

## **The Mysterious Force that is Pulling Pioneer 10 Back Toward The Sun**

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### **Introduction**

Researchers say Pioneer 10, which took the first close-up pictures of Jupiter before leaving our solar system in 1983, is being pulled back to the sun by an unknown force. The effect shows no sign of getting weaker as the spacecraft travels deeper into space, and scientists are considering the possibility that the probe has revealed a new force of nature.

Dr Philip Laing, a member of the research team tracking the craft, said: "We have examined every mechanism and theory we can think of and so far nothing works.

"If the effect is real, it will have a big impact on cosmology and spacecraft navigation," said Dr Laing, of the Aerospace Corporation of California[1].

According to the researchers' calculations, the speed of pioneer 10 decreases by 25 cm/day. Pioneer 10 was launched by Nasa on March 2 1972 with speed 43000 Km/h. Pioneer 10 was disappeared before 7 years from now. That means after 32 years of launching. Now the question is; what is that mysterious force which is decreasing the speed of pioneer 10? The answer is in my papers published in the General Science Journal. The first one is "Quantum and Relativity Theories Unified in Concepts, Principles and Laws[2]" \_

[www.wbabin.net/physics/azzam2.pdf](http://www.wbabin.net/physics/azzam2.pdf)

The second paper is "The Relativistic Quantized Force: Newton's Second Law, Inertial and Gravitational[3]" <http://wbabin.net/physics/azzam.pdf>

And the third one is “Generalization of Schwarzschild Metric[4]”

<http://wbabin.net/feast/azzam6.pdf>

### Theory:

What caused the speed of pioneer 10 to decrease is according to my paper Quantum and Relativity Theories Unified in Concepts, Principles and Laws[2]” [www.wbabin.net/physics/azzam2.pdf](http://www.wbabin.net/physics/azzam2.pdf) . Where, according to it, in section (3.3); Suppose a sphere is moving with constant velocity  $V_p$  on the earth's surface. As we have seen previously in this paper, both the earth observer and the moving train rider will be agreed on the sphere's velocity on the earth surface, where both of them will measure the velocity to be equal to the actual velocity  $V_p$  . Now, if this sphere entered inside the moving train and traversed the length of the train, then the time separation for the rider is  $\Delta t'$  via his clock and  $\Delta t$  for the observer via his clock where;

$$\Delta t' = \sqrt{1 - \frac{V^2}{C^2}} \Delta t$$

In this case, both the earth observer and the train rider should agree on the beginning of the event from the initial sphere's motion inside the train and the final; when the sphere traverses train length  $\Delta L$  , but they will differ on the measured time separation. Subsequently the measured velocity for the sphere inside the moving train according to the train rider is  $V_{rider}$  , where

$$V_{rider} = \frac{\Delta L}{\Delta t'} = V_p$$

According to the earth observer the measure speed of the sphere inside the train should be equal to  $V_{observer}$  where

$$V_{observer} = \frac{\Delta L}{\Delta t} = \sqrt{1 - \frac{V^2}{C^2}} \frac{\Delta L}{\Delta t'} = \sqrt{1 - \frac{V^2}{C^2}} V_p$$

We find that the sphere's velocity inside the moving train with respect to the earth observer is less than the sphere velocity on the earth surface by the factor

of  $\sqrt{1 - \frac{V^2}{C^2}}$  .

Now according to the equivalence principle in my papers “The Relativistic Quantized Force: Newton's Second Law, Inertial and Gravitational[3]” <http://wbabin.net/physics/azzam.pdf> and “Generalization of Schwarzschild Metric[4]” <http://wbabin.net/feast/azzam6.pdf> we get, if there is a planet moving with speed  $V$  in a circular orbit of radius  $R$  around a big mass  $M$ , then measured speed of this planet as a result of the gravitational field of  $M$  for an observer on the earth is  $V'$  given as

$$V' = \left(1 - \frac{GM}{C^2 R}\right) V \quad (1)$$

Now let's explain what happened for pioneer 10 according to my theory. Pioneer 10 was launched from the earth with speed 43000km/h. The distance between the earth and the sun is  $R$  where  $R = 1.5 \times 10^{11} m$ . The distance that is passed by pioneer 10 is  $h$  given by  $\Delta h = V \Delta t$ . But  $V$  is given according to equation (1) for the earth observer, from that the passed distance by pioneer 10 for an observer on the earth is  $\Delta h'$  where

$$\Delta h' = \left(1 - \frac{GM}{C^2 (R+h)}\right) V \Delta t = \left(1 - \frac{GM}{C^2 (R+h)}\right) \Delta h$$

Thus from that we get

$$dh' = \left(1 - \frac{GM}{C^2 (R+h)}\right) dh$$

Therefore

$$h' = \int \left(1 - \frac{GM}{C^2 (R+h)}\right) dh$$

Thus, the decrease in the travelled distance of pioneer 10 for the earth observer is given as

$$\delta h = \int dh - \int \left(1 - \frac{GM}{C^2 (R+h)}\right) dh$$

Thus

$$\delta h = \int_R^{R+h} \left( \frac{GM}{C^2(R+h)} \right) dh \quad (2)$$

By applying

$$G = 6,67266 \times 10^{-11}$$

$$M(\text{sun}) = 1,98892 \times 10^{30} \text{ Kg}$$

$$C^2 = 8,98755 \times 10^{16} \text{ m}^2 / \text{s}^2$$

$$R = 1.5 \times 10^{11} \text{ m}$$

And h is the passed distance that pioneer 10 must be passed, where in this year 2010 pioneer 10 should be passed the distance h, where

$$h = 4.3 \times 10^7 (\text{m} / \text{hour}) \times 24(\text{hour}) \times 365.25(\text{day}) \times 38.5(\text{years})$$

Thus the distance that must be passed at this time is

$$h = 1.45 \times 10^{13} \text{ m}$$

By integrating equation (2), we get

$$\delta h = \frac{GM}{C^2} (\log(h+2R) - \log(2R)) \quad (3)$$

Now by substituting, we get

$$\delta h = 2500 \text{ m}$$

From that we get pioneer 10 is delayed from the considered distance that must be reached at this time by 2500 m. that means reducing in distance per day as

$$\delta h(\text{per day}) = \frac{2500}{38.5(\text{year}) \times 365.25(\text{day})} = 0.178 \text{ m} / \text{day} = 17.8 \text{ cm} / \text{day}$$

In 1997, the reduced distance is given as

$$h = 4.3 \times 10^7 (\text{m} / \text{hour}) \times 24(\text{hour}) \times 365.25(\text{day}) \times 25(\text{year}) = 9.42 \times 10^{12} \text{ m}$$

Thus from equation (3) we get

$$\delta h = 2231 \text{ m}$$

Thus the reduced distance per day is

$$\delta h(\text{per day}) = \frac{2231}{365.25 \times 25} = 0.25 \text{ m/day} = 25 \text{ cm/day}$$

From that we get the decreasing rate in 1997 is greater than in 2010 that is because pioneer 10 was closer to the sun than this time.

## Conclusion

The mysterious force that is pulling pioneer 10 back toward the sun is the gravitational force of the sun that is affected on pioneer 10. Any body moving with real velocity  $V$  under the gravitational field, then the measured velocity of this body for an observer out of this field is given as in equation (1)[2-4]. Similarly, light travels slower through any given material, or medium, the body or the light beam travels slower through the gravitational field. Einstein used Huygens principle to compute the light bending through gravity by computing the light speed through gravity which is slower[4-5].

## References

- 1- <http://www.telegraph.co.uk/science/space/1384420/Mysterious-force-holds-back-Nasa-probe-in-deep-space.html>
- 2- AlMosallami, A., "*Quantum and Relativity Theories Unified in Concepts, Principles and Laws*" [www.wbabin.net/physics/azzam2.pdf](http://www.wbabin.net/physics/azzam2.pdf)
- 3- AlMosallami, A., "*The Relativistic Quantized Force: Newton's Second Law, Inertial and Gravitational*" <http://wbabin.net/physics/azzam.pdf>
- 4- AlMosallami, A., "*Generalization of Schwarzschild Metric*" <http://wbabin.net/feast/azzam6.pdf>
- 5- <http://www.mathpages.com/rr/s6-03/6-03.htm>