REASON BEHIND GRAVITATIONAL ENERGY

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Abstract:- Any two masses are attracted by gravitational force. But, we do not know why there are gravitational energy between two masses. When two black holes make collision and form a single black hole then there are some loss in mass, and this lost mass converted into gravitational wave [1].
In supernova explosion, gravitational potential energy released as explosion energy. So, in supernova, there are some mass defect [2]. Nuclear binding energy arises due to some mass defect [3]. So , from classical level to quantum level mass defect is the reason behind the attraction energy or binding energy.

Keywords:- Mass, Mass defect ,Gravitational energy.

Explanation:-An object of mass 'm' feels gravitational attraction energy in presence of another body of mass 'M'. So, in presence of two objects , there must be some loss in mass which is converted to gravitational energy between them. If there are Δm mass defect then it will be converted gravitational energy following the rule E=Δmc^2, where c is the velocity of light in free space.

Now, I want to calculate mass defect or loss of mass due to gravitational interaction. Gravitational energy between two masses 'M' and 'm' separated at a distance 'r' is given by

V=GMm/r [G is the gravitational constant]

Let in this case mass defect or loss in mass is Δm , which is converted into gravitational energy. So, V= Δmc^2.

- ⇨ Δmc^2= GMm/r
- ⇨ Δm=GMm/rc^2

So, mass defect for two object each having mass 1 kg and separated by distance 1 m is Δm=G/c^2=7.411*10^-28 kg. this is defect mass per kg^2 when object separated by 1 m.

Now , using this concept of mass defect one can calculate gravitational energy for any two particles separated by a distance 'r' and having masses 'M' ,'m'. The mass defect for this system is Δm'= (Δm/r)(M*m). So, gravitational energy between them V=Δm'c^2.

As for example mass of sun is M(s)=1.983*10^30 kg, mass of earth is M(e)=5.972*10^24 kg and the average distance between them r=1.5*10^11 m. so in presence of earth the combine system of sun and earth has a mass defect and it is given by

Δm'=(7.411*10^-28)* M(s)m(e)/r=5.868*10^16 kg

So, gravitational energy between earth and sun is

V= Δm'c^2

V=5.868*10^16*(3*10^8)^2=5.281*10^33 J

Conclusions:- According to this theory origin of gravity is mass defect of interacting particles or objects .when two objects come close to each other, they loss more mass due to increase in gravitational energy between them. If we break a chalk into two pieces then there must be some defect in mass which will be converted to gravitational energy between them. So , measured mass of all objects in presence of gravity is less than the actual mass of the object when there is no gravitational force i.e same particle has different mass in high gravitational field and low gravitational field. But this change of mass is very small compare to the mass of the particle.

References:-

[1] doi :- 10.1119/1.4985727
[2] doi :- 10.1093/mnras/stu163
[3] doi :- 10.1007/s13361-017-1741-9