed.
- These signals come from metabolic respiration, nerve impulses [GSR], muscle contractions [EKG, EMG], piezoelectric effects of bone and skin; and brain activity [EEG].
- In Traditional Chinese Medicine therapy and diagnostic were provided over skin (acupuncture, acupressure, massage, etc).
- **Interaction of MM wave with skin provides methodological basic for MM wave Therapy and Diagnostic over skin.**

Evidence of those hypothesis

In many of the studies summarized in the previous chapters, effects markedly different from those caused by heating have been found; in others, the power of **MM wave radiation was too low to cause thermal effects.**

Influence of MM wave on cell and nervous system

Among the possible cellular targets for MM wave in the upper layer of the skin, are keratinocytes, mast cells, melanocytes, Langerhans cells, and free nerve endings. Direct interaction between MW and neurons of various organisms has been shown to result in significant changes of neuronal activity [27-31].

Previously the studies have shown that MW had depressing effect on cell membrane excitability and chemo-sensitivity, which were realized through cell swelling [11]. At the same time it is known that cell pathology is accompanied by cell over hydration [12-14]. The fact that neuronal hydration brings to the increase of its excitation, in the result of increasing of the number of ionic channels functioning in membrane [15], the over hydration induced over-excitation of neurons was suggested as the main mechanism of pain (nococeptive) signal generation [16, 17].

MM wave radiation causes bio-resonant modification of only certain structural units of cells, which are able to absorb the given radiation with the given frequency. By changing the value of the membrane potential in various populations of immuno-competent cells, functional restoration of specific receptors for hormones, neuromediators and neuro peptides is accomplished, which can lead to various changes in neurons and glial cells.

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MM wave diagnostic system at acupuncture points and meridians

- In many investigation [46-52] it were shown that electro-physical properties (GSR, skin electroimpedance/electro-conductance) at acupuncture points and meridians strong differ from its in other skin points.
- In 1950 Nakatani [53] in Japan had found that electrical properties of skin at meridians of patients with some diseases differ from healthy patients.
- Then in Germany Voll [54-56] had elaborate special diagnostic system using measurement of electro-physical properties of skin meridian and acupuncture points. (VEGAtest).
- This diagnostic system was improved during the 1970s, another German practitioner, Dr. Schimmel [57-62] by elaboration of diagnostic systems of many diseases, influence of food, drugs, sport etc on health using measurement of electro-physical properties acupuncture points and meridians.
- These diagnostic are wide studied and used in many countries [63-68].
- All these measurements were provided at ac current or at low frequencies.

MM wave diagnostic system at acupuncture points and meridians

- But ac/ low frequency impedance depends very sensitively on measurement conditions such as the shape, size, material, and contact pressure of the electrodes, the applied current, etc [70,71].
- Non contact measurements give much more accurate results. Thus elaboration of microwave or MM wave measurement methods provide new generation of non-contact diagnostic without parasitic effects on electrodes.
- Besides every frequency range gives own information about human organism. Study human organism in wide frequency range is very important for understanding of origin and ongoing dynamic of diseases. MM wave frequency measurements because of access to moisture content and correlation with neurophysiological processes is one of the most interesting frequency range for elaboration of such medical diagnostic system .

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