

# Gravitational Energy

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21<sup>st</sup> July 2023*

**Abstract.** The purpose here is to compare the definition of gravitational potential energy, as is used in mechanics, with the intrinsic gravitational energy in atoms and molecules due to their presence in a gravitational field, and then to decide which of these two concepts best intersects with physical reality.

## Kinetic Energy

**I.** Assuming that ponderable matter has an intrinsic energy,  $mc^2$ , where the numerical value of  $c$  remains unspecified, then it follows that kinetic energy on the large scale is an additional  $\frac{1}{2}mv^2$  on top of this, where  $v$  is the translational speed of the body. The total energy  $E$  is therefore,

$$E = mc^2(1 + v^2/2c^2) \quad (1)$$

assuming mass to be constant. Kinetic energy is therefore like a kind of longitudinal Doppler shift of the intrinsic energy.

## Gravitational Potential Energy

**II.** In addition to kinetic energy, when a body is situated in a gravitational field, it will possess *gravitational potential energy*. In mechanics, gravitational potential energy is simply a system of accountancy which is designed to conserve energy, and that is why it is ascribed a negative sign. As a physical concept, it is reasoned on the basis that work needs to be done to lift a weight upwards to a higher height. In doing so, energy is lost, but it will be regained when the weight comes back down again. The term “*potential energy*” is based literally on this sure expectation, but it doesn’t represent anything physical that is going on within the atomic or molecular structure of the weight.

The problem with the mechanical definition of gravitational potential energy, however, is that it masks the cyclical oscillation of the intrinsic energy in the caesium atoms inside a GPS clock in an elliptical orbit. An alternative definition is now proposed that is more directly connected to the intrinsic energy in a body of mass,  $m$ , that is situated in the gravitational field of a body of mass,  $M$ . The quantity *intrinsic gravitational energy* will now be defined by the equation,

$$\Phi = +2GMm/R = mu^2 \quad (2)$$

where  $G$  is the gravitational constant,  $R$  is the distance between the centres of  $M$  and  $m$ , and  $u$  is the escape velocity. Gravitational force is the gradient of  $\Psi$ , and the positive sign in equation (2) means that the gradient will be negative, in line with the fact that gravity acts downwards. The factor of 2 has been introduced in order to cater for the effect that gravity has on the internal structure of ponderable matter, over and above the acceleration that it causes on the large scale. The negative sign in the standard textbook definition of gravitational potential energy introduces instantaneous conservation of energy which has the disadvantage of masking the additive effects that gravitational field strength and kinetic energy have on the internal mechanism of atomic GPS clocks that are undergoing eccentric orbits around the Earth. Choosing a plus sign on the other hand introduces more transparency by highlighting the cyclical nature of energy conservation in GPS clock orbits. The factor of 2 doubles the normal force of gravity in order to account for the existence of a latent component which is absorbed internally by the constituent molecules of the orbiting clocks. The idea is that this latent component, not observed on the large scale, causes a torque to act on the individual constituent atoms and molecules due to their dipolar nature, hence inducing a centrifugal pressure, and so increasing their intrinsic energy while possibly decreasing their angular frequency, just as planets in higher orbit have higher total energy but a lower orbital frequency.

It should also be stated that the definition of intrinsic gravitational energy at equation (2), while favourable in matters relating to the internal energy in GPS clocks, would not be so suitable in mechanics.

### **Fine-Grained Internal Torque**

**III.** The fine-grained torque that acts on the constituent atoms and molecules of an atomic clock in a gravitational field, increases their fine-grained centrifugal pressure, and hence increases their intrinsic energy. Additionally, any actual translational motion of the molecules induces a physical reaction that results in a further torque. Compared with the state of rest, this extra convectively induced torque causes a change in the body's intrinsic energy equal to the externally observed kinetic energy,  $\frac{1}{2}mv^2$ , while the inductive effect due to gravity causes a change in the intrinsic energy equal to,  $\frac{1}{2}mu^2$ . This gravitationally induced energy,  $\frac{1}{2}mu^2$ , is like a latent kinetic energy based on the escape velocity. It's a steady state situation analogous to a precessing pivoted gyroscope.

We can substitute the escape velocity into equation (1) to obtain,

$$E = mc^2(1 + GM/Rc^2) \tag{3}$$

In a closed elliptical orbit, both the gravity and the motion effects add together positively, and they both vary in time at exactly the same rate;

therefore, the intrinsic energy of an orbiting atomic clock will be maximum at its lowest height and minimum at its highest height. We can hence use equation (3) for both effects and then double the result.

We now need to establish exactly what translational motion is measured relative to, what the physical interaction is with any background medium, and how any such background medium interacts with gravity.

## **The Aether and the Electron-Positron Sea**

**IV.** It is proposed that space is densely packed with tiny aethereal vortices that are pressing against each other with centrifugal force while striving to dilate, [1], [2]. Each of these tiny vortices contains both a sink (an electron) and a source (a positron) in mutual orbit, [3], [4]. It is further proposed that the atoms and molecules of ponderable matter constitute more complex vortices. When a body linearly accelerates, the shear interaction between the constituent molecules and the background electron-positron sea (the luminiferous medium) leads to precession of both the constituent molecules and the background electron-positron dipoles, and this has the effect of increasing the fine-grained centrifugal pressure. The change in this internal centrifugal pressure as compared to the rest state is known as *kinetic energy*. Kinetic energy is a pressure which is induced either by acceleration caused by an external force, or when a fine-grained angular acceleration wave emitted from one body delivers kinetic energy into another body during a collision, [5]. When this happens, the other body then linearly accelerates.

It is proposed that gravity is mediated by tensile aether on the large scale, flowing into the sinks in all matter, for a reason unknown, at a speed equal to the local escape velocity, and that in doing so it superimposes on the local flow around and within the tiny rotating electron-positron vortices that fill all of space. There is therefore a prevalent flow of aether travelling radially downwards through the luminiferous medium and into the Earth. The luminiferous medium does not itself flow into the Earth, instead being entrained within the Earth's gravitational field as the Earth orbits the Sun. The luminiferous medium then forms the basis of the Earth centred inertial (ECI) frame. Due to their dipolarity, with the electron being a sink and the positron being a source, these tiny aether vortices that comprise the ECI frame are caused to precess by the gravitational inflow, hence inducing centrifugal pressure to act at right angles to the gravitational field lines. In the case of two mutually orbiting planets, a region of the sea of tiny vortices (luminiferous medium) is entrained within each gravitational field, and the tension that exists at the interface between these two gravitational fields so as to cause mutual attraction, is undermined by centrifugal pressure acting at right angles to the gravitational field lines. The greater the mutual shear velocity between the two gravitational fields, the greater will be the centrifugal pressure emanating from

the tiny vortices at the interface. This is centrifugal force on the large scale, and it acts against gravity to push the two planets apart.

Meanwhile, internal fine-grained centrifugal pressure is the basis of all intrinsic energy in atomic and molecular matter, and also in the electron-positron sea. It is the *rest mass* energy,  $mc^2$ , where  $c$  is the circumferential speed of a compressed molecular orbit, [6]. In the case of the electron-positron sea, it is proposed that  $c$  will be the speed of light, and hence each dipole will have a stored centrifugal potential energy of 1.02MeV. When a gamma photon supplies an additional 1.02MeV of aether pressure on top of this, the electron and positron in the dipole will then overcome the external centrifugal pressure that was pushing in on them from the surrounding dipoles and hemming them in. The electron and positron in the dipole will hence escape from their lattice bonds, leading to electron-positron pair production, [7].

## Conclusion

V. We can simplify the above propositions simply by considering atoms to be satchels of fluid aether. In a gravitational field, atoms absorb some of the down-flowing aether, and the stronger the gravitational field is, the more aether that is absorbed by the atoms.

In the case of freefall, the atoms of a body absorb two quotas of aether in equal amount. One quota will relate to the gravitational field strength, while the other quota will be connected with the kinetic energy. When the body hits the ground, the quota of aether that was collected as kinetic energy will spill out into the ground.

If we then push the body back upwards again, we will be pushing against gravity, and so work will need to be done. Kinetic energy will be imparted to the body from the external force, hence injecting aether into the atoms, but as the body rises, both quotas of aether will be squeezed out into the gravitational field to flow back down to Earth again.

In the case of an elliptical orbit, the aether pressure in the atoms will be maximum at the lowest height. Centrifugal force is caused by aether pressure, which is why a recoil occurs at the lowest height. At the lowest height, the body then starts to move upwards, because the aether pressure now exceeds the aether tension in the gravitational downflow, [8]. Equation (2) is therefore a definition of gravitational energy that better intersects with the physical reality within the fine-grained structure of a gravitating body, but the standard definition of gravitational potential energy, with its negative sign, still remains the best for the purposes of solving problems in mechanics.

Ultimately, the seat of gravitational energy lies with a mysterious hidden mechanism that pulls the aether into negative sink particles.

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