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Crystal Growth and Reproductive Entities

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Abstract

Crystal Growth and Reproductive Entities play a more important role in modern technology and in medical physics.

We will use Confined Quantum Field Theory in Crystal Growth and Reproductive Entities which will give us a more fundamental perspective.

Order and disorder

Crystal by definition is the case when atoms are placed together in an order form. In these analyses first we need a measure for order versus disorder. The best candidate is entropy.

Entropy comes originally from thermodynamic which describe mostly the state of gas. But we in thermodynamic measure the quantities in a macroscopic sense for example temperature. But we need a measure in a microscopic or atomic level. For example, if we have only two available states 1,2 then the sequence 12121212 from macroscopic point of view there is no order since we must take the local average but microscopically it is a well ordered sequence.

Formally in information theory the entropy is defined.

$$H = -\sum p_i \, log \, p_i$$

There, for any discrete distribution function,

$$\sum p_i = 1$$

From this point of view or we may say entropy from information point of view is not the same as thermodynamic. And it does not need to obey exactly entropy law from thermodynamic and we will show later that we can well have reverse entropy in a process. For the time being we say that if we have several atoms that are placed together in a stochastic way it contains zero information or maximum entropy. But if they are formatting the atoms of a DNA that so far we know possess the maximum information or minimum entropy. Therefore, for our approach we need a measure that calibrated in a way that is zero for no order at all and maximum for configuration that DNA has. And we begin with no order at all to be zero level and a simple crystal to be level one. Then we will have higher levels up to DNA.

Application of the Confined Quantum Field Theory

Here we are concerned with the dynamic of the crystal growth and reproductive entities. For those who are not familiar with the Confined Quantum Field Theory I suggest the references [1-6]. Otherwise, one can accept and follow some simple statements. We must emphasis that Confined Quantum Field Theory is a new discipline in physics. People associate the word quantum with uncertainty, paradox, and complication. But Confined Quantum Field Theory is a simple and transparent theory and easy to apply. In fact the calculation is more similar that of classical physics, the only difference is that we must modify our calculation according to the metric and topology of the underlying space. This sometimes creates confusion, since people expect that quantum must be difficult. In Confined Quantum Field Theory, the first statement is that all quantum objects are represented by bounded connected manifold. The second statement is that the metric and as a result the size of the manifold is in relation with the energy density. Experimental observation shows that quantum objects with higher energy have smaller manifold. We must emphasis that energy conservation is always valid. We will learn soon that in the problem concerning solid states and condensed matters periodicity plays very important role. When we deal with a crystal we deal mainly with a periodic potential. Of course, crystals may have defects and impurities that also come in the picture. Then we must think that in the dynamics of our concern nuclear interaction seldom play a role and the dynamic is in principle result of the interaction between this periodic potential and other electrons. In the beginning suppose that we have a perfect crystal with a perfect periodic potential in one dimension and some electron moving around.

$F = \frac{dp}{dt} = \int_a^b \rho\, sin(x)dx$, where F force p momentum and the ρ is the charge density of the electron, and we see that if the length of the segment ([a, b]) = $2n\pi$, then $\int_a^{a+2n\pi} \rho\, sin(x)dx = 0$, That means such a quantum system can move without resistance.

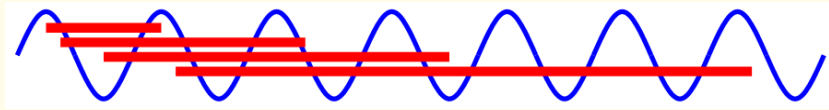

Figure 1: In a simple one-dimensional case, an electron with right energy can move in a periodic potential without exchanging energy.

This follows from the basic axioms of the Confined Quantum Field Theory, namely all quantum objects are bounded connected manifold with a metric which is function of energy and conservation of energy is valid all the time. Of course, no crystal is perfect and even if the crystal is perfect, we always have fluctuations due to the temperature and other disturbing elements. But according to the Confined Quantum Field Theory we do not need to have a perfect potential in order that an electron can move inside such a potential without exchanging energy. How this is possible?

When an electron experiences a force emits a photon. In the Confined Quantum Field Theory, the picture is the following.

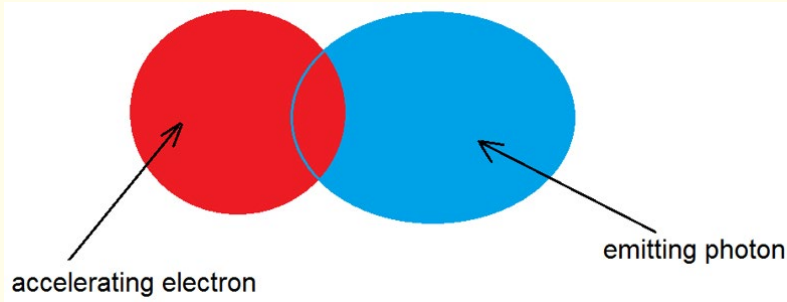

Figure 2: In emitting photon by accelerating electron, the emission is not point wise and it take some amount of time before the two manifold separates totally. Therefore, energy is conserved all the time.

In the Confine Quantum Field Theory, the photons and the electrons are not points but bounded connected manifold, therefore it takes some time before the emission is complete. And only then we have energy exchange. Since small disturbance is mostly a combination of an acceleration and de-acceleration. If during this short time the electron gets a de-acceleration the photon absorbs back, and we have no energy exchange.

Superconductivity and super fluidity

For us superconductivity and super fluidity is an example for transition from order level zero to level one order in our measure. When we see that an electron can move in a bulk without exchanging energy, that we call such electron pre-superconducting, it is not so difficult to understand the mechanism of superconductivity and superfluity. But not all electrons can move in a bulk without exchanging energy, the necessary condition is that its manifold has the right size. Then according to the second statement this size is the function of energy. Then if the electron does not have the right energy, then it exchanges energy many times until under a suitable condition attain the right energy and size to move around without exchanging energy.

Since such a state is a stabile state if temperature is low more and more electrons fall into such stabile state which in turn causes less and less interactions in the system and eventually we have transition to the superconductivity state.

Superconductivity an example of Disorder to Order transition

Disorder to order transition is the central point in this article. Superconductivity and superfluity are Just an example of disorder to order transition. Let's look at superconductivity. Before superconductivity state the electrons move around without any mutual order. But after they move like marching soldier. This collective movement is in fact the reason for such a strong magnetic field they create. This is in fact the first level of order if we want to have a measure for order.

Application of the Confined Quantum Field Theory for Reproductive Entities

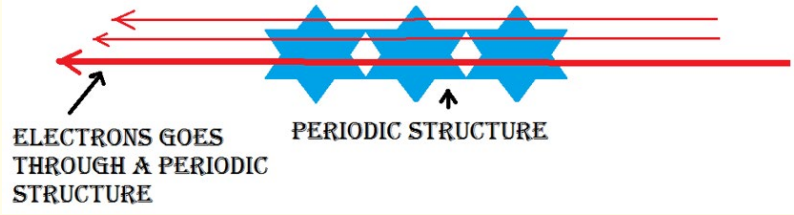

Figure 3: Here we show that electrons which go through a periodic structure have a memory of the structure.

In explaining superconductivity and super fluidity. We observe that periodicity plays a key role. Now we are in the position to handle our central point, namely the Reproductive entities.

Transition to Reproductive Entities in our measure is transition from order level one to a higher order.

Suppose we are on the earth sometimes before the presence of life. And we choose $A_1, A_2, \ldots\ldots\ldots A_n$ entities. Naturally most of them have no structure. But some of them have some structure in the form of periodicity. Hydrocarbon mostly appears as chain which is some sort of periodicity. Those who have no structure we put in the category zero level of information. Those who have some periodicity and structure we put in level one information. These entities interact with the surrounding mainly in two different ways. One with the electrons and the other with high energy particles, radioactive or cosmic radiation. The electrons that have the energy or size which is adjusted just to the periodicity of the entity can pass through the entity without interaction. Therefore, material or entities that have similar periodicity have easier to attach themselves with the entity (See figure .3), since such an object least interacts with the electrons coming through the initial entity. And therefore, the entity grows.

The link shows how a bigger crystal eats smaller crystal and growth [7].

This atomic-scale video shows two disc-like nanoparticles merging together in real time. The particles consist of a core of cadmium atoms surrounded by a shell of cadmium chloride. Using a microscopy technique called liquid cell transmission electron microscopy, researchers were able to examine, for the first time, how these particles grow and interact. Their findings were surprising. When two particles merge into one big one, the direction of growth is guided not by the difference in their size — as theory dictates — but by a crack defect in the shell of the larger nanoparticle. "This is a huge milestone. We are rewriting textbook chemistry, and it's very exciting," said Haimei Zheng, a materials scientist at the University of California, Berkeley [7].

Play

They grow until they lose mobility and have no access to new material and become stationary, but they still are in the category one information. But they are subjected to cosmic radiation or radioactive high energy particle that can penetrate deep inside and gradually destroy the internal structure and bring them to level zero. But on the other hand, this radioactive bombardment can create weak point or line in the structure in a way that by some internal or external pressure the entity can divides in two similar entities. This will give them again mobility and access to new material and grow again. This is just transition to the higher-level order.

At the end we will analyse the conditions which are in favour for reproductively.

First access to hydrocarbon, since hydrocarbon builds up chain which possesses some periodicity.

Then water or some substance that gives mobility. Then temperature that should be high enough to give mobility and access to material and low enough to not destroy the internal periodicity.

At the end radioactivity to create partial internal changes that only radio activity can do.

References

1. Weakness and Problem in Quantum Field Theory, Which Leads to the Development of the Confined Quantum Field Theory.
2. Confined Quantum Field Theory.
3. Do we teach our students the right physics?.
4. Symmetry aspect of Confined Quantum Field Theory.
5. Why the light changes direction in entering the water.
6. Universalities in the Complex Science.
7. Credit Q Zheng., et al. /Nat.Communications https://lnkd.in/dEMKfuss.
   # #chemistry #university #video #TEM #nanoparticle