

# Pioneer Anomaly

## A Confirmation of Relativity

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### **Abstract**

The Pioneer anomaly is due to time dilation that is caused by the gravity of the Solar System. As pioneer leaves the solar System the rate of flow of time increases causing a doppler blue shift relative to our perspective. This blue shift reduces the expected red shift so the red shift is not as far red shifted as expected. The craft is where it is supposed to be, it just appears to be closer to us than it is.

### **Word list**

Relativity, time, dilation, contraction, gravity, Pioneer, anomaly, Solar System, blue-shift, red-shift, Doppler, Hubble's-law, mass, matter, antimatter.

**Gravitational time dilation** is the effect of time passing at different rates in regions of different gravitational potential; the lower the gravitational potential, the more slowly time passes. Albert Einstein originally predicted this effect in his theory of relativity and it has since been confirmed by tests of general relativity.

[http://en.wikipedia.org/wiki/Gravitational\\_time\\_dilation](http://en.wikipedia.org/wiki/Gravitational_time_dilation)

The opposite of time dilation is time contraction. These are both aspects of “the rate of flow of time”.

It is proven that clocks in orbit around the Earth run faster than those on the Earth's surface, thus confirming that gravity does indeed dilate the rate of flow of time.

In view of the strength of gravity that the Earth exhibits being puny in comparison to what the Sun and our whole Solar System exhibit. Why then are we surprised by the pioneer anomaly? It is predicted by gravitational time dilation. Clocks in the solar system speed up as they leave it and enter “normal” space.

As pioneer leaves the solar system the rate of flow of time in its locality increases causing a relative doppler blue shift. In normal space, photons leave the vehicle at a certain speed (the speed of light). **The speed of light remains a constant because the rate of flow of time is a variable.** As they enter our Solar System, the photons experience a gravitational time dilation. This translates from our perspective as photons, as they leave the craft and in space before entering the Solar System are blue shifted. In other words, the red shift is not as far red shifted, as we would expect it to be because the photons are being blue shifted due to the rate of flow of time outside the Solar System being faster.

The craft is where it is supposed to be, it just appears to be closer to us than it is.

This answer was predictable and should come as no surprise. If everything else being normal, no fuel leaks etc to cause any deviation then this is the answer to the problem.

## **Conclusion**

The pioneer spacecraft only “appears” to be decelerating because of time contraction producing a doppler blue shift outside the Solar System. This blue shift effectively reduces the predicted larger red shift.

Time dilation within the Solar System is the simplest explanation.

In consequence of the solar systems time dilation, we are seeing everything else in the outside universe as marginally less red shifted than it is.

Normally we would not be aware of this minute local time dilation. It only came to notice, as we were accurately tracking a spacecraft that was leaving the Solar System.

## **Hubble's Law**

There are processes other than acceleration that can affect perceived distance in the universe.

As mass affects the rate of flow of time and Hubble's law only takes into account Doppler red shift due to distance (derived from acceleration). The law may need to be adjusted to take into account other factors. The rate of flow of time being gravitationally dilated or contracted at source, also the fact that the gravity of the Solar System is causing everything that we see outside of the Solar System to have a "relative" gravitational blue shift. If the Solar System affects gravitational time dilation, the Milky Way galaxy must on a much larger scale affect it. Mass (normally assumed to be matter) causing a local dilation of the rate of flow of time whilst antimatter [in our universe] causes a contraction in the rate of flow of time. In addition, the release of a large amount of energy can cause a local rate of flow of time contraction in its locality.

This translates from our perspective the photons, as they leave the craft, being blue shifted. In other words, the red shift is not as far red shifted, as we would expect it to be (because the photons are being blue shifted at source).

The local gravitational time dilation of the Solar system means that everything we see outside of the Solar System is slightly blue shifted relative to us. An object at a fixed distance would have a slight blue shift. A receding red shifted object would have a slightly reduced red shift.

It may be the adjustments to account for gravitational changes in the rate of flow of time due to matter or energy are small enough to be ignored. However, the adjustment for antimatter (quasars) is very significant as it is giving a false interpretation of distance when applied to the early universe.

For another but much larger time and distance anomaly please see  
The Discrepancy in Redshift between Associated Galaxies and Quasars

<http://vixra.org/abs/1103.0113>