

# The formula $e=mc^2$ , the Planck units and the speed of light

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## Abstract

The formula  $e=mc^2$  is maybe the most famous formula of the world. The Planck units are the fundamental units of Physics. The speed of light is a fundamental constant in physics.

Is there a connection between them? And what could a connection between them tell us? The following paper shall answer this question.

The speed of light is a fundamental constant in physics. Its value in meters is exactly (per definition) 299.792.458 meters. The problem with this value is that the meter is a unit designed by humans and is not based on physical constants or values. If there has been chosen another unit designed by humans as the meter it would be another value. So the value of the meter is very arbitrarily unit.

Different from units chosen by humans are the Planck units.

They are fundamental units in physics based on the smallest values of distance, time and so on.

In Planck units the speed of light is exactly 1 (1 Planck distance/1 Planck time) based on physical constants/values.

If we set this speed of light in Planck units into the formula  $e=mc^2$  the following equations can be set:

1.  $e=mc^2$
2.  $e=m*1^2$
3.  $e=m*1$
4.  $e=m$

$e=m$  shows us the equivalence of energy and matter directly.

Energy is mass.

Mass is energy.

## Result

In this paper the equivalency of energy and mass could be shown directly and simplified.