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The Way to ETIs

Applied Gravitational Mass Spectroscopy

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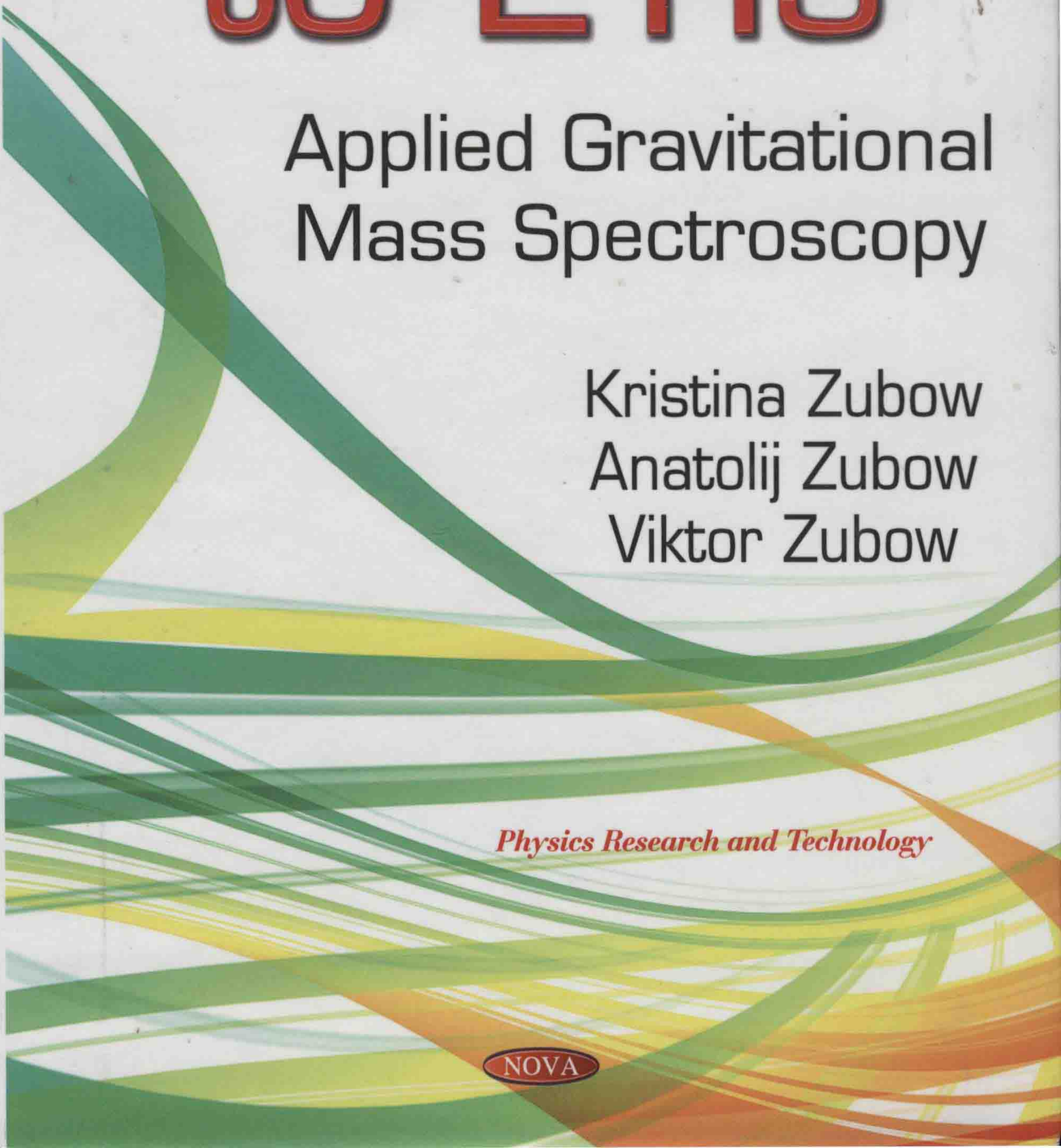

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Chapter 1

INTRODUCTION

The principle of material analysis using shock waves is well known and widely accepted in nature. For example, a fish generates acoustic signals in water and analyze the replies it receives; analogously, the woodpecker employs this method to find larvae in trees. The algorithm of this technique is based on the interaction of acoustic waves with the substance. The larger the geometric object, the stronger and longer must be the shock waves. On the other hand, increasing shock wave energy worsens the quality of the information. Therefore, the woodpecker varies its hit power on the wood to get exact locational information concerning where the larvae are or their sizes and quality. Thus, there is a natural model describing a device for scanning the heterogeneity in matter using the analysis of reflected shock waves. This model was observed to concentrate into itself physical and mathematical models as well as neural brain networks together so that they create a system for the generation and analysis of signals with the needed characteristics. Its realization without modern computer techniques and program design, however, is impossible. The next challenge was to understand and explain the huge information flow. Our brain is not able to process a sequence of five to seven signals and even less umpteen variable ones. Nevertheless, nature gives examples for living organisms (e.g. dolphins) that are able to process many more signals. The problem is more complex because the reflected signals are very weak and "dirty" with noises from their surroundings. Simply hitting an object weakly informs us about its hardness and sound. With a relatively high probability we learn, whether the object is a porous or monolithic and whether it is made of metal, plastic, wood, stone, sand, or liquid.

In the physical chemistry of polymers, the term "free volume" is often used when referring to the inside of the polymer structure. Mass concentrations at the level of clusters/domains should be their reverse. The sizes of the domains are in the nanometer area because their masses are umpteen billion Daltons and they are characterized to determine the most important properties of materials. The clusters in molecular matter are considered seed crystals at the point of transformation into the crystalline state. While the crystalline state is well studied by many methods, the analysis of the amorphous unstable one is problematic even though this state is the most important. It determines the direction of the biochemical processes, crystallization of substances, and destruction of materials. It is not right to believe that there is absolute chaos in the amorphous part. Our world has been built up by nature harmonically and each building stage exists as a compromise between array and chaos. Here, the empirical rule is applicably: 70±15% (array) to 30±15% (chaos), mainly with regard to liquids, polymers, and biochemical processes (mutagenesis).

To get an idea of the structure of the amorphous molecular matter, a new construction of devices is needed by which the recording of mass concentrations in stationary gravitational energy clusters is possible. The new method could be based on the influence of dosed energy impulses on the sample and the simultaneous analysis of the reflected ones. Here, the energy impulses are characterized as shock waves that are easily recorded. Technically the following tasks have to be solved: the source of the shock waves, receiver of reflected the shock waves, interface, and the administration system and service.

We attempt to inform a broad circle of readers on the essential details and the possibilities for the suggested method, therefore, we do not stop at difficult mathematical calculations, physical and chemical models, or electronics and computer design. The method we are introducing is called gravitation mass spectroscopy (GMS). Only after reading the monograph as a whole it is possible to understand the key aspects of this method and its huge potential. Examples of investigating some substances, processes, and events will be presented as they are helpful. The interaction of weak shock waves with pure substances will be discussed as well as their long-range order at the level of mass concentrations (clusters). Furthermore, the monograph covers the analysis of processes in which clusters are involved (physical chemical processes, remote cluster interaction). The clusters are characterized to be both wave and particle (wave-particle dualism)—with new revolutionary perspectives in natural science that could therefore be opened.

Chapter 2

WEAK MOLECULAR INTERACTIONS

Weak intermolecular interactions encompass the following:

- Fluctuation of charge densities on atoms and the induction of opposite charge densities on adjacent ones. These are the so-called dispersion interactions (Van der Waals force, widespread in the 20th century). They will be realized in inert gases and substances with a zero dipole moment (CH_4, CCl_4). The whole interaction energy of electrically neutral molecules can be calculated according to the Mie equation:

$$E = -\mathrm{A}\cdot\mathrm{d}^{-6} + \mathrm{B}\cdot\mathrm{d}^{-12}$$

where A and B are empirical constants and d is the inter atomic distance [1, p. 472].

- Dipole-dipole interaction between molecules with dipole moments or with one dipole and one induced dipole on another molecule. For instance, substances with polar molecules like water, ammonia, halogenated hydrocarbons [1].

- Hydrogen bridges between molecules. Here the hydrogen atom is linked with an atom of strong electro negativity (halogen, oxygen, nitrogen, etc.). The energy of hydrogen bridges are low, around 4…40 kJ/mol.

- Donor-acceptor interactions (coordination bonds). In this case, one atom is characterized to be the owner of an electron pair while the other one is the provider of an electron-free orbital (nomenclature of the 20th century) [2]. Hydrogen bridges are classified as a case of donor-acceptor interaction. Some problems, which arise at the investigation of weak donor-acceptor interactions, for instance, in mixtures of organic liquids, can only be understood after reading [3].

- Gravitational interaction. This type of remote interaction between mass concentrations has been developed by Newton and is described by:

$$\mathrm{F} = \gamma\cdot\mathrm{m}\cdot\mathrm{M}/r^2$$

where γ is the gravitation constant $6.672\cdot10^{-11}\ \mathrm{N}\cdot\mathrm{m}^2\cdot\mathrm{kg}^{-2}$, and m and M are masses (kg) that interact at the distance r (m). The reasons for this interaction have yet to be found.

- Our discovery of remote interaction between ensembles of mass concentrations (domains/clusters) [4, 5] that we believe to cause the Newton forces.

All of the above mentioned interaction forces inside of an individual substance with the same long-range order will be classified as cohesion forces whereas those between different substances will be regarded as adhesion forces. Adhesion forces, however, can be developed inside of one and the same substance when clusters of different structures appear, e.g. isomers, clusters of different isotopic content, clusters with different conformation and configuration (isotactic, syndiotactic polystyrene). The terms “cohesion” and “adhesion” will be of importance in understanding the processes of cluster formation in individual substances, solutions, and polymers.

2.1. THE ENERGY OF WEAK MOLECULAR INTERACTIONS

Thus, molecular clusters are described as the product of weak energy, cooperation, and structural interactions that are not sufficient for the clusters’ stability. Another factor in stabilizing the cluster structure was observed to be stationary waves in white noises [6, 7]. The lifetime of clusters is low, being in the diapason of ps and ns for liquids [8] and about some seconds for polymers [9]. Clusters interact with each other at a distance and form super cluster structures — ensembles. A long-range order in liquids and polymers will be built by these ensembles of clusters [10, 11].

According to Trouton’s rule, in liquids, only 1% of molecules are freely moving [12], with the huge remaining part being in a bound state. The thermodynamic model of area-wide network bonds between all molecules cannot withstand the criticism because of strong internal tensions and the loss of flowability; a possible way out from this “dead end street” could be the acceptance of cluster formation in liquids and polymers. For example, while investigating methanol, Zakharov and colleagues found clusters in this alcohol and even calculated their free surface energy [13]. The structure of water clusters has been described by many authors [14, 15, 16], (see Figure 2.1.1) because the appearance of clusters in natural and synthetic polymers has been proven experimentally [4]. The formation energy of clusters in individual liquids and solutions is observed to be lower than the heat background (kT), < 2...3 kJ/mol [6], and for solvated clusters of ion pairs (SCIP), the number is even less at about a J or mJ per salt mole [11]. As we already know, the stability of an organized structure depends not only on the energy component but also on entropy being the determining factor in the case of SCIP. The formation energy dependency on the seed crystal size is discussed in [17] and only in two cases does it approve of low values around zero.

The analysis of periodical structures in the long-range order of liquids using GMS can be understood by applying a simple example. Assume that the periodical structure consists of *n* elements, whose lifetime is remarkably shorter than the observation time. That means the elements disappear as soon as they have arisen. At recording the time of elements’ formation/destruction the observer will see only one part of them, because the other one has been destroyed. At the next moment, the former visible elements have disappeared and new ones are at another place appeared and so on. For the observer it looks like chaos. Accelerating the reaction of both the emergence and disappearance of elements means that they are visible to the observer; an impression arises and the observer is able to see more elements and a higher order. This scenario said can be compared with the principle of a screen where the display is a result of fast movements of an X-ray point and the visible “play of time” in the observer’s brain. The observer now understands that his perception involves not only *n* elements but also their wave properties. The wave properties of clusters were discovered by the authors of the present monograph and described in their work [10].

The long-range order in liquids is believed to be built of three different kinds of clusters: skeletal, randomly appearing, and intermediary. All of these three cluster types form an ensemble whose stability depends on the cooperative interaction of the clusters inside the ensemble—like a unit—and on its ability to achieve the lowest potential energy. The size and stability of an ensemble are directly connected with the mass of liquids and destroying factors (temperature and pressure fluctuations, external energy flows, vessel walls, colloids, gases, ions).

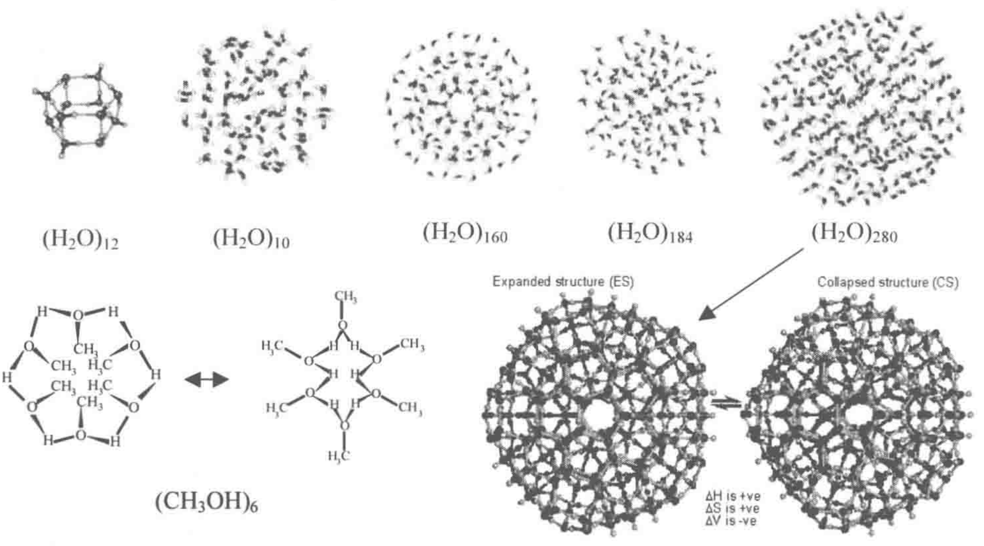


Figure 2.1.1. Calculated water cluster models (with the kind permission of Professors Chaplin, http://www.lsbu.ac.uk/water/index.html, and Lenz, $(H_2O)_{12}$ [14]) and clusters in methanol experimentally observed by the authors [10].

2.2. IDENTIFICATION METHODS FOR WEAK MOLECULAR INTERACTIONS

Weak molecular interactions can be analyzed through classic physical chemical methods using modern computer techniques. Furthermore, modeling molecules and molecule processes with the help of computer design is based primarily on the Lennard-Jones potential and its variants [18]. It has to be mentioned that in the Lennard-Jones potential calculations, the Mie equation (§2) will be used. Lastly, the gravitation mass spectroscopy method suggested in this monograph is suitable in identifying weak molecular interactions, too, although it works at the level of molecular clusters/domains.

2.3. MOLECULAR CLUSTERS

Molecular clusters are described as the precursors of seed crystals. The authors of [19] have even managed to observe clusters of saccharose in water, as well as those of solvated ion pairs clusters ($KCl \cdot nH_2O$), and to take of a photograph of them directly. Clusters will be built in stationary gravitational waves and stabilized by gravitational noises where their formation energy will be provided by energy clusters of the physical vacuum [4]. As will be shown later in §21 and [4, 20], unbalanced processes of dissolving and condensation of baryonic matter in the physical vacuum, proceeding with super light velocity, are the main source of gravitational noises. On the other side, molecular clusters are characterized to emerge from weak gravitational radiation that is found to be individualized for each cluster and can be considered a "finger print." This weak gravitational radiation from a cluster and cluster ensembles changes the gravitation field of its surroundings. Anthropogenically changed white noises and their transfer in color noises lead to new formation conditions of clusters and cluster ensembles. This has consequences for the structure of seed crystals, the long-range order of liquids and polymers, their technological processes, and their product quality. This can schematically be represented as follows (Figure 2.3.1).

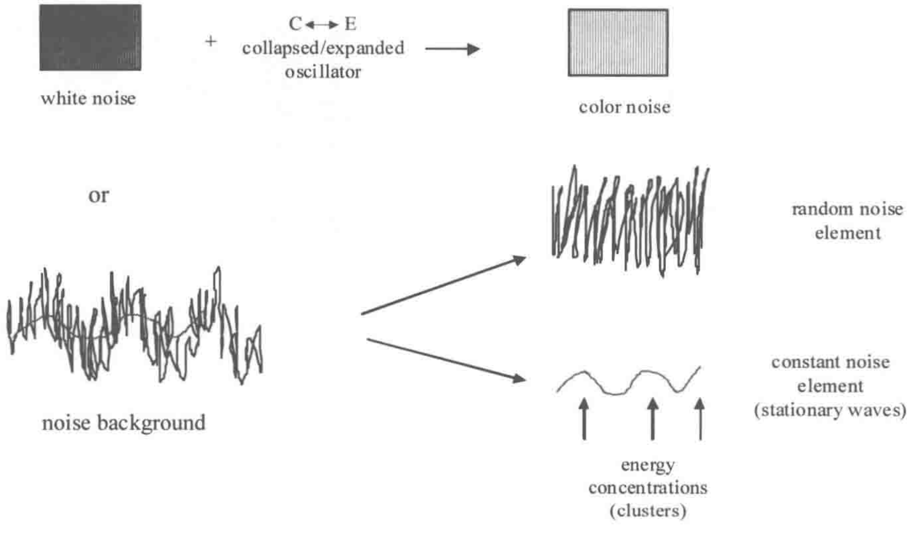


Figure 2.3.1. The interaction of background gravitational noises with weak gravitational noises of molecular clusters. C – collapsed (close-packed), E – expanded cluster form (loose clusters). The constant noise element is caused by stationary waves being the energy supplier for the formation of molecular clusters. The white noise can be seen on the TV screen when the antenna is switched off while color noise is the white noise that is disturbed by external energy flows, e.g. radio disruptions.

According to Figure 2.3.1, the stabilization of molecular clusters through the background noise leads to the formation of a new background noise, reflecting the wave character of the cluster and its structure. After forcefully shifting the C ↔ E balance (e.g. pressure on a polymer, stirring a liquid, or at beating), the wave character of a cluster will be changed. That means its gravitational "fingerprint" becomes different. This "fingerprint" is characterized as typical of the energy profile/histogram for the proton jumping between the cluster atoms and physical vacuum. In accordance with the resonance, the oscillation of a cluster ensemble remotely influences a smaller analog one, and large ensemble forces cause the other one to subordinate itself. Here a new ensemble consisting of the large ensemble and the small one will be built.

A number of processes in chemistry, biochemistry [6], and the hydrodynamics of liquids (change of viscosity under seismic waves) [21] as well as wall effects ([22], §10.9) and the influences of celestial bodies (§9.5.1, §10.10, §16) points to the fact that there is a resonance between cluster analogs being far away each other (from any number of meters to astronomic units). These cluster analogs are characterized by equal or at least similar energy forms of gravitational noises, which arose from protons solved/condensed in/from the physical vacuum. Understanding the interactions at such large distances is possible only when large masses are involved in this resonance process. Here, as will be shown later, the oscillating masses have to be seen as clusters of matter in which a "transmission of colors" between the dissolution and condensation part of protons takes place. The "transmission of colors" could be compared with a flock of bird or shoals of fishes changing their density, direction, and structure.

Dimers were found to be the simplest molecular clusters; their formation scheme is shown below:

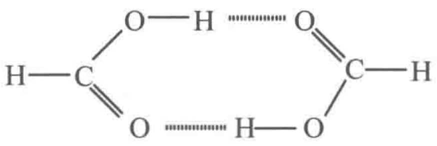
$$\mathrm{A} + \mathrm{A} \leftrightarrow 2\mathrm{A}$$

this means that it is probable at a given time and in a defined space to find a dimer characterized by a concrete lifetime and a concrete energy formation even when it is remarkably lower than the destroying heat background (kT). Even if the life and observation times are very different, the dimer will be recorded by the device in any case. For very small lifetimes, however, the talk is on the highest statistical probability (Ψ) between two limit cases, only:

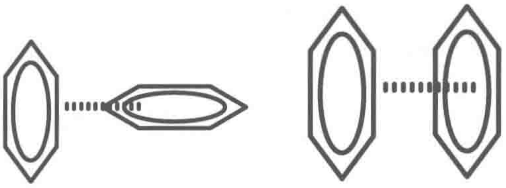
$$[\text{no signal}] \leftrightarrow [\text{yes signal}]$$

Stable clusters will be observed when this balance is shifted to [yes signal] and then the clusters are able to be extracted and characterized by conventional physical chemical methods, e.g. a unique cluster in polystyrene [23]. In the reality, $0 < \Psi < 100\%$ so it never amounts to zero or 100%. For dimers with similar cohesion forces, Ψ will be postulated to always be larger than zero where the postulate can be applied to mass concentrations of two or more molecules with nearly the same cohesion energies, as well as to mass concentrations (domains) within a large molecule, e.g. proteins or synthetic polymers.

The adhesion-cohesion interactions and structural factors, which stabilize the clusters/domains with the lowest potential energy, were found to be the driving forces of mass concentration formation. For example, in the formic acid dimer, the cohesion interaction between two equal molecules will be enforced by the structure factor (ring formation) and approach of the dimer rotating form to a spherical one with a minimum potential energy.



On the contrary, in the unstable expanded benzene dimer, the cohesion forces are assumed to be the essential component of linking forces whereas the structuring factor belongs to the destroying parameter. On the other side, in the stable collapsed benzene cluster, the weak cohesion interaction will be enforced by the structure component (the rings are perpendicular to each other). In the context of the atom molecule theory of the 20th century, the stability of the two benzene dimers could not be explained. Applying the new understanding of the molecule as an ensemble of nuclei and of electrons as stationary shock waves, however, means that the conflict will be solved (§22 and §23):



(collapsed cluster) (expanded cluster)

The existence probability of the expanded and collapsed clusters in liquid benzene was observed to be different, but under the influence of external structure factors, e.g. polymer chains (polystyrene, §9), the existence of the one or other dimer gets more probable and depends on the chain configuration.

The adhesion factors of cluster stabilization are characterized to play an important role in the long-range order formation in liquid mixtures (§10.8), solvated cluster ion pairs (§10), and in the formation of proteins (§11). To get some idea on clusters, computer models simulating the molecular dynamics of a defined number of molecules have been applied [24, 25, 26]. As will be shown later, stationary gravitational waves approve only determined mass concentrations to be built. Here molecular clusters as an organized matter obtain the energy for their existence from energy clusters in the stationary gravitational waves of a physical vacuum.

In Figure 2.1.1, some clusters in individual liquids that are statistically most probable are given. The theoretical cluster models for water and methanol were proven experimentally by the authors. It has to be mentioned that computer models only describe the quantifiable clusters, but do not reflect the qualitative properties or the fast changing surface structure and mechanism of cluster interaction with the surroundings they are part of. On the other side, the internal cluster structure is not less important, e.g. solvated clusters of ion pairs (cluster $HCl \cdot 98H_2O$ [27]) and clusters in styrene are characterized by a layer structure that gets even more complicated in the area of large masses and their ensembles (§5 and §8).

The reader should know that every mass concentration is characterized by an individual histogram of gravitational energy differences between the proton dissolution in the physical vacuum and its condensation from that one (§21, §22, §23). The two last processes are not discussed in detail because they are not the object of the monograph. The histogram problem