

## MORE THOUGHTS ON SPACE AND TIME

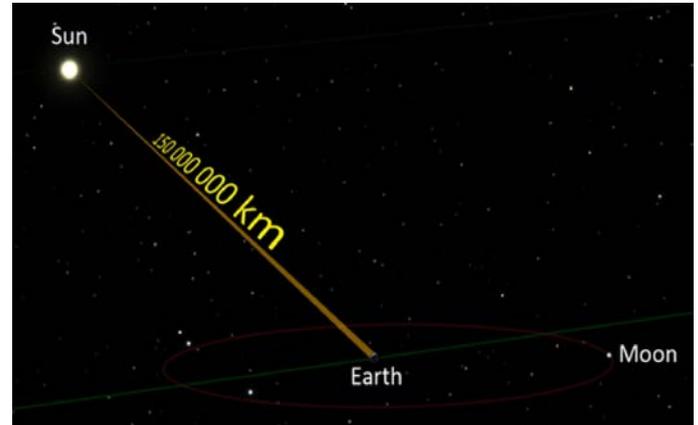
The speed of light in vacuum, commonly denoted  $c$ , is a universal physical constant important in many areas of physics. Its exact value is 299,792,458 metres per second.

**Ole Christensen Rømer** first demonstrated in 1676 that light travels at a finite speed (as opposed to instantaneously as presumed earlier) by studying the apparent motion of Jupiter's moon Io.

Historically, the symbol  $V$  was used as an alternative symbol for the speed of light, introduced by **James Clerk Maxwell** in 1865. In 1894, **Paul Drude** redefined  $c$  with its modern meaning. **Einstein used  $V$  in his original papers on special relativity in 1905, but in 1907 he switched to  $c$ , which by then had become the standard symbol for the speed of light.** According to special relativity,  $c$  is the maximum speed at which any conventional matter and all known forms of information in the universe can travel. In the special and general theories of relativity,  $c$  interrelates space and time, as also appears in the famous equation of mass–energy equivalence  $E = mc^2$ .

### APPROXIMATE LIGHT SIGNAL TRAVEL TIMES

Distance	Time
one foot	1.0 ns
one metre	3.3 ns
from geostationary orbit to Earth	119 ms
the length of Earth's equator	134 ms
from Moon to Earth	1.3 s
from Sun to Earth (1 AU)	8.3 min
one light year	1.0 year
one parsec	3.26 years
from nearest star to Sun (1.3 pc)	4.2 years
from the nearest galaxy to Earth	25000 years
across the Milky Way	100000 years
from Andromeda Galaxy to Earth	2.5 million years
from Earth to edge of universe	46.5 billion years

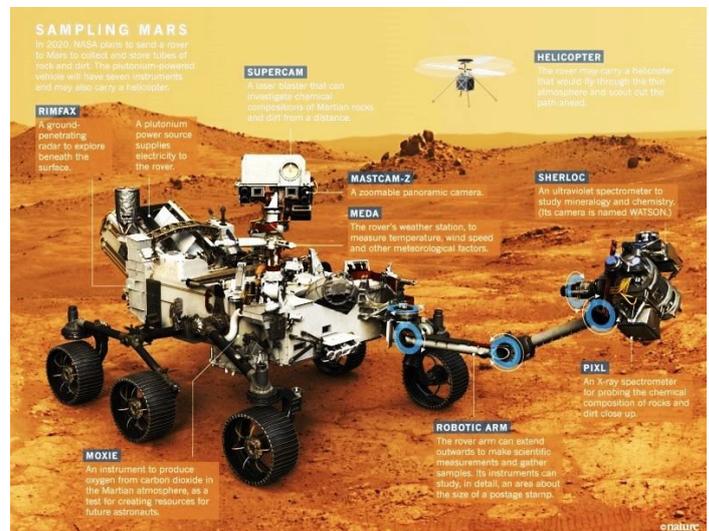


Sunlight takes about 8 minutes 17 seconds to travel the average distance from the surface of the Sun to the Earth

Einstein's Theory of General Relativity adds Mass (Energy) to the Space and Time interactions by showing that both Speed and Mass (Gravity) affect the passage of time. **This leads me to the curious hypothesis that, if an increasing mass causes time to slow down and eventually stop at a maximum point, then a decrease in mass must of necessity cause time to speed up, up to some possible minimum point where everything happens instantaneously. Could it be that we, with our present environment, just happen to be somewhere on this Speed Line between Minimum and Maximum, a point determined by our present speed and mass environment?**

Does that mean that somewhere in our cosmos there could be a point with zero mass and zero speed, where time is infinitely fast and everything happens instantaneously? Do we have the means to test this hypothesis? We know that clocks run faster in a lower Gravity environment. I wonder how much faster a clock would run on the Moon (0.012 of Earth mass), or on Mars (less than a quarter the mass of Earth). Surely they must have clocks on their equipment on Mars that could confirm a proportional speed of time there. Has it been done? If not, why not?

**A confirmation of this idea may even help bringing the Big Bang theory back to life.** A zero speed and mass at the beginning would allow for Cosmic Inflation of the Universe at the speed of light for billions of seconds instantaneously, before the emerging Energy (Mass) caused time to slow it down to the present rate of expansion. Perhaps we will learn more in February 2021, with the latest Martian Rover on Mars. AK, with Wikipedia Notes



“When the newly developed Mars 2020 rover lands on the Red Planet in February 2021, we will be able to hear sounds of the landing and the Martian surface for the first time.

There will be a microphone as part of the camera system during entry, descent and landing and a microphone on one of the science instruments that will allow us to hear sounds on the surface as we are driving around”.

Amongst all that, surely there must be a clock somewhere!