Casimir Forces Are Produced By Thermal Blackbody Radiation – Not From Nothing

Source: Thomas Prevenslik
Dated: May 22, 2009

The Casimir force thought produced by the speculative zero point energy sometimes called the energy of the vacuum and claimed to be a force from nothing can only exist because of thermal blackbody radiation.

Background

Casimir showed a pair of neutral flat plates in a vacuum attracted each other. This was a remarkable finding because bodies usually only attract each other by electrostatics. The problem with Casimir's derivation was the assumption the plates were immersed in EM radiation from the controversial zero point energy (ZPE) speculated to pervade all of space. In contrast, thermal blackbody radiation is real and undeniable.

The existence of the ZPE aside, there is a more fundamental problem with Casimir's derivation. Casimir ignored the fact the excluded EM radiation in the gap G may be spontaneously conserved by a change in its frequency, and instead assumed the plates moved despite the fact inertia of the plates precluded instantaneous plate motion. In effect, Casimir's derivation was unphysical.

If Casimir would have conserved the EM radiation by a change in frequency, he would have concluded the EM energy is constant for all gaps G, and therefore the Casimir force given by the gradient of the EM energy with respect to the gap G vanishes. There simply is no Casimir force.

What is actually being measured in Casimir experiments was recently proposed to be electrostatic forces produced by charges from the removal of electrons from the plates caused by the photoelectric effect becaise of the VUV radiation induced by QED in the gap. See www.nanoqed.org at link "Casimir Force"

Problems with Electrostatic Force

Attraction of Casimir's plates by electrostatics proved erroneous. Upon EM confinement, the low-frequency thermal kT energies of surface atoms is indeed induced to VUV levels by QED that by the photoelectric effect removes electrons and charges the plates. But this does not mean an electrostatic attractive force is produced.

The QED photons are produced as excitons recombine. Excitons are pairs of separated positive charge holes and electrons created by QED induced radiation at VUV levels. Prior to the emission of QED photons, the excitons could provide electrostatic attraction if the pairs spanned the gap. For metal plates with low dielectric constant, the spacing between holes and electrons of the Frenkel exciton is limited to atomioc spacings. In high dielectric materials, the Mott-Wannier exciton may span a few tens of atoms, but not more than about 6 nm. But gaps G in Casimir experiments are generally far larger.

What this means is the QED photons are likely localized in one or the other plates, and therefore unlikely to span typical gaps G to produce the electrostatic attraction measured in Casimir experiments. Casimir force therefore by electrostatic attraction does not occur.

Casimir-Polder Force by Thermal Blackbody Radiation

The ZPE forming the basis for the Casimir force between plates also provided the basis for the Casimir-Polder (CP) force between an atom and the surface. However, the ZPE is not necessary to produce the CP force. Indeed, the CP force was shown to be reasonably approximated by the interaction of the polarizability of the atom in the gradient of the BB radiation field emitted from a surface. See Ibid at link

“Blackbody Radiation Force”

Extensions to Casimir Force

The CP force from BB radiation was extended to the attraction between Casimir’s plates. See Ibid, at link “Casimir Update.” Unlike the EM energy, the EM energy density in the gap in Casimir's plates is not constant, but increases as the gap decreases. The gradient of the electrical field of the QED induced photon standing across the gap produces a BB attractive force because of the polarizability of the surface atoms. The ZPE energy is not invoked.

Conclusions

The force measured in Casimir experiments has nothing to do with the ZPE and is not caused by electrostatic attraction, but rather by the polarizability of surface atoms in the plates in the electrical field of QED induced radiation.

###

About QED induced Radiation: Classically, thermal EM radiation conserves heat by an increase in temperature. But at the nanoscale, temperature increases are forbidden by quantum mechanics. QED radiation explains how heat is conserved by the emission of nonthermal EM radiation.

Category	Research, Science, Technology
Tags	casimir, casimir-polder, casimir force, zpe, blackbody radiation
Email	Click to contact author
Address	Kelheimerstrasse 8
State/Province	Berlin
Zip	10777
Country	Germany
Link	http://prlog.org/10241719

Scan this QR Code with your SmartPhone to-
* Read this news online
* Contact author
* Bookmark or share online