

# Contamination with Natural Radioactivity and Other Sources of Energy - the Explanation for Bose-Einstein Condensates, for the Creeping Behaviour of Helium and for the “Casimir Effect”

Florent Pirot\*

Independent researcher, Plobannalec-Lesconil, France

\*Corresponding author: [florent.piroto@orange.fr](mailto:florent.piroto@orange.fr)

Received August 10, 2019; Revised September 28, 2019; Accepted November 10, 2019

**Abstract** Bose-Einstein condensates, the creeping behaviour of helium, and the Casimir Effect happen to be particularly simple to explain. The forgotten cause is to be found in the various sources of energy producing movement, in experimental settings in which, especially, the contamination with radon is not checked. Other sources of movement as well interact with the experiments - sometimes the experimenters' imprecise behaviour leads to the result. The issue of the “Vacuum catastrophe” is hence solved.

**Keywords:** Bose-Einstein condensates, helium superfluidity, Casimir effect, vacuum energy, vacuum catastrophe

**Cite This Article:** Florent Pirot, “Contamination with Natural Radioactivity and Other Sources of Energy - the Explanation for Bose-Einstein Condensates, for the Creeping Behaviour of Helium and for the ‘Casimir Effect’.” *International Journal of Physics*, vol. 7, no. 3 (2019): 95-96. doi: 10.12691/ijp-7-3-5.

## 1. Bose-Einstein Condensates

For Bose-Einstein condensates, the key element is the presence of radon and its decay products in the experimental area. The alpha particles and their high speed and kinetic energy trigger the move of the bosons; beta minus particles produced by the decay of various daughter products of radon also contribute.

The key part of the condensation is when two or more bosons happen to be between one alpha particle and one beta minus particle; the opposition of charges brings the electron in the direction of the helium nuclei, “sandwiching” the bosons.

Then, as a cluster starts to form, more bosons can be progressively pushed by alpha and beta decay into the small cluster (alpha decay acting as a pusher; electrons can get captured by the small condensate, hence driving alpha decay to happen with a higher frequency in the direction of the cluster and hence driving even more bosons into it), and as the cluster grows, the likelihood of more bosons getting cornered increases as the *cross-section for capture of the condensate* increases; so is explained the progressive acceleration of condensation that is systematically observed in the experiments.

In a iron-yttrium-garnet thin film which is particularly favourable for the conduction of electric charges, *condensation happens at room temperature* [1], confirming the above hypothesis. Alpha and beta minus

particles interact much more easily thanks to the conductivity of the support material, making condensation much easier.

A simple way to describe Bose-Einstein condensation is the process in which shepherd dogs bring sheep together progressively. Bringing the first two sheep together is extremely difficult and painful. But as the group increases in size, shepherd dogs find it more and more easy to push the sheep into the forming cluster. For the last sheep it is almost physically impossible to avoid being cornered into the group when pressured by dogs to join it.

Fermionic condensates would be also possible under conditions of a very strong contamination with radon.

## 2. The Creeping Behaviour of Helium-4

For the behaviour of superfluid helium in a receptacle which was studied among others by Lev Landau, the contamination of the experiment with radon is also the explanation.

The vase with helium has some radon floating into it; the alpha decay expels out slowly the helium. Alpha particles are repelled by each other, so the entire vase is *starried* by alpha “shots”. Radon is nevertheless relatively heavy and weighs onto the helium. So the helium is pressed against the sides of the wall and the decay progressively acts as a water pump; and likewise, when helium tips over, radon, also floating outside, keeps sending alpha particles pressing it onto the exterior side.

### 3. The “Casimir Effect”

A vacuum is always slightly imperfect and plaques can be moved by any form of energy. Solar neutrons and other cosmic rays, gamma rays from the natural radioactivity in the concrete of the walls of the experimentation room, for instance, the heat of the bodies of the researchers watching the experiment, a laser beam used in theory to measure the distance between the plaques but hitting one of the plaques and hence in reality pushing it onto the other... Or, of course, radon in the experiment. There will always be much more radon outside the two plaques than inbetween. So, the kinetic energy is mostly outside, and will inevitably press the plaques one onto the other. The powerful energy of the alpha decay will do it. Another possibility is some natural contamination with uranium in the glass in which the experiment takes place, hence alpha decay which can be directed into the plaques from the glass, even if the experiment is cleansed of radon (even if no alpha particle from the glass hits the plaques directly, they hit other particles in the always imperfect vacuum which can then bounce onto the plaques, moving them one against another). Another is natural radioactivity in the plaques themselves. The presence of alpha and beta decay will mean that the plaques will have positive and negative charges which may in some cases also move them one into another if one plaque is mostly loaded with positive charges and the other with negative charges due for instance to contamination with potassium-40 on a side and with uranium on the other.

In one case [2], the researchers did telemetry with a laser beam to measure the distance between the two plaques. The laser beam energy itself was obviously enough to move the plaques.

Other forms of energy as well can push the plaques: electromagnetic signals, radio waves for instance, or Wi-Fi... In a vacuum, with thin plaques and a very limited movement needed to fill the space, weak sources of energy are enough and cosmic rays from the Sun for instance can also produce the so called Casimir effect.

### 4. Comments

In general, in all experiments at low levels of energy, it is essential that researchers think of checking all sources of contamination that can affect the results, from radon and natural radioactivity in general to gamma rays, solar neutrons, heat, electromagnetic signals...

In research, it is always essential to start by the simplest explanations. Common sense is frequently forgotten because of pressure to publish and needs to present seemingly

impressive theories. The Casimir Effect-associated postulates of a “vacuum energy” (the idea that energy can emerge out of a vacuum simply contradicts all the basic laws of physics, such as the mass-energy equivalence) led to the so-called “vacuum catastrophe” in astrophysics, “*the largest discrepancy between theory and experiment in all of science*” [3] and “*the worst theoretical prediction in the history of physics*” [4] now definitively explained as an error caused by experimental conditions.

The issue was already solved by the author by revising totally cosmology, showing how the Big Bang is just a local event not defining any actual beginning but just a question of perception in an infinite space with no beginning and no end in time, where black holes are the cradle of stars and planets, in a permanent dynamism of recycling – black holes aggregate matter, conflating it into superheavy actinides, atoms well beyond what is achieved in research on exotic atoms, and sometimes erupt part of it as heavy clusters of heavy atoms such as uranium, which when they are heavy enough become critical (birth of a star); stars have a dual fission & fusion motor and volcanism is a smaller-scale version of this phenomenon on objects too small to have undergone stable criticality. All objects except the smallest keep a small part of the black hole they erupted from in their core, around which the erupted piece wraps itself at the instant of the eruption and this small black hole itself can erupt (hence magmatic hot spots). Fusion of ternary fission products, neutrons and beta minus particles produces the light elements. The Big Bang is solely the black hole eruption from which our own matter together with the matter of the objects around us erupted – eruptions of black holes usually produce “crowns” of stars, as the Pleiads for instance – a lengthy demonstration is provided in [5].

### References

- [1] Demokritov, S.O. Demidov, V.E, Dzyapko, O, Melkov, G.A., Serga, A.A., Hillebrands B and Slavin A.N, “Bose-Einstein condensation of quasi-equilibrium magnons at room temperature under pumping”, *Nature*, 443 (7110), pp 430-433, 2006.
- [2] Mohideen U, Roy A, “A precision measurement of the Casimir Force from 0,1 to 0,9  $\mu\text{M}$ ”, 1998, arXiv <https://arxiv.org/pdf/physics/9805038.pdf>.
- [3] Hobson MP, Efstathiou GP and Lasenby AN, *General Relativity: An introduction for physicists* (Reprint ed.). Cambridge University Press, 2006, p. 187.
- [4] Adler RJ, Casey B, Jacob OC, “Vacuum catastrophe: An elementary exposition of the cosmological constant problem”. *American Journal of Physics*. 63 (7): 620-626, 1995.
- [5] Pirot F, “Nucleosynthesis and star & planet formation in black holes, explosive and effusive volcanism, geochemistry, bolides, the graviton / antigraviton couple, and spontaneous explosion of nuclear reactors”, in *From an Einstein Syndrome to the People, Editions universitaires européennes*, 2019.

