The Relationship between the Speed of Light and π

Keir McCormack HS [*]

Department of Science and Engineering, Columbia University, United States

[*]**Corresponding author:** Keir McCormack HS, Department of Science and Engineering, Columbia University, United States, Tel: 61418352801; E-mail: keirspellman@gmail.com

Abstract

In writing and illustrating A Picture Book For Our Universe, the author believed that he has uncovered an unknown relationship between the speed of light and π. This project began with the hopes of making complex areas of science a little easier to understand, exploring Einstein's Relativity, Quantum Mechanics, the Big Bang and more. By tracing back the history of major discoveries, he found that the way in which units of measurement are determined may provide a hidden clue to revealing the secrets of our universe. As a result, he is inclined to believe that the moment of creation that led to our Big Bang may in fact be happening all around us, a continual process at each and every moment giving birth to the existence of length, mass and time. This hypothesis is based on evidence combining mathematical equations of a Half-Period of a Pendulum, Newton's Second Law and Einstein's Equivalence Principle.

Keywords: Earth; Pendulum; Speed; Mathematician

Introduction

Where once we believed the Earth was at the center of the universe, we have learned of our orbit around our Sun, our position in our Milky Way Galaxy, we have become aware of galaxies external to our own and today we may uncover substantial evidence that our Big Bang has been just one moment in an infinite continual process. The research led the author to question methods determining values for length, mass and time, within meters, kilograms and seconds. Upon exploring how units of measurement had been established through the use of a pendulum, the author has discovered their must be a relationship between π and the speed of light [1-4].

Materials and Methods

π and Pendulums

Pi, most commonly recognized by the Greek symbol "π", is the ratio of a circle 's circumference to its diameter representing infinite curvature. Approximated as 3.14159, it is a measurement that does not require any units, it cannot be expressed exactly as a fraction, its decimal representation never ends and never settles into a permanent repeating pattern and it is

impossible for any circle to produce the exact same area as any square. Like the speed of light, π is a value that speaks to the design of the cosmos (FIG. 1-3).
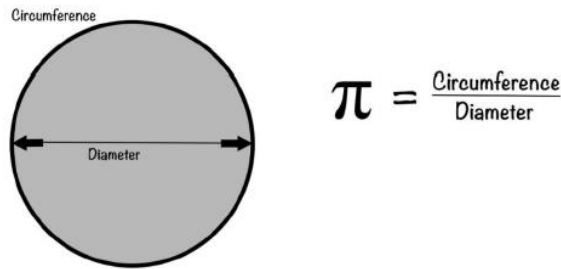

FIG. 1. **Like the speed of light, π is a value that speaks to the design of the cosmos.**

The earliest written approximations of π were displayed by the fraction 25/8 found in Egypt and Babylon, dating as far back as 1900 BC. In 250 BC, the Greek mathematician Archimedes used a geometrical approach by drawing a hexagon inside and outside of a circle and doubling the number of sides until he reached a 96-sided polygon. In doing so he was able to calculate that π was between 223/71 and 22/7, a value of roughly 3.1408. The development of computers allowed American mathematician John Wrench to accurately reach 1,120 digits in 1949 and today with supercomputing power more than a trillion ongoing digits have been calculated.
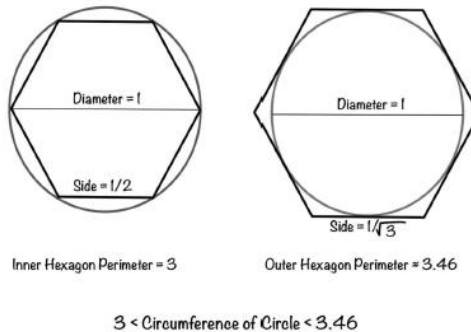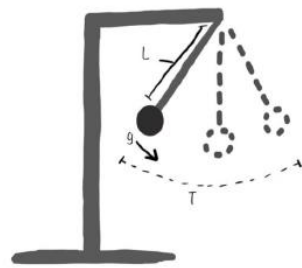

FIG. 2. **Greek mathematician Archimedes used a geometrical approach by drawing a hexagon inside and outside of a circle and doubling the number of sides until he reached a 96-sided polygon.**

The ancient Egyptians developed a 365 day solar calendar and by using a sexagesimal time system with the base number 60 it allowed time to be split into many even fractions. By the French Revolution the invention of mechanical clocks would help define the second as " 1/86,400 of a mean solar day," and based on this value the meter would be determined as "the length of a pendulum with a half-period of one second at standard gravity." Thus, we determined our value for the meter at the same time we determined our value for the acceleration due to Earth's gravity. Upon using the equation that describes the half-period of a pendulum, if T and L are both set as "one", the acceleration due to Earth's gravity must be represented by a value of " π^2 m/s^2".

$$\text{Half-Period of a Pendulum} = \pi \sqrt{\frac{\text{Length of a Pendulum}}{\text{Acceleration due to Earth's Gravity}}}$$

$$T = \pi \sqrt{\frac{L}{g}}$$

$$g = \pi^2 \ m/s^2$$

FIG. 3. Upon using the equation that describes the half-period of a pendulum, if T and L are both set as "one", the acceleration due to Earth's gravity must be represented by a value of " π^2 m/s ^{2}".

Due to variations in gravity on Earth's surface, this pendulum approach often led to discrepancies determining the value of length and instead, a prototype meter bar was constructed as "one ten-millionth of the distance from the Earth's equator to the North Pole, measured on the meridian through Paris." Because of this, values of length and time were now arrived at independently of one another and as a result, Earth's gravity would represent acceleration in terms of the prototype meter bar length, which is why today " g " is considered 9.8066 m/s 2 rather than π^2 m/s ^{2}. Upon combining this Pendulum Equation with Newton's Second Law and Einstein's Equivalence Principle, the author found that something amazing happens when the unit values for time, length, force and energy are all set to "one" (FIG. 4).

FIG. 4. The speed of light should be defined as "exactly 299,792,458 meters per second in a vacuum, when values of length and time are determined at a gravitational field strength of π^2 m/s ^{2}".

Results and Discussion

The expansion of our universe best described by Hubble's Law compliments this theory and as a result it may offer new insight as to the origin of length, mass and time. He found that the ratio between the radius of our visible universe (45.7 billion light years) and the Hubble Distance (14.4 billion light years) is a striking 3.17, less than 1% from the value of π. He believes this is an indicator as to the creation process. The recent 2017 discovery of "time crystals" has unveiled a new form of matter that provides evidence of breaking time-translation symmetry (Whereas normal three-dimensional crystals have a repeating pattern in space but remain unchanged with respect to time, time crystals repeat themselves periodically in time as well, changing from moment to moment never reaching thermal equilibrium). He believes upon embracing unit values that properly express the speed of light's relationship with π, time crystals will serve as mathematical proof that the creation is a continual process. Werner Heisenberg's uncertainty principle states that the energy associated with a photon would disrupt any act of measurement. Thus, at this small scale level complementary variables such as position and momentum, rotation and angular momentum, or time and energy, cannot both be determined [5-8].

Conclusion

As Maxwell's equations demonstrated that all electromagnetic waves travel at the same constant speed of light and Planck provided evidence through his proportional constant "h" that the energy of these waves exists in incremental amounts; Einstein determined that light behaves both as a wave and as a massless particle. At the fundamental limit in which the frequency of light waves correlates to an incremental amount of energy, the infinite power of c must reach a breaking of symmetry and he believes it results in the creation of time and energy. Through investigating these great truths and by writing and illustrating A Picture Book For Our Universe, the author hopes to inspire peace and prosperity for all people.

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