

# The relativistic effect of kinetic stars

Yi-Liu Fan

**Abstract** The paper discusses the “time paradox” and the “mass paradox” of “twin paradox” in the Special Theory of Relativity. The research discovers that the space-time outside a kinetic star shows a double structure.

Keywords: twin paradox, mass paradox, wave-particle duality

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## I Introduction

Many people have formed such an impression of the Special Theory of Relativity is only satisfactory for a high-speed field of a microcosm and it cannot have application in a massive star in the whole domain of the motion of the natural world. But one sees that it is hard to draw sometimes a sharp dividing line between two different theories in science. Thus, the law by which high-speed motion effect structure of stars will need to be studied in greater detail so that such effects can be incorporated into the theory of gravitation. The explanation of the cosmological redshift of the quasars' redshifts is sufficient for the study to become which brooks no delay at the moment.

## II The theoretical analysis of “the time paradox” and “mass paradox” on kinetic stars

Now let's imagine that a star like our sun, which is moving uniformly and in a straight line at the speed of light relatively to a static frame of reference. Based on the time dilation effect formula of special relativity, one has

$$d\tau = \frac{dt}{\sqrt{1 - \frac{V^2}{C^2}}} = \gamma dt \quad (1)$$

In the region of the gravitational fields where  $dt$  is an interval of time which a freely falling particle go from  $r=R$  to  $r=r_0$ . This interval can be expressed as[2]

$$dt = \left( \frac{R^3}{8GM} \right)^{\frac{1}{2}} \left[ 2 \left( \frac{r}{R} - \frac{r^2}{R^2} \right)^{\frac{1}{2}} + \cos^{-1} \left( \frac{2r}{R} - 1 \right) \right] \quad (2)$$

where  $M$  is the stellar mass. By formula (1) and let  $r=0$ , one has

$$d\tau = \frac{dt}{\sqrt{1 - \frac{V^2}{C^2}}} = \frac{\pi}{\sqrt{1 - \frac{V^2}{C^2}}} \sqrt{\frac{R^3}{8GM}} \xrightarrow{v \rightarrow c} \infty \quad (3)$$

On the other hand one considers the increase in mass

$$M = \frac{M_c}{\sqrt{1 - \frac{V^2}{C^2}}} = \gamma M_c \quad (4)$$

Thus a star will exceed its critical value in mass to support gravity necessarily if only it moves at a high velocity[3]

$$M = \gamma M_c > M_c = \frac{8}{9} \sqrt{\frac{2}{3kc^2 \rho}} \quad (5)$$

where  $c^2 = 1.86 \times 10^{-27} \text{ cm g}^{-1}$ , the last term is the critical mass of stars to support gravity, thus in such a situation, the gravitational collapse must occur if only that stars have a sufficient velocity. This time can be expressed as which it collapse to the central singularity

$$d\tau = \frac{\pi}{2} \sqrt{\frac{3}{8\pi GM}} \quad (6)$$

By (4), one obtains

$$d\tau = \frac{\pi}{2} \left( \frac{3}{8\pi GM_c} \sqrt{1 - \frac{V^2}{C^2}} \right)^{\frac{1}{2}} \xrightarrow{V \rightarrow C} 0 \quad (7)$$

One sees that (7) is in disagreement with (3) and they will tend to two extreme states as  $V \rightarrow C$ . Because of they belong to the same system, it is unable to steer a middle course between these views.

### III Conclusion

The great success is obtained with Special Relativity by the infinitesimal treatment of an inertial frame in fields of the microcosm and the macrocosm. By contrast, it seldom takes account of effects of Special Relativity to involve the material motion about the large scale structure of space-time because of a difference of the background of space-time. But in fact it is difficult to draw an exact line of demarcation between two type of space-time, for a true gravitational field. In consequence of an asymptotic flatness in space-time, one must consider that effects of Special Relativity. In theory, one thus faces not a very cheerful divergence that shows up as form of “twin paradox” which takes into account the “time paradox” and the “mass paradox”. It seems to be not inherent in an object to accompany two phenomena. Thus one discovers that there is also a similar phenomenon in the Special Theory of Relativity with fundamental problem of quantum mechanics—wave-particle duality.

### References

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