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About photon and Black Hole

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ABSTRACT. *As early as two hundred years ago, Michelle and Laplacas predicted an invisible star with the law of gravitation. Because of its mass, the photons emitted by star were bound by their own gravity. This is the earliest spoken black hole (then known as a dark star), calculated by the law of gravitation, if it the sun were to become such a dark star, its radius would be only 3,000 meters. Coincidentally, such results can be obtained by using modern general relativistic calculations. Many theories are suppose to assumptions of black hole at present, and some theories think the mini black hole are all over the universe, but the cannot bound the photon. So we discussion the massive black hole in this paper. This kind of black hole is invisible, so we only can find the black hole according to the motion of celestial bodies to around of black hole. we can think the first cosmic velocity in black hole to achieve the light speed and exist energy transformation to kinetic energy to potential energy.*

KEYWORDS: *Black hole; Gravity; Cosmic velocity; Energy transformation*

1. The theory of photon in the black hole and relationship to mass and energy

The kinetic energy of photon is $E = mc^2$ and photon has no rest mass , so we think the potential energy transformation as kinetic energy that is completely about photon . black hole has the mass of eigenstates which is equivalent to the mass of star on live . the black hole transformation of kinetic energy to potential energy with particle when the black hole eat stars . The space-time was curved near to black hole that is very severe , So any celestial bodies has trend falling into the surface of black hole when the object near to black hole , The observer is outside of black hole think the celestial bodies is static onto surface of black hole, it were can turn dim and turn red that is gradually , and the can cover in the end . This phenomena are similar of redshift in relativity , so this surface name as “infinite redshift surface” .

The mass of kinetic heavier than mass of static , but they are relative ,we can think mass of kinetic show inertia .Because of photon has the light speed , so the scale of photon is fixed value. the photon can transformation part of the kinetic energy to potential energy when them pass by the star , so we has a formula:

$$mgh = mc^2 - h\upsilon$$

The kinetic energy of photon is $E_k = h\upsilon$,the frequency is variable in relativity , the frequency of photon is variable when photon pass by the massive stars , they are follow a law of change:

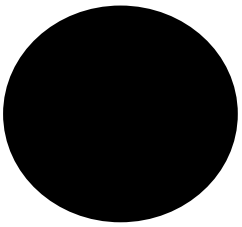
$$\upsilon = \upsilon_0 \sqrt{1-\frac{v^2}{c^2}}$$

The change of energy is source of gravitational redshift

Two kind of black hole in universe : Schwarzie black hole and Kerr black hole (Kerr-Newman black hole) the simplest black hole is Schwarzie black hole that is static black hole and it has a metric in Schwarzie timespace:

$$ds^2 = -\left(1-\frac{2M}{r}\right)dt^2 + \left(1-\frac{2M}{r}\right)^{-1} dr^2 + r^2 d\theta^2 + r^2 \sin^2\theta d\varphi^2$$

The Schwarzie black hole is the spherical and symmetry , so the photon has distribution of gradient in Schwarzie black hole . So that the energy is uniform change . A kind of distribution of mass in black hole , the particles can receive the pressure more and more heavy when the particles falling to center of black hole ,until it break .



Schwarzie black hole diagram

Schwarzie black hole is a static black hole. It has no rotation, so its interior will not have inertia centrifugal force.

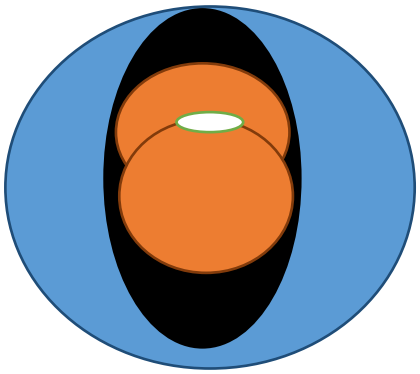
The Kerr black hole is different from Schwarzie black hole , the distribution of energy is complex then Schwarzie black hole . It is not static , so it not spherical and they has intrinsic angular momentum ,so that mass distribution is uneven .

The space time of Kerr has a metric too :

$$ds^2 = -\left(1-\frac{2Mr}{\rho^2}\right)dt^2 + \frac{\rho^2}{\Delta}dr^2 + \rho^2 d\theta^2 + \left[\left(r^2+a^2\right)\sin^2\theta + \frac{2Mra^2\sin^4\theta}{\rho^2}\right]d\phi^2 - \frac{4Mra\sin^2\theta}{\rho^2}dtd\phi$$

$$\rho^2 \equiv r^2 + a^2\cos^2\theta, \Delta \equiv r^2 - 2Mr + a^2, a = \frac{M}{J}$$

If it uniform rotation of the kerr black hole they are distribution of gradient too only the can present the spiral .



Kerr black hole diagram

Kerr black hole is a stable rotating black hole, in which the blue part of the black hole is the energy layer region, the black part of the black part is the outer horizon, the orange part of the boundary is the inner horizon, and the white part in the middle of the inner horizon is odd ring.

2. The essence of gravitational wave

All of the particle has wave particle duality . For example the photon is particle or wave . we can think photon transformation potential energy to kinetic energy that is completely when it falling in the black hole , we can think the kinetic energy transformation potential energy that is completely too . At the this time , photon performance as particle is stronger than performance as wave so we can think the wave is performance as kinetic energy . The collision of two black holes can make photon regain the kinetic energy ,now it performance as wave . this is gravitational wave .it depend on energy-momentum tensor ,it has maximum on black hole :

$$T_{\mu\upsilon}=\lim_{\substack{S_1\to\infty\\M_1\to\infty}}\begin{pmatrix}\boldsymbol{\varepsilon} & \frac{\mathbf{S_1}}{\mathbf{c}} & \frac{\mathbf{S_2}}{\mathbf{c}} & \frac{\mathbf{S_3}}{\mathbf{c}}\\ \mathbf{cM_1} & \mathbf{T_{11}} & \mathbf{T_{12}} & \mathbf{T_{13}}\\ \mathbf{cM_2} & \mathbf{T_{21}} & \mathbf{T_{22}} & \mathbf{T_{23}}\\ \mathbf{cM_3} & \mathbf{T_{31}} & \mathbf{T_{32}} & \mathbf{T_{33}}\end{pmatrix}=\sum_{i=1}^{3}M_i c$$

The collision can make the photon convert potential energy transformation as kinetic energy, that is completely .So we can derivation a formula :

$$\lim_{v\to\frac{1}{2}c}m_1v_1+\lim_{v\to\frac{1}{2}c}m_2v_2=\lim_{v\to\frac{1}{2}c}\left(m_1+m_2\right)\left(v_1+v_2\right)=Mc$$

So

$$\frac{d\left(\frac{1}{2}m_1v_1^2\right)+d\left(\frac{1}{2}m_2v_2^2\right)}{d\left(\frac{1}{2}m_1v_1^2\right)d\left(\frac{1}{2}m_2v_2^2\right)}=Mc$$

2. The wave particle duality in black hole

Heisenberg uncertainty principle is depend on kinetic energy with particle that is unstable ,there are two formula in quantum:

$$\Delta x \Delta p \geq \frac{h}{4\pi}$$

or

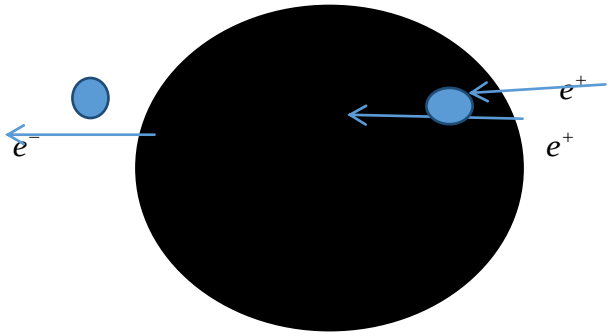
$$\Delta E \Delta t = \frac{h}{4\pi}$$

But in black hole , the photon has potential energy so it does not Heisenberg uncertainty principle . According to wave particle duality , the Kerr black hole has volatility when it rotation , so they can consist of “black hole-ring” now we can think closed of timespeace so that is”ring timespace” now the time is unlimited . For example the surface of ball , you can not arrive to the border . If an astronaut into this ring , so he can obtained a live that is unlimited.

If the electron in the Kerr black hole is consist of Kerr-Neuman black hole. They can produce by electron of static in this black hole. If it fast of rotation so that velocity is close to limited the black hole can emitting the photon . Now the black hole emit some radiation of photon .

According to the law of lowest energy , lowest energy photon in the black hole , so the photon is put up the negative energy that is completely . The positive energy to be strip out the atom but leave the negative energy.

Because of photon is produce in positive electron collision to negative electron ,a photon can divide a positive electron and negative electron when photon suffer from a celestial bodies (For example a black hole or Quasar) photon should received the tidal forces that is powerful so that separate the positive electron and negative electron . At the this time , the positive electron escaped the gravitational field , so we analyse the black hole when we used of nucleus .We can think the positive energy out to gravitational field but the negative energy goes to the central of black hole and take a until of positive energy of black hole , so this phenomena put up to decrease the energy to black hole. This is Hawkin radiation. He think black hole to be evaporation witch is less than the sun mass of 10^2

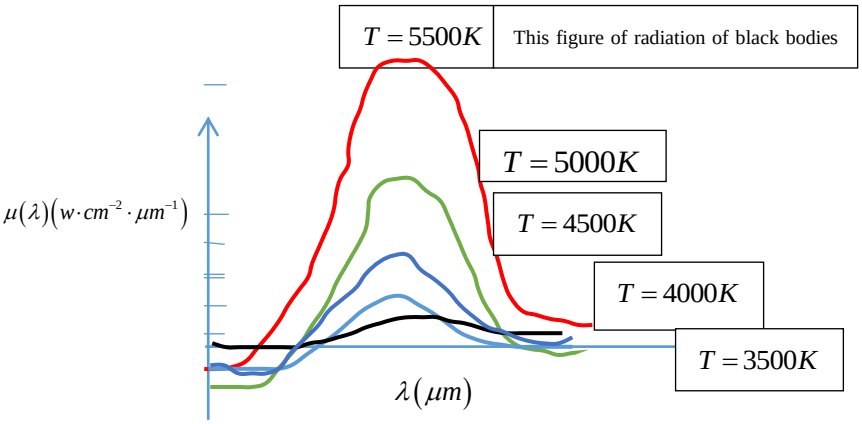


The black hole can emit the radiation when they are eat stars , we can think that is photon , so the black hole obtained the live . The radiation is obey to a formula of black bodies:

$$E_{\upsilon}=\frac{8\pi h\upsilon^{3}}{c^{3}}\cdot\frac{1}{e^{\frac{h\upsilon}{kT}}-1}$$

This is planck formula

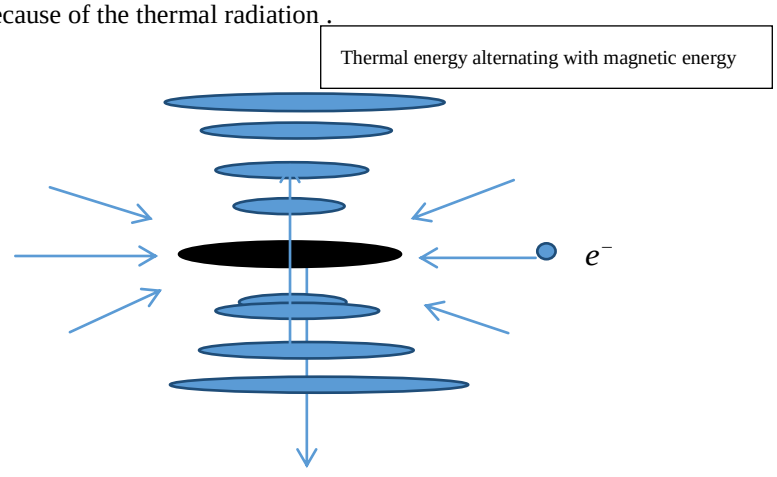
We can quantization of energy that is obey the Planck formula And they has a figure



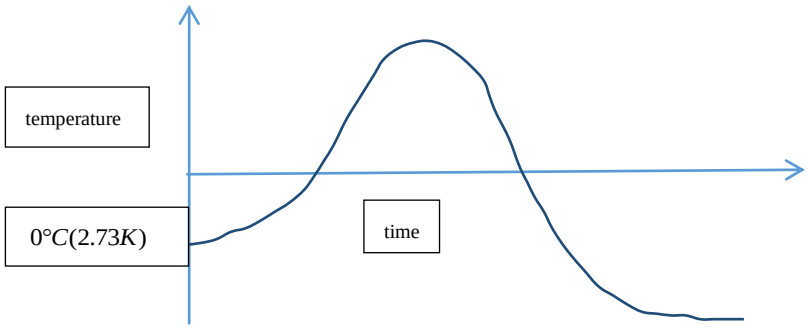
According to the law of displace in quantum mechanical ,the wavelength is variable when the temperature is variable too . At the this time , the wave crest is constant. The wavelength and temperature are obey a formula:

$$\lambda T=b\left(b=2.897\times10^{-3}k\cdot m\right)$$

The black hole has thermal of jet when they are eat the star and that is vertical with accretion disk of black hole and it obey the Vearne displace law . According to the relationship of $\lambda(\mu m)$ and $\mu(\lambda)\left(w\cdot cm^{-2}\cdot\mu m^{-1}\right)$, we can think they occur radshift because of the thermal radiation .

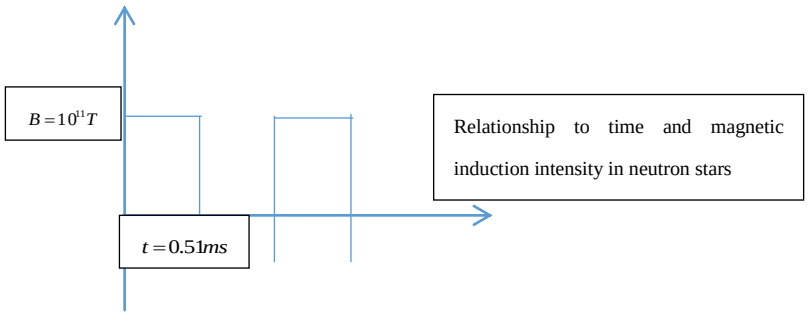


The thermal radiation of particle emitting can turn red when the particle stay away from observe , this is the Doppler effect ,so we think the frequency is lower than frequency of eigenstates of particles , this is a kind of phenomena in the visual . The thermal energy can quantization too , now they put up the thermal in jump of quantum , they has a limit of lowest when the lowest energy in quantum , that is cosmic microwave background radiation $T = 2.73K$ (residue thermal rotation in explode birth the universe)



According to the thermal motive of molecular we can think the particle has kinetic energy of eigenstates . Is depend on how many particle in the mini space .according to the theory of photon of Einstein we can think the consist of the unit with many photons , that is massage of pulse ,that is exist of cepheid variable stars and neutron stars .

Neutron stars is a kind of star in the end of live , so it heavy after black hole . Neutron starts consist of the neutron , and a little of electron at ground , but they can emit the photon so we can think the electronic equilibrium in neutron , the degeneracy pressure of neutrons destruction the electron equilibrium in neutron. At the this time, the neutron produce to radiation of electromagnetic that is very powerful.



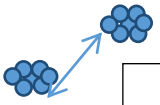
Neutron stars can formation black hole too when the neutron has a limit of energy :

$$T + V = m_e c^2$$

The mass of neutron is variable :

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

At the this time , as the mass of increase of neutron , the rejection force of Pauli can not suppose to the degeneracy pressure of neutron , so the neutron has the collision of interaction that is powerful, so that the neutron is broken and emit positive energy to space but the negative energy is falling into the central of star they are formation to degeneracy energy(we can think that is photon of negative) this is black hole .



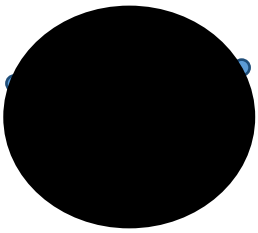
The neutron collision of interaction on neutron stars

Because of the photon of negative in black hole and it can transformation the kinetic energy to potential energy that is complete , so it was heaviest in universe and it can absorption the photon .

The gravitation is very powerful on the surface of black hole ,we can said the gravitation to κ , it has a formula :

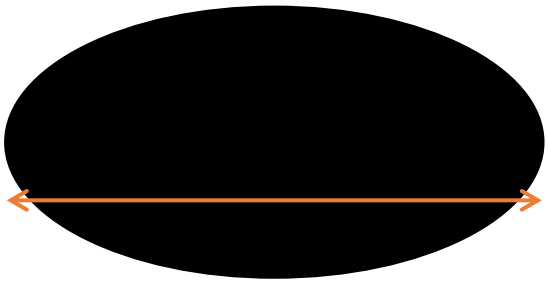
$$\kappa = \lim_{r \to r^+} b\sqrt{-\hat{g}_{00}}$$

The particle has acceleration “b” near to black hole and they are put up the performance of particle of photon for the observer where is outside black hole.



The degeneracy positive electronic in black hole

According to the photon theory of Einstein , the photon is most basic particle in universe . So we think the particle field in the black hole what is most basic , they are similar to ground state of atom . According to the define of black hole , it can not emit any radiation when it not receive any interference . At the this time , it keep a balance of thermal .



Balance of thermal in black hole

The kerr-Neuman black hole still has some the kinetic energy because of produce to the electronic so it can not arrive the balance of thermal , they can emitting the energy make they are arrived the balance of thermal. **3. About the end of time in black hole**

Has a odd point in schuwazie black hole there are end of time. There has some Event of history with particle . Because of in black hole the Coordinates is swap for time to space, so the time is vector in black hole . If a particle falling the schuwazie black hole, so it running to the finish, at the this time , the particle is destroy.

We can assume a kind of celestial body it was inverse of black hole, that is white hole There are start of time, so there are not the gravitation . Because of it only emitting the material, so it has powerful of temperature.

4. Conclusion

Two kinds of black hole in universe: Schwazie black hole and Kerr black hole , they are -different from distribution of density of energy . Because of black hole consist of curved time space that is vacuum .So according to the theory of Dirac`vacuum we can think the photon is negative energy in black hole.

To sum up in conclusion , the black hole is a kind of black bodies and they are obey the law of black bodies . So the black hole is not end of massive star lively it only a kind of state of lowest with energy.

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