

'3D time' - new concept could be key to 'theory of everything'

A new study from the University of Alaska Fairbanks suggests time has three dimensions, while space is merely derivative. The theory accurately reproduces particle mass and makes testable predictions, opening up new avenues for a 'Theory of Everything'.

A new study from the University of Alaska Fairbanks (UAF) has proposed a bold hypothesis: the true foundation of the universe is not spacetime, as physics currently believes, but time — and time has three dimensions. Space, in this view, is merely an 'emergent' element of the multidimensional structure of time, not its root element.

Six-dimensional universe: 3 time dimensions + 3 space dimensions

While standard physics combines **one time dimension** with **three space dimensions**, the study published in *Reports in Advances of Physical Science* (April 21) describes a **six-dimensional structure** consisting of three time dimensions and three space dimensions.

According to the authors, the need for three dimensions of time stems from the way the universe operates on three scales:

1. **Extremely small** (Planck level in quantum mechanics),
2. **Particle interactions** (quarks, electrons, neutrinos...),
3. **Large-scale cosmology**.

These three scales are associated with the three generations of elementary particles known to physics. And interestingly, the mathematics in the new model shows that the mass differences between generations of particles can be explained directly from the structure of... time.

The most remarkable point is that the "3D time" model is not just abstract mathematics. It accurately reproduces the masses of many measured elementary particles, specifically including:

1. Top quark: calculated 173.21 ± 0.51 GeV (compared to measured 173.2 ± 0.9 GeV).
2. Muon: match 105.6583745 MeV, almost identical to the actual measurement.
3. Electron: 0.5109989461 MeV, exactly matches the known value.

Not stopping there, the model also makes specific predictions for verification:

1. Neutrino mass: $\nu_3 \approx 0.058$ eV, $\nu_2 \approx 0.0086$ eV.
2. New particle resonances at around 2.3 TeV and 4.1 TeV.
3. Small variation in gravitational wave speed, $v/c \approx 1.5 \times 10^{-17}$.

Particle collision experiments, gravitational wave detectors, and cosmological surveys in the 2025–2030 period could well test these numbers.

Besides, the model also "solves" many long-standing mysteries of physics such as:

1. **Three generations of particles** emerge naturally from time symmetry.
2. **The violation of symmetry in the weak interaction** (an important property of elementary particles) can be explained as a geometric consequence of time.
3. **Quantum gravity**, which is often the "infinite problem", in this model gives finite results. Einstein's **general relativity** remains a special case, where the two dimensions of time are considered negligible.

In other words, this theory does not negate Einstein, but rather expands the foundation to reconcile **quantum mechanics** and **relativity** — two pillars of modern physics that are 'incompatible'.

"Theory of Everything" – a not-so-distant prospect?

The grand goal of science is to construct a '**Theory of Everything**' to explain all phenomena in the universe. With calculations that match experimental data and testable predictions, "3D time" could be a serious candidate, not just a science fiction idea.

Of course, this hypothesis is still outside the mainstream of physics and will require many years of testing to confirm. But once the mathematics are rigorous and the predictions can be tested, scientists have reason to believe that this could be a real step forward in the quest to explain the universe.

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