Gravitational limits

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Abstract

The theory of black holes states that without the energy set free by nuclear fusion, the gravity of a big star will always be stronger than all other forces, causing it to collapse and ending in a singularity. During such a collapse, however, gravity itself should free enough binding energy to ultimately prevent the star from collapsing to a state where its escape velocity reaches the speed of light.

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To create a stable compact object through gravity, it is necessary that the object be able to lose some energy, for example, through radiation or other processes. Mass is accelerated by gravity and, if not somehow slowed down, it is accelerated to the speed it needs to get back from where it came.

Let us visualize two infinitely elastic balls in a universe of their own. Set free, they start to move toward each other, gaining speed through gravity. As they gain speed, some of their rest mass is converted into energy (speed). The balls should collide but, since they cannot get rid of the energy (speed) produced by the gravitation, they again separate and slow down, converting energy back into rest mass, thus oscillating between the start and collision points forever. The balls will never be held together in a stable way. Gravity accelerates mass and does so to the exact speed the mass needs to escape it again. To reach a stable compact condition, some of the energy must be lost, slowing down the parts. This process can take place by radiation or through departing particles that carry energy away from multiple collisions, leaving the newly created object forever.

The energy required to take a stabilized object apart again is directly related to such an object's escape velocity. During agglutination, the object heats up, but as it loses some of this heat through radiation or other processes, it is able to cool down, reaching a new stable condition with a higher escape velocity. The new object has a slightly smaller mass than the sum of its original parts. Rest mass is converted into energy and some energy is lost through heat radiation, such that, in the end, the compact object loses some of its overall mass.

An object loses mass as its escape velocity increases. An increasing escape velocity always converts mass into energy. Up to an escape velocity of the speed of light, this is a complete reversible process, which means that the exact amount of energy needed to take the object apart again must be set free during compaction. If an object has an escape velocity of almost the speed of light, any part to be taken away from the object must be accelerated to almost the speed of light. This process will take an already huge amount of energy and set free exactly that amount if a particle from outside falls onto the object. When the escape velocity reaches the speed of light, the situation becomes worse, since an infinite amount of energy is now needed to accelerate anything to a speed that would allow it to leave the object. But this means that exactly that amount of energy falling onto the object would be set free: infinity energy! The energy produced by falling onto the object becomes independent from the object's mass. A black hole would therefore not only be infinitely dense but would also carry infinite energy.

Gravity converts much more mass into energy, as assumed in the theory of black holes. It accelerates mass and can only reach a stable condition by losing this energy. To achieve a state where its escape velocity reaches the speed of light, it must lose an amount of energy equal to its overall mass, and would therefore never exist. A black hole would have no mass! The star would literally be vaporized.

Even light falling or traveling toward such an imaginary object behaves differently than assumed. Light cannot be accelerated any further, so instead of getting accelerated when traveling toward such an object (or any other heavy object), it gets blue-shifted. But if it gets blue-shifted, it gains energy. If mass is accelerated by gravity, it also gains energy (speed) but compensates by losing some of its rest mass to keep the overall state (mass + energy) constant. Light cannot lose any rest mass, since it does not have any; it loses intensity instead.

The frequency of the light will be blue-shifted but its intensity will be weakened. A secondary radiation process will radiate in the direction opposite to that of the gravitational blue-shifted radiation, carrying some of the radiation energy away. The radiation is partly reflected back through the gravitational blue-shift itself. Reaching the event horizon of such an imaginary object, the radiation's frequency will also be shifted to infinity but its intensity will be zero. Everything is reflected back in a secondary radiation caused by the blue-shift itself. Therefore, nothing is actually able to reach an event horizon, not even light itself.

Mathematically described objects such as black holes and wormholes are more like mirrors than real objects, since they all contain also a reversed time. If one took time travel literally, time would reverse itself. If time were reversed, it would be reversed not only for the universe of the traveling object or the object itself but for both of them. This means that by traveling back in time, the object itself would also travel back to the exact state it was, with all the consequences. The object would forget everything about its future, just as its universe would. Basically, time travel is time reverting itself.

In summary, it can be said that the gravitational binding energy set free during a gravitationally forced compaction and the law of energy conservation prevent anything from collapsing into a black hole or singularity. Forcing matter from outside into this state would fail for the same reasons. At the stage the escape velocity reaches the speed of light, everything is converted into energy, moving with the speed of light, which escapes the gravitational pull. This is a final border where matter’s mass (or, better, its rest mass) disappears.

By respecting the amount of gravitational binding energy set free, the anticipated behavior of mass within the universe is changing. The speed of light is again an ultimate barrier that cannot be broken. All matter within the stars and planets or any compact object kept together by gravitation sets free gravitational binding energy, thereby losing some rest mass. The universe therefore does not seem to be a place for black holes, singularities, or time travel.