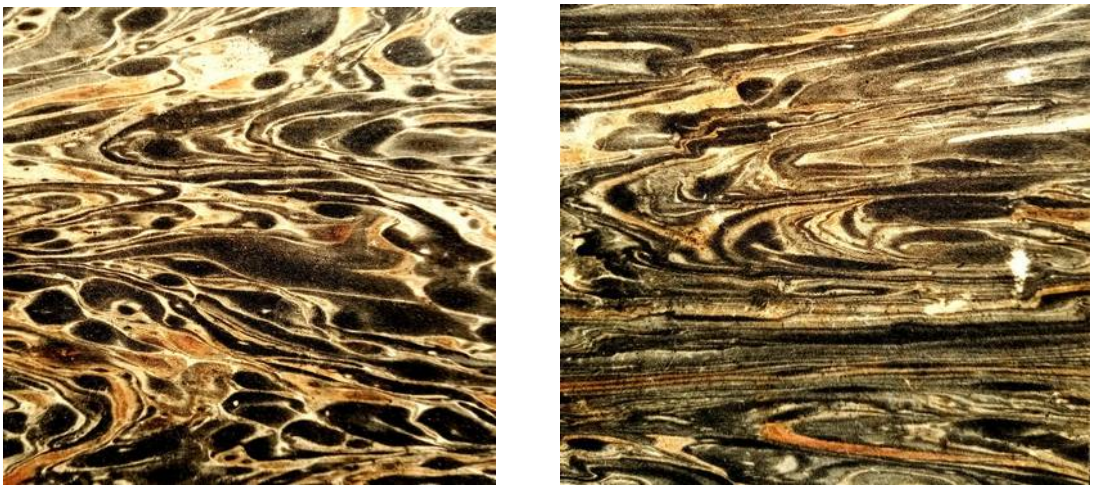
The field of vacuum flutuations



a) initial state **b)** after a while

Fig. 1 – the field of vacuum fluctuations in two states a) and b)

How to describe a vacuum? How to describe the field of vacuum fluctuations? Vacuum fluctuations, where pairs of particles and antiparticles are created and annihilated to form electromagnetic waves (gamma radiation) from which another pair is created and annihilated again and so on. And inside such a field are scattered particles like electrons, protons, and neutrons.

Notice: In a vacuum, they are virtual particles, antiparticles and photons, with various masses and wavelengths. If we want to create a real pair of particle and antiparticle, we have to use a real photon with a minimum energy equal to or greater than the energy of the pair e.g. electron and positron. It should also be added that such a transformation cannot happen anywhere in a vacuum, but only near the electric field of the atomic nucleus e.g.

Our whole expanding universe with all its matter (galaxies, individual stars and planets, including various matter) and radiation is simultaneously filled with quantum fluctuations of vacuum. All the matter of the universe is scattered like crumbs in an ocean of vacuum fluctuations. Think of the universe as a numerical axis full of irrational numbers (vacuum fluctuations) between which rational numbers (matter) float like tiny crumbs.

Fig. 2 – the "unknown" field

What's the image of Fig. 2? A snapshot of the distribution of matter in the universe, or a detailed snapshot of quantum foam full of fluctuations, where new random shapes are created or lost? We know, when we go closely into details of the things that surround us, we see the image above (Fig. 2). And so, when we see the same image if we go to ever-larger dimensions bordering an area of observable universe. Hard to distinguish images! Especially if there is a common attribute - the randomnes at every part. But there is a difference in time. At the micro level of fluctuations, the image continues to change sharply, whereas at the macro level of the universe, there is more or less a static image that changes slowly.

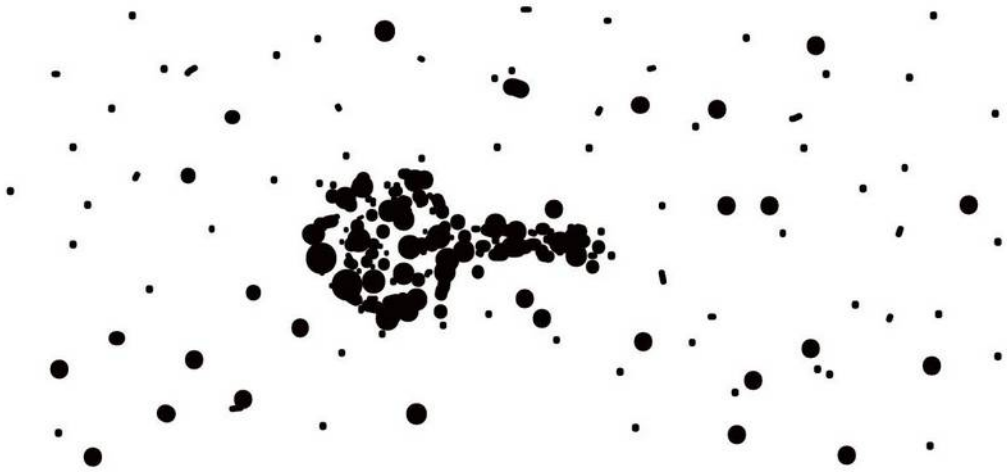


Fig. 3 – the familiar shape (a ball with a peak)

It is very interesting to recognize same familiar shapes in the middle of very random images. See Fig. 3. There are a probabilistic area of an appearance of the shape. The origin such behaviour - see the appearance of electron - Fig. 4

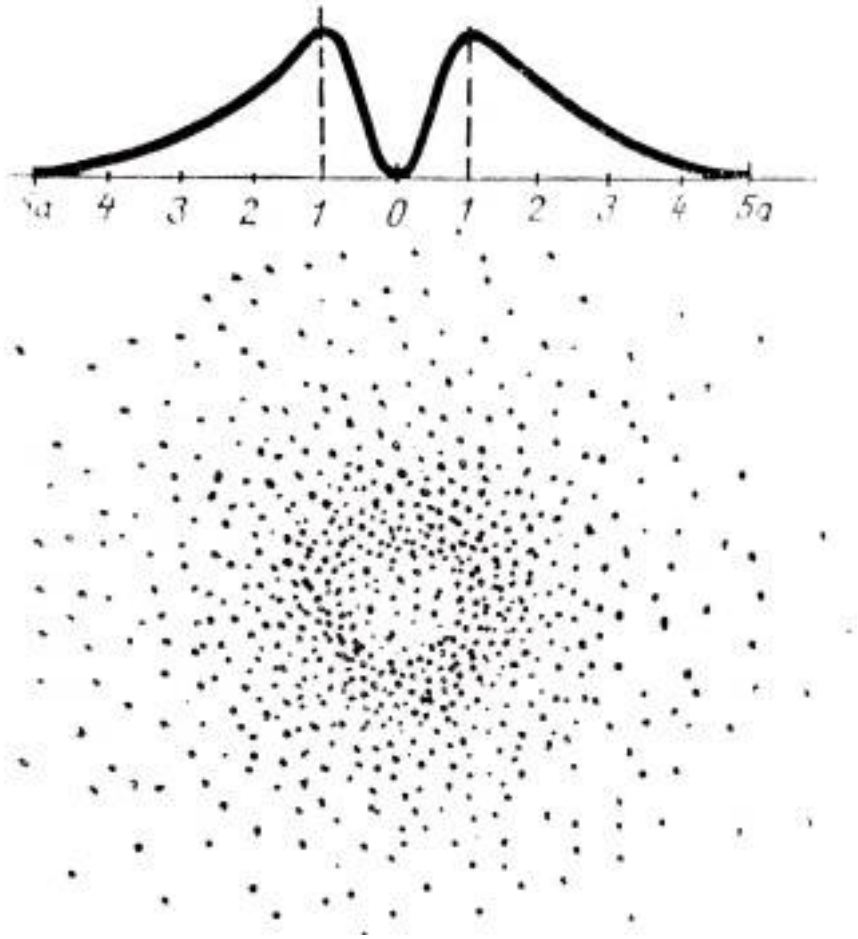


Fig. 4 – distribution of the probability of an electron in a hydrogen atom

Here is a very important aspect - the point of view vs. our perception - or better to say, our perception through used devices.

When we go closer, we see pure randomness, when we go further in the same way. At a suitable distance, we are able to distinguish some shapes we know. It should be noted that at birth, we learned to distinguish the relevant shapes, through our perception. Our perception is determined by a long biological evolution.

to be continued

Frame atoms molecules, cells and so on regenerate and created

superior laws

to fill from another chapters