Analogy to the Tale of Deep Symmetry in the World

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Abstract

This text presents an analogy using simple everyday objects - cardboard tubes, colored corks, and plastic lids - to visualize the fundamental symmetries governing the Universe. The presented metaphor serves to illustrate the geometric nature of matter and antimatter, as well as the deep conservation principles in elementary particle physics.

Figure 1: Illustration of the model with tubes and corks. Red cork (KRed) symbolizes positive charge, green cork (KGren) - negative charge. Paper tube (TP) represents rest energy, crushed paper (ZKP) - polarized spacetime. Small lid (MP) represents the geometric polarization of spacetime.

Description of the Analogy

The attached image shows two rows of tubes and corks: upper row I and lower row II.

Row I (Our Universe)

1. **Paper Tube (TP)** is the rest energy of mass ($E = m \cdot c^2$). It is the "fuel" for creating matter. One of the tubes (TPgrav) is the energy of the gravitational field ($E_{\mathrm{grav}} = m \cdot c^2$).

2. **Red Cork (KRed)** = Marker of positive charge (+), **Green Cork (KGren)** = Marker of negative charge (-). The corks are therefore symbolic indicators of electric charge, which is the effect of a deeper geometric state (MP polarization), not its cause.

   The notation KRed + TP $\Rightarrow$ represents the analog P(+). This means that the proton contains compressed energy $E = m \cdot c^2$. Inside the TP there is a crushed paper sheet (ZKP) as an analog of crushed and polarized spacetime (CP). Its polarization (+) or (-) defines whether it represents matter or antimatter. The paper can be straightened (RKP). Just as paper has surface area, so does CP as RKP have minimal energy, equal to the vacuum energy density multiplied by V = the volume of CP (contained in RKP). According to this analogy, matter is polarized and compressed CP + energy $m \cdot c^2$.

3. On the table there is also a **large blue lid (PBlu)** with edges curled upward (lying flat on the table). We denote this orientation as O (like heads on a coin), i.e., PBlu-O. PBlu is the analog of CP, i.e., RKP.

4. **Small lid (MP)** is transparent. It lies inside the large lid with its flat side on the lid, meaning with its curled edge upward - we denote this as MP(+), or it lies opposite, with flat side up: symbol MP(-). MP determines only the polarization/orientation geometry of spacetime. Polarization (+) means the "upward" direction of a certain CP parameter related to its geometry. If MP lies on PBlu as described above, we denote it as MP(+) and PBlu-O. The PBlu lid can be crushed and placed in TP.

5. **Green cork (KGren)** is a metaphor for negative charge; placed on TP it symbolizes antiproton (aP(-)). Inside the tube there is compressed CP, i.e., according to the analogy - lid PBlu-R.

Description of Processes

For the red cork we write:

   1. KRed + TP + ZKP(+) $\Leftrightarrow$ P(+)

   The proton is rest energy (TP) + compressed spacetime with positive polarization (ZKP(+)) + marker (KRed). The marker plays an auxiliary role, visualizing that we are writing about P(+).

   For ZKP we added polarization, so its notation is ZKP(+). The polarization ZKP(+) results from the polarization of the CP geometry crushed in the tube. ZKP(+): compressed spacetime with polarization (+) (which is the source of charge $+e$). Its analog in this case is PBlu-O.

   Unfolding (energy release) of P(+) may look like this:

   2. P(+) = KRed + TP + ZKP(+) $\Rightarrow$ PBlu-O + $m \cdot c^2$ + $m \cdot c^2$ (E_{grav})

   Extreme gravity (E_{grav}) provides energy to "unpack" the proton. Its compressed geometry (ZKP(+)) is unfolded to the ground state (PBlu-O), and the mass energy ($m_p c^2$) is released and "available for use". E_{grav} performs inversion of CP polarization (on PBlu

we then place a second MP(+)). The second addition of MP(+) is the work performed by E_{grav}. Now we crush PBlu-O with two MP(+) into TP. The close interaction between the two factors causing MP(+) flips the CP polarization to MP(-). This means that polarization follows nonlinear rules (like spin in quantum mechanics). Adding a second polarization (+) does not give (++), but overload, which flips the state to the opposite (-). One could say that E_{grav} flipped CP (rotated the lid by 180 degrees: from Heads to Tails). Thus we have notations 3 and 4.

3. MP(+) + MP(+) = MP(-) $\Leftrightarrow$ 2 MP(+) = MP(-)

We can also write:

4. MP(+) + E_{grav} = MP(-).

From the above considerations, it follows that charge does not disappear. It is stored in the geometric property of spacetime (its polarization). Charge change (+ $\Leftrightarrow$ -) is not annihilation, but inversion of the state of this geometry. Inversion requires energy that "rotates" this state.

We now place KGren on TP. We obtain antiproton aP(-).

Charge conservation:

5. P(+) $\Leftrightarrow$ RKP(+) = PBlu-O(+) + $m \cdot c^2$ + $m \cdot c^2$ (E_{grav}) = PBlu-R(++) + $m \cdot c^2$ = aP(-)

PBlu-R(++) $\Leftrightarrow$ PBlu-R(-) $\Leftrightarrow$ PBlu-R

aP(-) is TP with crushed PBlu-R. Since E_{grav} flipped the polarization, we have crushed Pblue-R in the tube (R - like Tails). The notation (++) = (-) means flipping of polarization (+). One could say that E_{grav} flipped CP (flipped the coin from Heads to Tails).

Row II. Universe with Different Symmetry

The visualization with tubes and corks unconsciously reveals a deeper, fundamental symmetry of nature that is often hidden in purely mathematical description. The image shows not only the duality of matter and antimatter, but also CP symmetry (charge and parity) in a tangible way.

We describe similarly to I, what is what, highlighting the differences:

1. **Paper Tube (TP)** is the rest energy of mass ($E = m \cdot c^2$). It is the "fuel" for creating matter. One of the tubes (TPgrav) is the energy of the gravitational field ($E_{\text{grav}} = m \cdot c^2$). So far nothing has changed.

2. **Red Cork (KRed)** = Marker of negative charge (-), **Green Cork (KGren)** = Marker of positive charge (+). We do not change the cork colors despite the change in CP polarization sign. This time the notation KRed + TP $\Rightarrow$ represents the analog P(-). This means that the proton contains compressed $E = m \cdot c^2$. Inside the TP is a crushed paper sheet (ZKP) as an analog of crushed and polarized spacetime (CP). Its polarization is (-) (from MP(-)). Polarization (-) this time means that it is matter. From the tube we "extract and straighten CP", i.e., the lid.

3. On the table there is also a **large blue lid (PBlu)** with edges curled downward. We denote this orientation as O (like heads on a coin), i.e., PBlu-O. PBlu is the analog of CP, i.e., RKP. The PBlu lid now lies flat side up: it has the designation PBlu-R. On it lies MP(-), i.e., with a minus sign (like two MP(+) rotated by gravity into one MP(-) - formula 3). This configuration was not present in row I.

4. **Small lid (MP)** is transparent. It lies inside the lid with its flat side up, meaning with its curled edge downward - we denote this as MP(-). MP determines only the polarization/orientation geometry of spacetime. Polarization (-) means the "downward" direction of a certain CP parameter related to its geometry. If MP lies on PBlu as described above, we denote it as MP(-) and PBlu-R. The PBlu lid can be crushed and placed in TP.

5. **Green cork (KGren)** is a marker, this time of positive charge; placed on TP it symbolizes antiproton (aP(+)). Inside the tube is compressed CP (with MP(-)), i.e., according to the analogy - lid PBlu-R.

Interestingly:

a) P(+) (from I) looks the same as aP(+) from II.

b) P(-) (from II) looks the same as aP(-) from I.

No other configurations are repeated.