A conjecture of gravitons driving cosmic expansion

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Abstract

It is well known that electronic orbital potential reduction or orbit shrinkage can result photon emission, and photon can excite another atom then expand electrons shell. In similar way, one stellar system shrinkage should also emit graviton, and another stellar system on the path of graviton propagation should be able to absorb the said graviton if energy enough to secure a minimal orbital expansive leap.

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Introduction

Since the accelerating expansion of universe was observed, the driving energy has been speculated and credited to unknown dark energy.

In fact, not only cataclysmic expansion, but also local shrinkage can be observed. For example, in September 14, 2015, two detectors of the Laser Interferometer Gravitational-wave Observatory (LIGO), decoded a gravitational wave signal GW150914 from 1 billion light-year remote galaxy, caused by a merger of binary black-hole system.

The aforementioned coalescence supposedly converted about 3 times mass of the Sun into gravitons energy, that is really unimaginable huge energy $\mathbf{3}M_{\odot}\mathbf{c}^{\mathbf{2}}$!

Unfortunately, nobody questions what effect can be brought by universal omnipresent gravitons emission and propagation.

Comparative study and analysis by analogue of graviton to photon

In the well analyzed Bohr atomic model, an orbital electron has both positive kinetic and negative potential energy, and the absolute value of potential energy is the double of kinetic energy.

When an excited orbital electron jumps from outer orbital to inner orbital, the dominated potential energy will counter-balance the increase of kinetic energy, and release extra energy by emitting photon.

In hydrogen atom, the first orbital radius is named Bohr radius, about 53pm (unit pm = picometer), and total energy is about **-13.6eV**; for the **n**th orbit, radius $\mathbf{53*n^2}$ **pm**, energy $\mathbf{-13.6/n^2}$ **eV**.

Thus, **2nd** orbit, 212pm, -3.5eV; **3rd** orbit, 477pm, -1.5eV.

We are interested in the ratio of radius change to energy change, i.e **|Δr/ΔE|**, so as to evaluate which direction (shrinkage or expansion) is more sensitive in space change for same energy transaction.

Assume the electron of hydrogen in the 2nd initial orbit, hence:

for shrinkage direction to 1st orbit, |Δr/ΔE| = (212 - 53)/(13.6 - 3.5) = 15.7 pm/eV;

for expansion direction to 3rd orbit, |Δr/ΔE| = (477 - 212)/(3.5 - 1.5) = 132.5 pm/eV.

For any other initial orbit, calculation can show the same trend, therefore, for same energy transaction, space expansion is obviously far great than shrinkage!

The formula expresses of gravitational force and Coulomb force are quite similar, therefore, by analogy, gravitons should exhibit similar properties with photons.

There is photoelectric effect in atomic world. If the energy of a photon is not enough to make other atom's shell electron leap from low to high quantum orbit, then the photon can not be absorbed, otherwise the photon will be absorbed, and the de-orbited free electrons can form electric current by voltage supply.

Similarly, if graviton energy is high enough, it can excite stellar system and make it expanded, else if the energy too much, it can even deorbit a planet into free planet, i.e. interstellar or rogue planet, else, the graviton can not be absorbed by the stellar system in midway of propagation, and then be reflected to other direction, or just simply pass through.

Stellar orbital debris or asteroid can also capture low energy graviton that is under the threshold of an ordinary planet's minimal excitation energy.

When graviton is emitted, the source stellar system will lose mass; the mass loss is shared proportionally between orbit shrinking object (e.g. planet) and its host object (e.g. star, blackhole), otherwise, if graviton is absorbed, the receiver stellar system will increase commensurate mass in similar mode.

Supposedly, the excited planet should be also able to de-excite until return of original orbit, and such a deexcitation also emits graviton in turn.

Just as photon can not exist forever in free space, so does a graviton.

Even the science community can not accurately identify the emission direction and location point of a newborn photon, therefore, I have to conjecture that a graviton may be emitted from the mass center of de-exciting planet and its host star, and the emission direction is vertical to the orbital plane, so as to align graviton's angular momentum and system angular momentum, as the theorized graviton is a Bosonic particle with integer spin 2.

Not to mention angular momentum dilemma, If assuming that newborn graviton propagates in orbital

plane, then the early stage nebula accretion disk would fail to form, because the inner orbit released graviton could kick off outer orbit materials in same disk plane. Only in vertical to orbit plane the graviton emits, the consumer of graviton can be assured not the producer itself.

Above situation is same for photon, that is: the consumer of photon can not be the producer atom itself.

When a stellar system has expanded, there is no reason to automatically shrink the interstellar space in order to keep constant distance between 2 points across 2 stellar systems, therefore, new space has to be created, and then eventually the whole universe will see expansion.

Above situation is also same for atom expansion, that is: a local excited atom in expansion will result in bulk expansion, otherwise its container will feel pressure.

How to amplify kinetic to higher graviton energy?

In atom world, we can double the kinetic energy of free electron, and convert it into photon. Following figures show how this happens.

To get the doubling effect, the position of electron trespassing nucleus and velocity should be adjusted to proper values, so as to keep rotating speed same with previous when it was free.

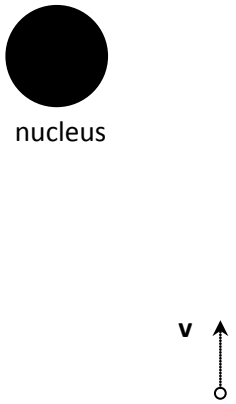

Fig. 1: when electron is free

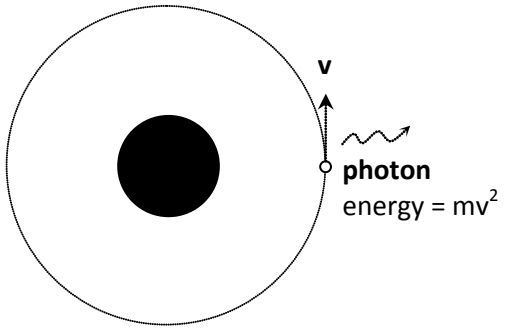

Fig 2: after captured, speed no change

Just like the electron capture, a stellar system can also capture rogue planet running at speed **v**, even release up to double energy i.e. $\mathbf{mv^2}$ of previous kinetic energy by graviton, provided entry position and velocity are both proper.

Such an energy enlargement phenomenon does not offend energy conservation law, because more negative potential energy is bounded with the system.

Next time, if the bounded electron or planet needs to be liberated and to restore previous free state and keep same speed, the photon or graviton with same energy $\mathbf{mv^2}$ should be absorbed.

Conclusion

The comic expansion does not have to be explained by the mysterious unknown dark energy, instead, interstellar graviton exchange or transaction can reasonably explain it under energy conservation law, as long as we recognize the similarity between atomic system and stellar system and between photons and gravitons, though currently it is just a conjecture.

Reference

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