

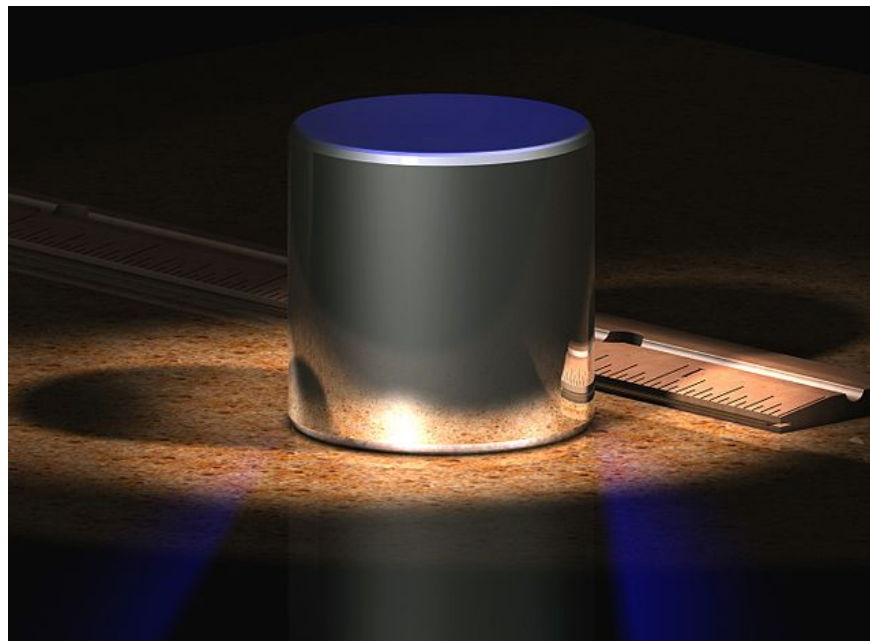
Will the Kilogram mass unit be redefined in 2018?

The calculation of a kilogram will be changed by using the Planck constant.

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1. Concussion conclusions: In addition to 3 solid, liquid, water gas, there is a fourth state
2. Physicists create matter with "negative mass"

Recently, the National Institute of Standards and Technology - NIST has found the most accurate value of this Planck constant. This enables the Science and Technology Data Commission to give an accurate definition of 'one kilogram' in 2018.



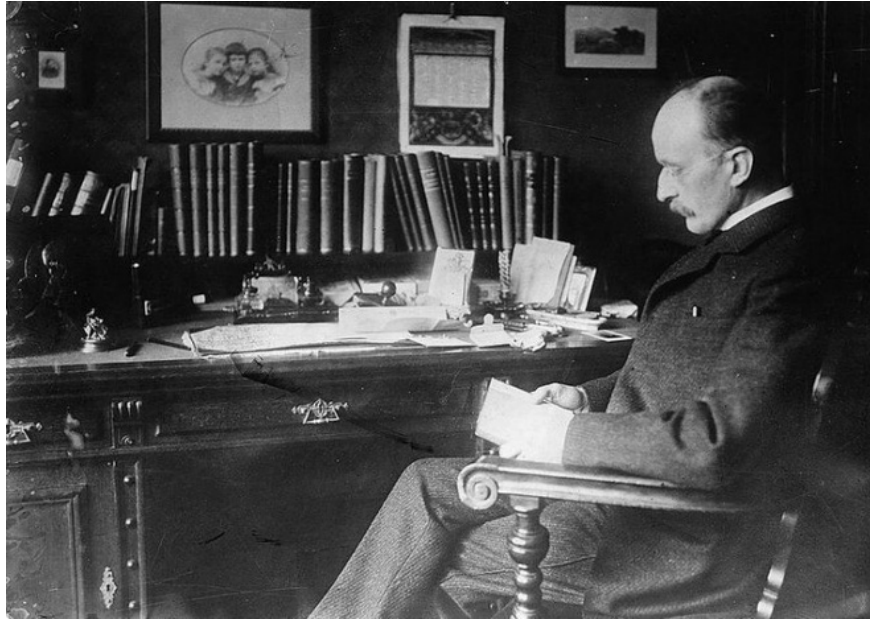
Prototype International Kilogram.

Specifically, NIST introduced the new Planck constant value of $6.626069934 \times 10^{-34} \text{ kg} \cdot \text{m}^2 / \text{s}$, replacing the old value of $6.62607004 \times 10^{-34} \text{ kg} \cdot \text{m}^2 / \text{s}$.

Scientists used the 'Kibble balance' Kibble balance machine to calculate the new value of the Planck constant with a deviation of only 13 / 1,000,000,000, more accurately than the previous one with a deviation of 34 / 1,000,000,000.

So what is Planck's constant?

This constant is taken from the German physicist Max Planck, who seeded quantum theory about a century ago. Quantum physics is often used to calculate the energy level of particles and objects.



Max Planck - German physicist.

Planck has discovered that energy transfer always follows a certain amount. By measuring the amount of heat radiation emitted when the atoms in matter vibrate, he determines the frequency of the waves produced by this phenomenon will be the number of times a constant is called h . We have h , $2h$ or $3h$ but never half h - h is the amount of energy we have said above.

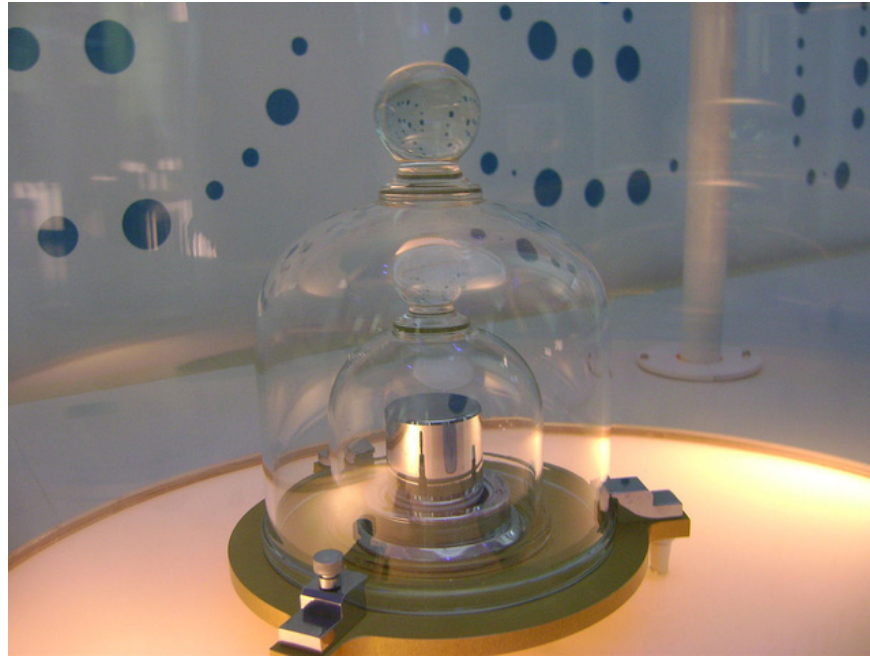
That unit h is named Planck constant. If we take the Planck constant multiplied by the frequency of a wave, we can find energy in that wave. Thanks to Einstein we know that energy and mass always come together so we can get Planck's constant to describe the mass of an object.

Up to this point, only the kilogram unit is defined by a specific object. It is the International Prototype Kilogram (IPK) Prototype or 'Le Grand K', a round cylindrical solid block of 39 mm diameter, 39 mm high, 90% platinum and 10% iridium, in a safe in France.

Over a long period of time, the mass of this standard kilogram is no longer exactly the same as the atom could fall, but it could also be added. Therefore, we cannot use IPK as a standard measurement for a kilogram.

In addition, there is another reason that using IPK as a standard for a kilogram is already obsolete. All other physical quantities have had mathematical constants for definition.

1. Ampere will be defined by the fundamental charge, ie the charge of the electron and photon.
2. Kelvin will be defined by the Boltzmann constant.
3. Mole will be defined by Avagadro constant.



Le Grand K. - Le Grand K.

We can take the specific atomic number of an element to give a definition of a kilogram to a norm. And that is Planck's constant.

The Kibble balancing device consists of a heavy weight placed on a core-mounted rack mounted in a magnetic field. When power is applied to this core, an electric current creates another magnetic field that pushes the mass of the weight. Scientists will use special operations to measure the current and measure the movement of the stand when there is and no weight to produce the Planck constant.



Kibble balance device.

Stephan Schlamminger, the head of the study, said they had three trials with a deviation of less than 20 parts per billion, while at least three trials with a deviation of less than 50 parts per billion and one deviation below 20 parts 1 billion to determine the correct number

Scientists at NIST hope that, with these newer and more accurate numbers, the new meaning of 1 kilogram will be approved and recognized by the community next November.

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