Gravitational Energy and the Casimir effect

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Abstract

The part of the vacuum energy that we associate with “dark matter” is assimilated to the classical gravitational potential energy (reference 1), this energy is at the origin of the Casimir effect and can be measured by it. Here we provide additional information to demonstrate this proposition and clarify what “dark matter” could be in our universe.

Introduction

The notion of Gravitational Energy, in its most classic sense, has lost part its importance with regard to the geometrization provided by General Relativity. The consideration of a quantum character granular Space leads us to identify this energy with one of the phases of this medium; we will see the reason why... This phase constitutes the inertial part of the vacuum energy (see reference 1), so we have associated it with “dark matter” which then becomes a consequence of the properties of the quantum vacuum and not an unknown matter as it is supposed. We also provide a demonstration of the fact that the Casimir effect is a manifestation of this energy.

Gravitational Energy

It is important to remember that the energy associated with a field (electric, gravitational, etc.) translates, in fact, the reaction of the “medium” to the existence of its source (charge, mass,

etc.). In all cases, the medium in question concerns the vacuum. In this case it is showed that the energy density (E) has the value, up to a constant, which is the square of that of the field concerned.
In the case of gravitation; we have **E = G M^2 / 8 pi r^4** where G is the gravitational constant, M the source mass of the field and r the distance to the center of mass.
We therefore considered (see reference 1) that this energy constitute one of the phases of the quantum medium which is vacuum space.

We have also shown that this phase was the very strong majority in our laboratories located on the surface of the earth, in fact; the energy density at this location is given by the formula (see reference 2):
E(g) = M c /2pi r^2 T where T is the age of the universe (13.8 10^9 years).
Then we have: **(E)/(Eg) = G M T / 4 c r^2** (1) whose numerical value is of the order of 5 billions !
Our corpuscular theory is based on the hypothesis that matter and space are made up of micro-grains, all having the same energy e = h/T, these are the QF which are also micro-vibrators whose state of resonance defines the phase of the quantum medium which fills the universe (see reference 2).
For ordinary (baryonic) matter; all constituents QF have a common wave phase which is, moreover, stationary.
For the vacuum in the absence of gravity, it is the same about free waves made up of 2 QF (energy 2h/T), which constitute “dark energy”.
Finally for the vacuum phase constituting gravitational energy, identified with “dark matter”; we have an intermediate state where resonance (phase agreement) only exists for the gravitons that compose it.

The Casimir effect; characteristic manifestation of gravitational energy.

We formulated this hypothesis (reference 1) which led us to define a saturation distance between the conductive plates of the device due to the finiteness of the energy density.
The use of the formula giving the Casimir pressure makes it possible to demonstrate this proposition within the framework of corpuscular theory (reference 3). Indeed, the value of (E)/(Eg) given by relation (1) expresses the number of QF associated (constitutive) with a graviton over the unit length (one meter). As the graviton is a free wave, these QF are of identical polarization and alternating phase; we can then express the wavelength L of the graviton by the relation:

$L = 8\ c\ r^2 / G\ M\ T$

The numerical application, for the terrestrial laboratory, gives
$L = 4.9\ 10^{-10}$ m
This value is precisely the saturation distance between the plates calculated using the Casimir pressure formula (see reference 1), so L = d(s). It should be noted that this value is minimal because it only concerns gravitons whose direction is strictly in the axis of the field (…) .

This result seems very important to us because it validates the assimilation of gravitational energy to the vacuum energy measured in our laboratories by the Casimir effect, but above all it justifies the corpuscular theory (ref.2), since this theory is necessary for the establishment of relation (1).
The new result, as it has been said, is that we can measure the energy density E of the vacuum by the saturation distance between the conducting plates d(s) of the Casimir device :

$E = 3\ \pi\ h\ c / 480\ d(s)^4$ (ref.1)

This remains to be shown experimentally, possibly in a space laboratory beyond the Earth's attraction (ref.1).

Dark matter

We want to justify, here, the assimilation of gravitational energy to what we call “dark matter”.
First, this energy constitutes a phase of the empty universe which occupies a very large volume; in fact, the gravitational range of a large galaxy is of the order of 100 000 light years and the number of these galaxies exceeds 100 billion !
Then, gravitational energy is a static (inertial) energy since it is attached to the masses constituting the universe; from particles to galaxy clusters.
We also think that black holes are massive objects made up, at least half, by this energy (…). We will return to this subject…
We know, since analyzes of data acquired by the Planck satellite, that this dark matter represents some 25% of the energy of the universe; however, the inventory of the entire gravitational energy of known (or estimated) objects is very far from reaching this value...
We also know, particularly since the work of Hélène Courtois and her team (references 4 and 5), that the largest structures in the universe are made up of super-clusters of galaxies (like ours named “Laniakéa”) of which the dimensions reach several hundred millions light years.
We suppose that these super-clusters can be linked to hyper-massive black holes whose gravitational range would reach precisely these dimensions, what would also give meaning to the presence of the “big attractor” which could be one of these black holes…
The application of the formula giving the gravitational range (see ref. 1) gives them a mass of approximately 10^49 kg, which means that a thousand of these objects could constitute near totality of dark matter (about 25% of the energy in the

universe).
Black holes with such a mass have a radius which reaches that of a large galaxy, their internal density is very low (approximately 10^-3 J/m^3), so they are completely harmless to any object penetrating Inside and are very difficult to detect, it is only possible through detailed analysis of the galaxies movements .

Conclusion

Assimilation of dark matter with gravitational energy is an entirely novel point of view.

We have shown that its justification comes from the conception of a granular space in which all mass emits infinitesimal particles (gravitons) which are the dynamic expression of fundamental grains.
This proposition seems to be experimentally verifiable by two ways :

The first concerns the demonstration of the saturation of the Casimir force and its use to measure vacuum energy, for that we indicated that it was necessary to be free from the attraction of the earth.
The second is based on a better knowledge of the movements of galaxies inside our super-cluster (Laniakéa), allowing to characterize black holes of very large mass (around 10^49kg) whose gravitational range could reach our own galaxy, allowing us to explain the velocity anomalies of peripheral stars.

The “mystery” of dark matter could thus be solved…

References

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