

# Missing Pieces for Quantum Mechanics

The forth Spiritual Physics Research Series Discussions

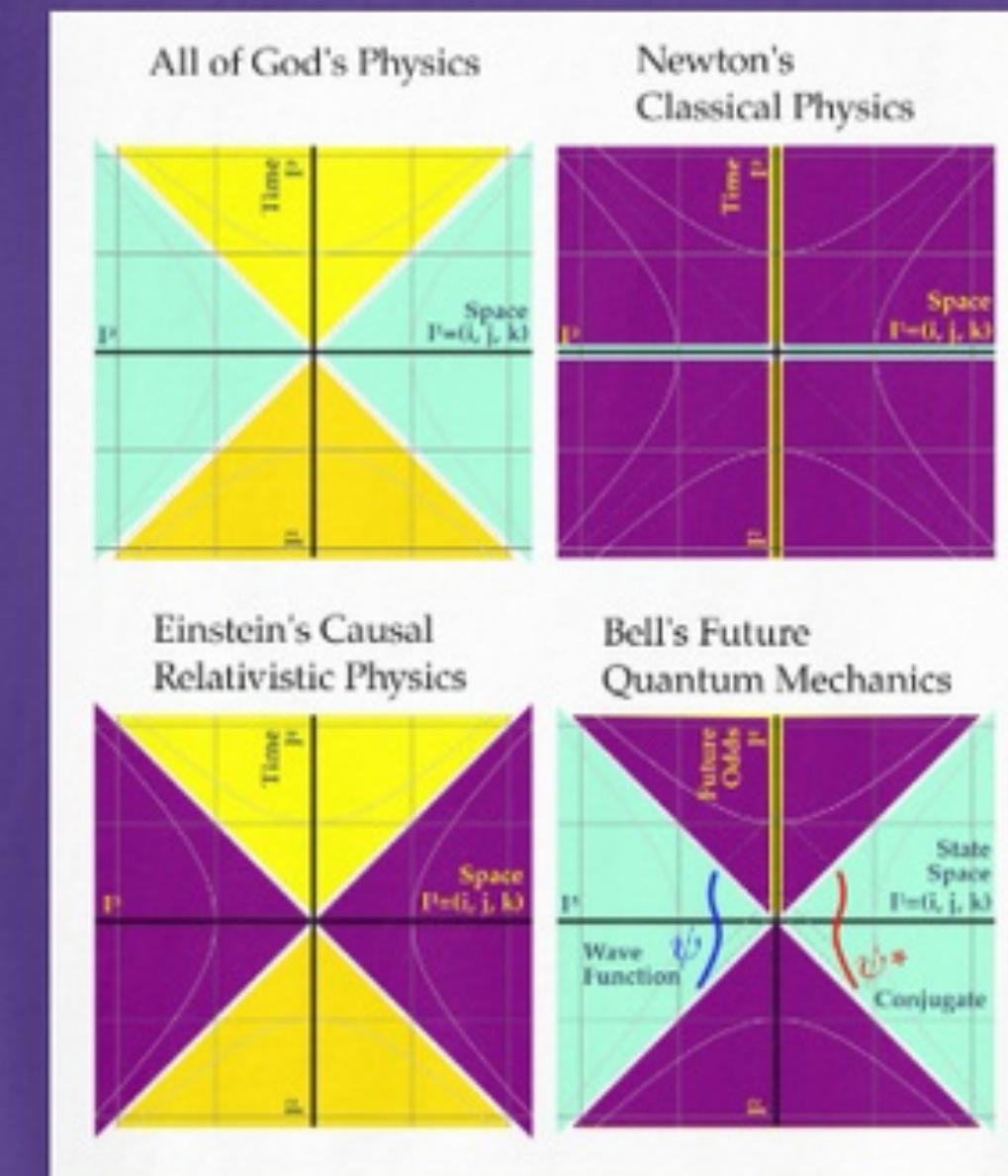
Final Friday, April 30, 2021

First Church Unitarian of Littleton, MA

Spiritual framing by Rev. Lara Hoke

Physics research slide presentation by Doug Sweetser  
Slide design by Elle Sweetser

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Physics research slide presentation by Doug Sweetser



A puzzle cannot be solved  
when pieces are missing

# Outline for tonight's slides

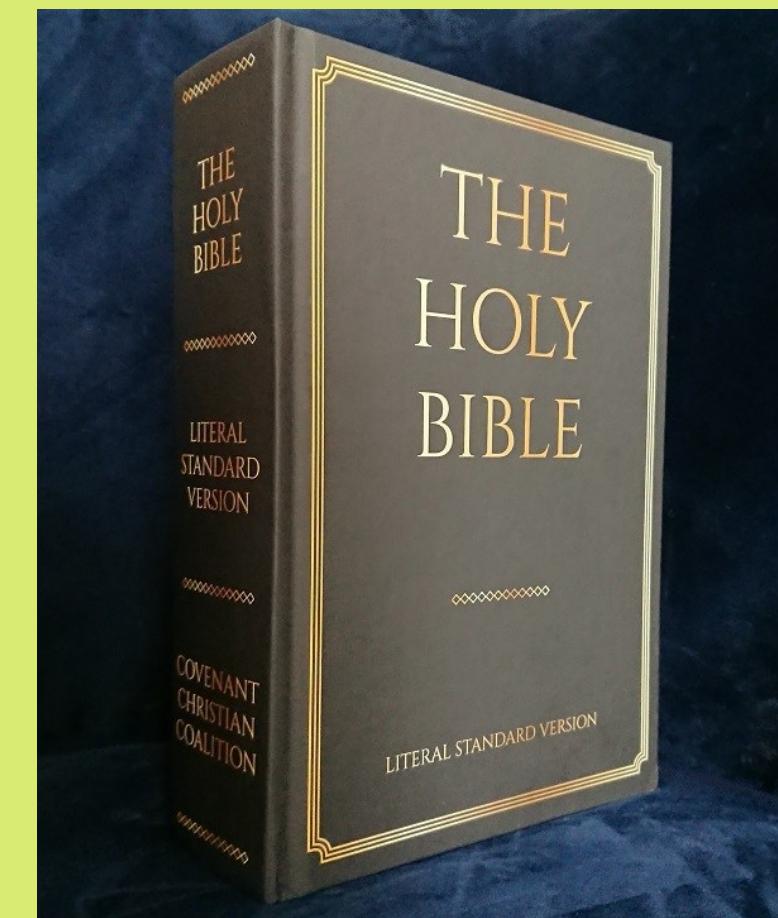
Review our progress

Discuss **God**

The mystery of the mystery  
of quantum mechanics

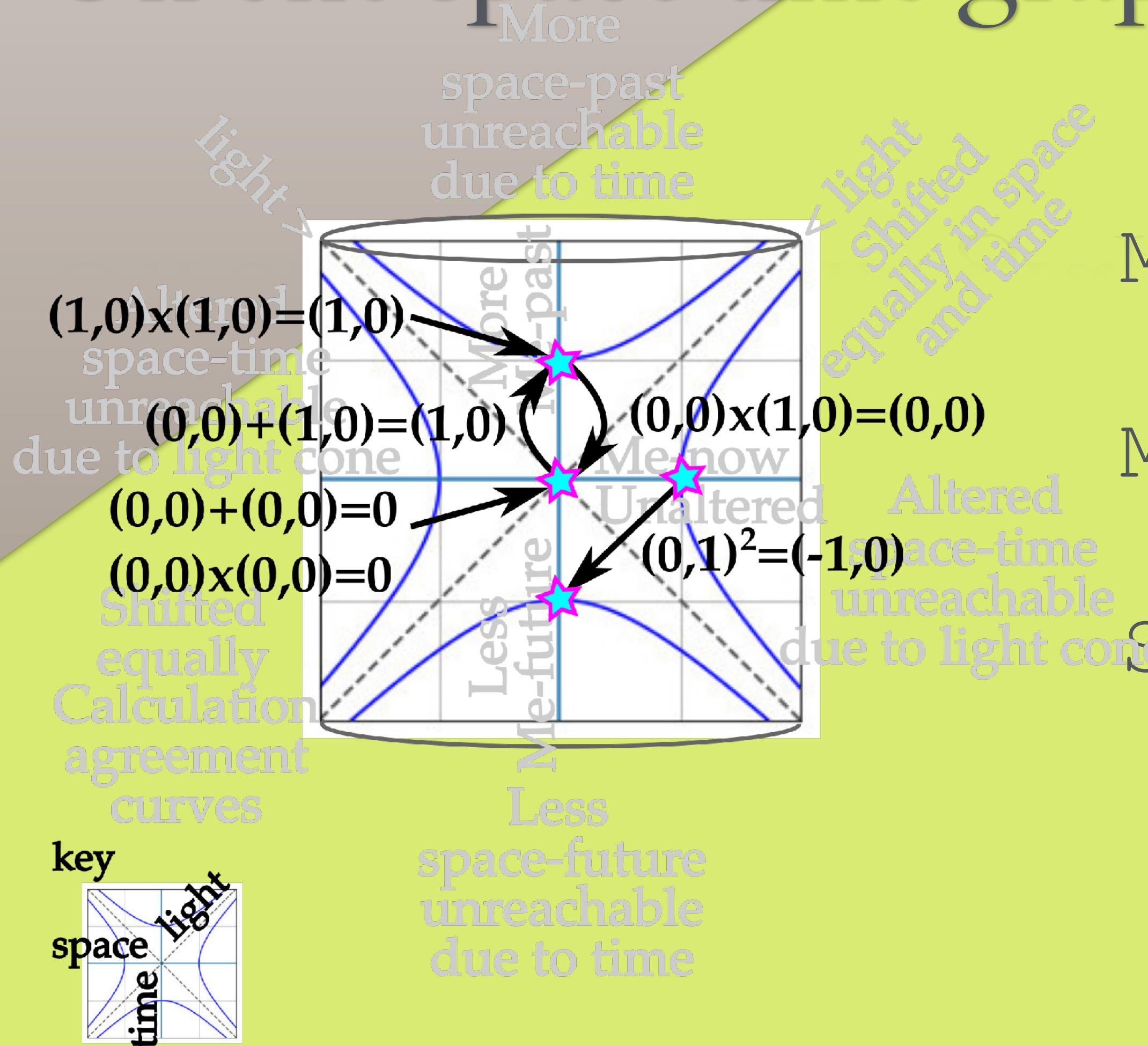
Look at the t-shirt

Two Schrödinger's Cats videos



# The 5 most important equations in physics

## On one space-time graph

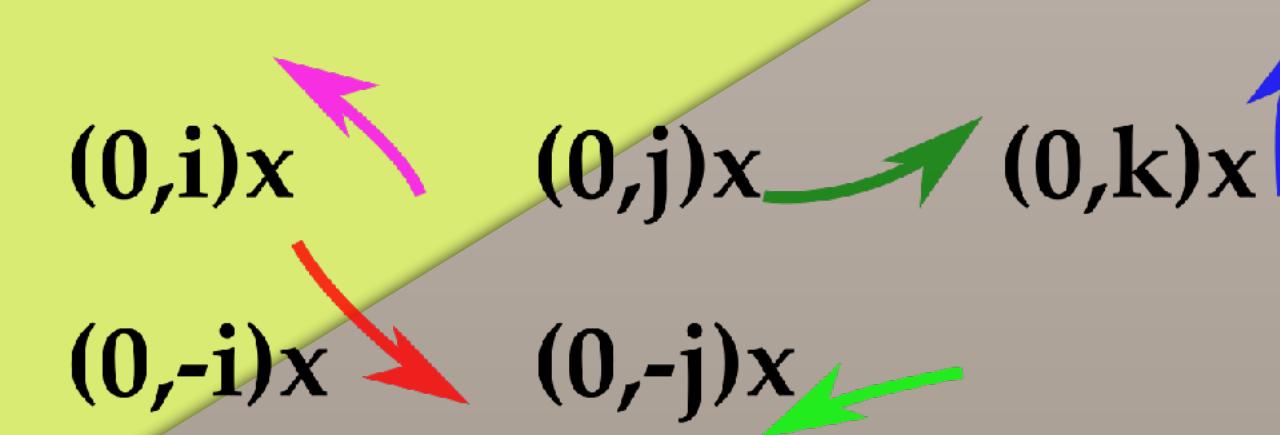
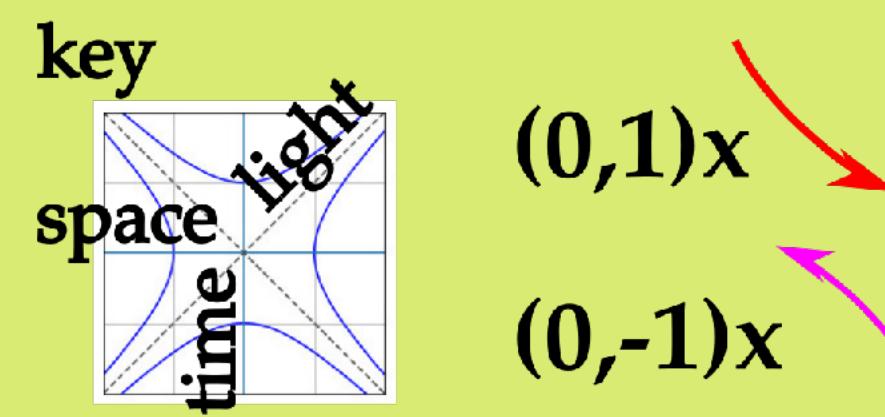
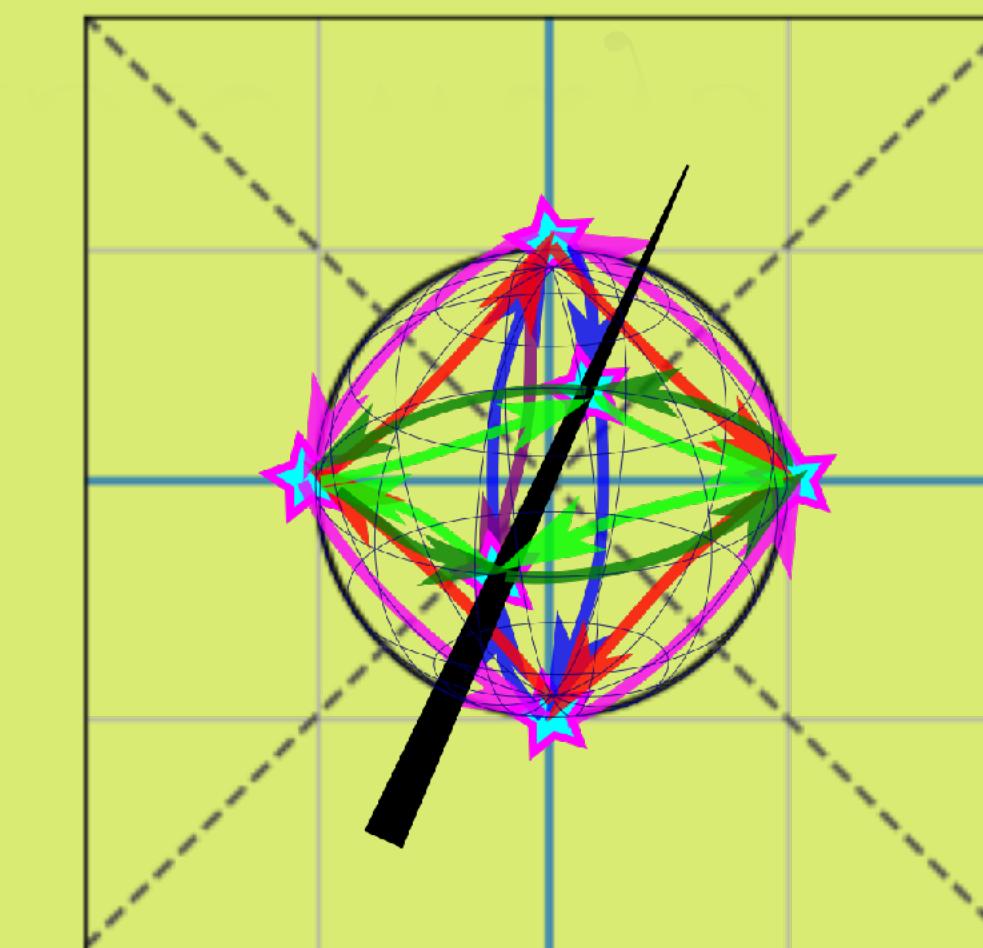
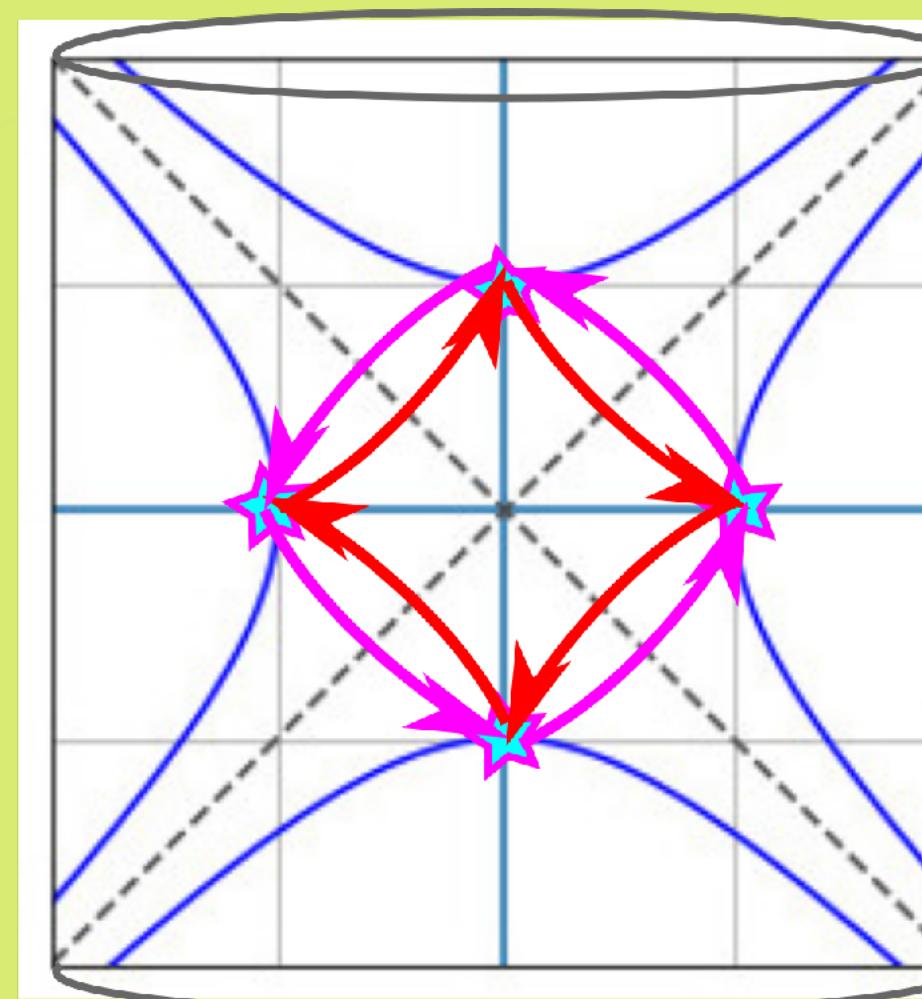


Me-now remains Me-now

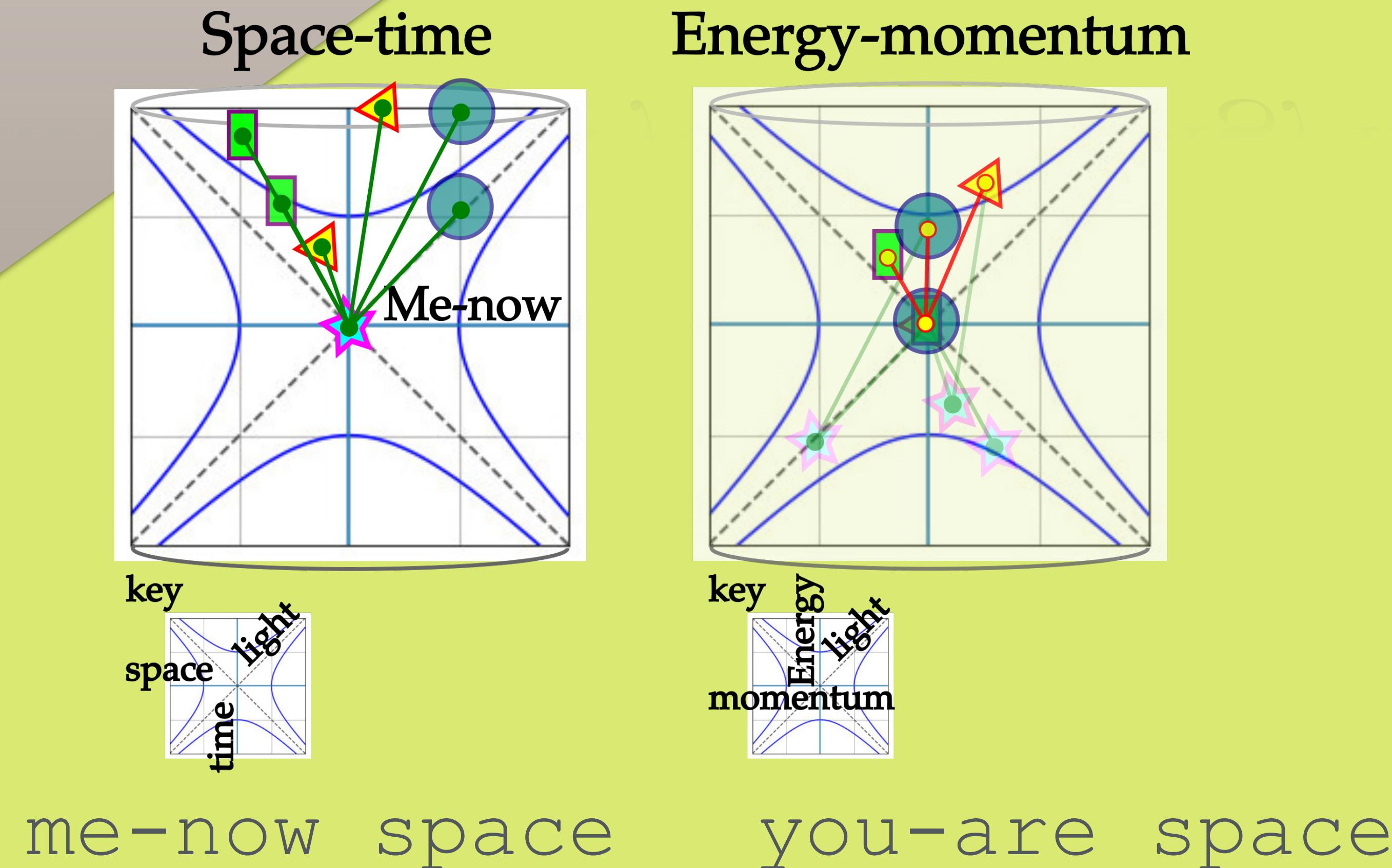
Me-now remembers the past

Square there-now to here-future

Multiply by 3 there-nows spins the world around me-now in all possible ways



To describe things, we need both me-space  
(space-time) and you-are (energy-momentum)



Put this all together and it is too much

space-past  
unreachable  
due to time

$(1,0) \times (1,0) = (1,0)$

$(0,0) + (1,0) = (1,0)$

$(0,0) + (0,0) = 0$

$(0,0) \times (0,0) = 0$

More space-past

Me-now

Unaltered

Less space-future

More space-future

Altered space-time  
unreachable  
due to light cone

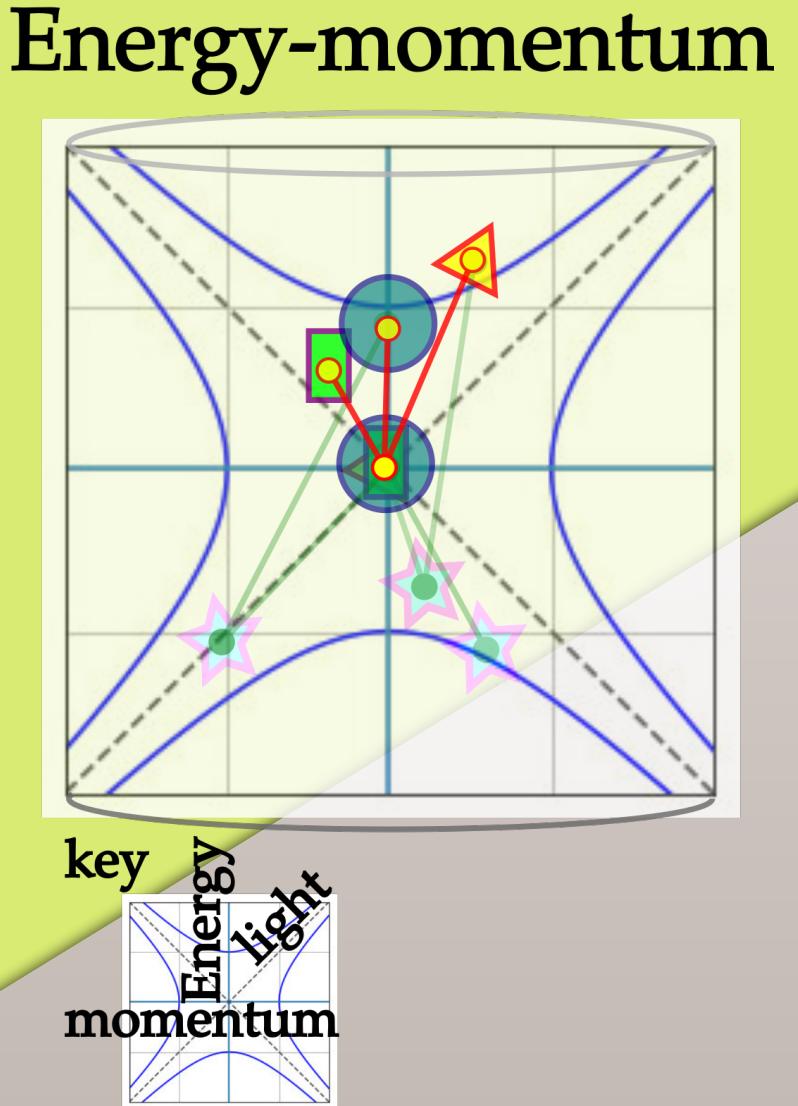
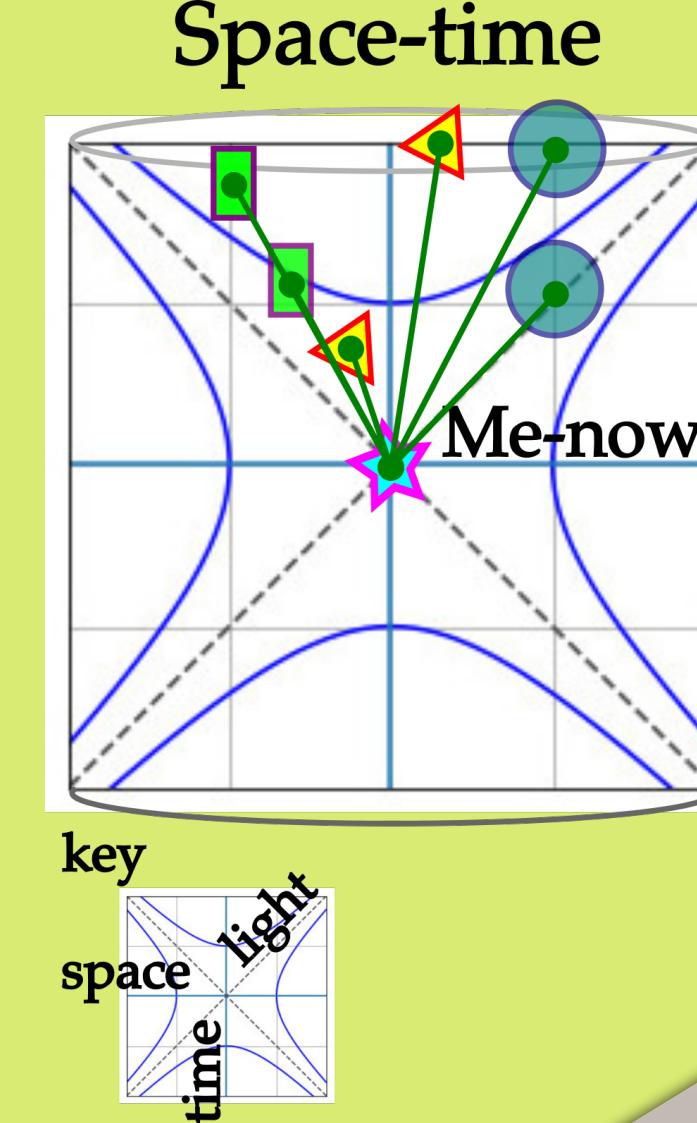
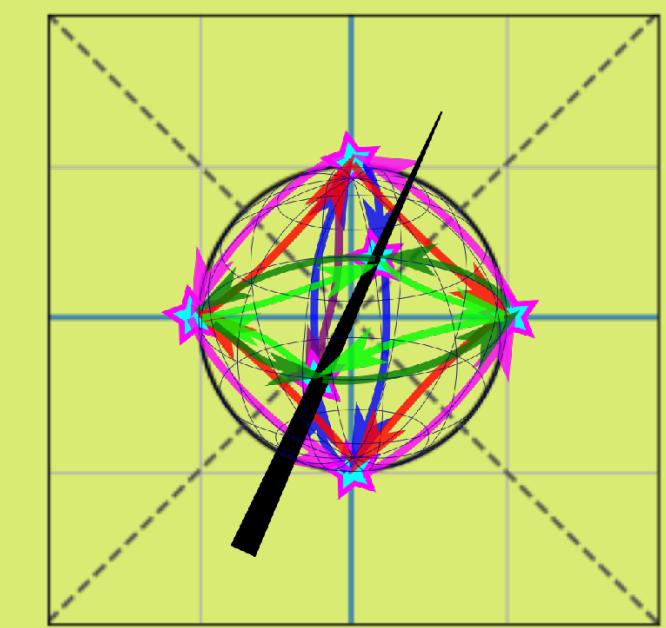
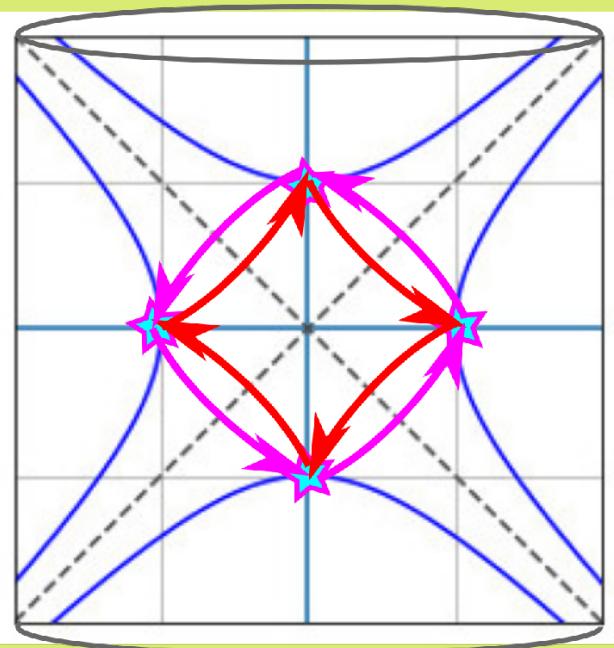
Shifted  
equally in space  
and time

Calculation  
agreement  
curves

key

space time

light



# Numbers 3D space-time Me-space, you-space

# Imagine $10^{23}$ returning-momentum-energy tops!

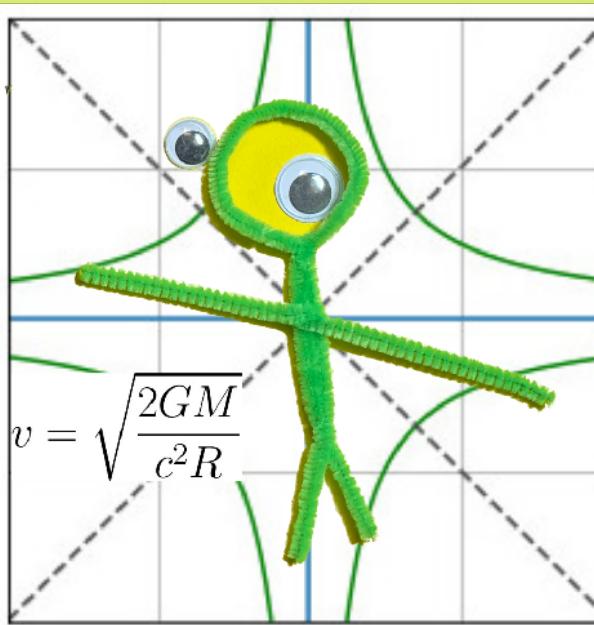


All the random pointing would cancel

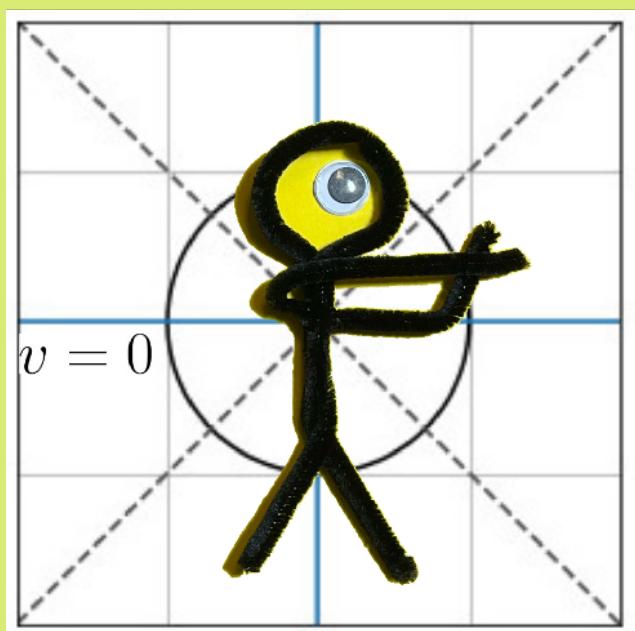
All the energy would add

The new idea:  
Inertia is randomized  
returning-momentum-energy

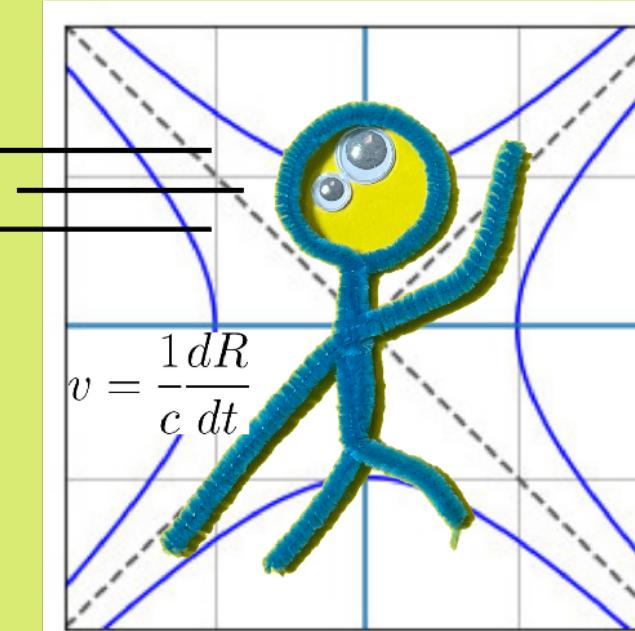
# Speedy relativity uses the velocities you see. Gravity relativity uses escape velocity, calculated



High Guy is  
Gravity relativity



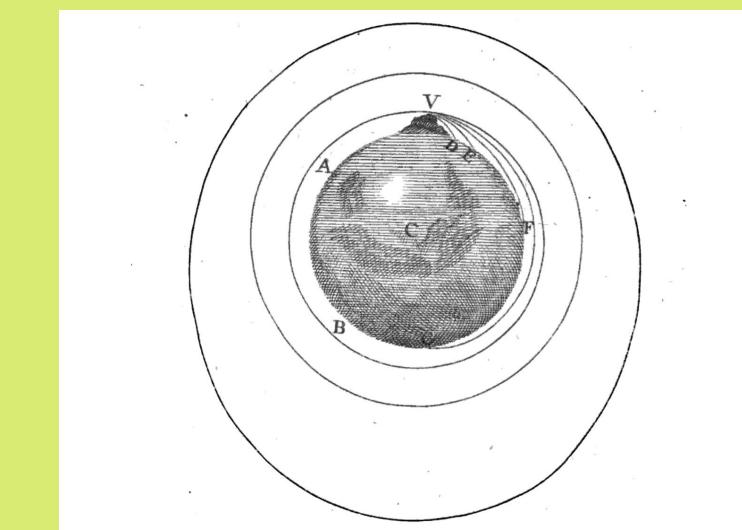
Me here-now  
Precise!



Zippy You is  
Special relativity

Same hyperbolas, rotated by 45 degrees

$$v_{esc} = \sqrt{2 \frac{GM}{c^2 R}}$$



$$\begin{aligned} dt'^2 &= dt^2 - dx^2 \\ dt'^2 &= dt^2 - dx^2 \\ &= \frac{1}{\gamma^2} dt^2 - \gamma^2 dx^2 \\ &\approx (1 - \beta^2) dt^2 - (1 + \beta^2) dx^2 \end{aligned}$$

$$\text{if } \beta = \sqrt{2 \frac{GM}{c^2 R}}$$

$$dt'^2 \approx \left(1 - 2 \frac{GM}{c^2 R}\right) dt^2 - \left(1 + 2 \frac{GM}{c^2 R}\right) dx^2$$

Review complete!

# God, your Kendi definition? (His Antiracist book chapters start with definitions)

Polytheist - show profound respect (hard)

Old testament - harsh male

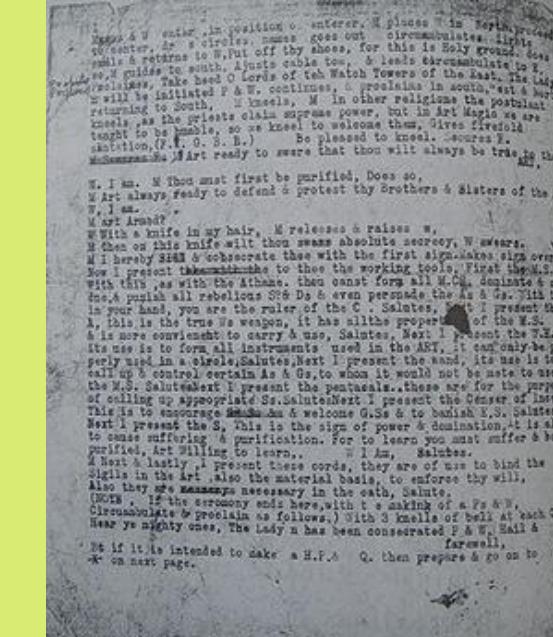
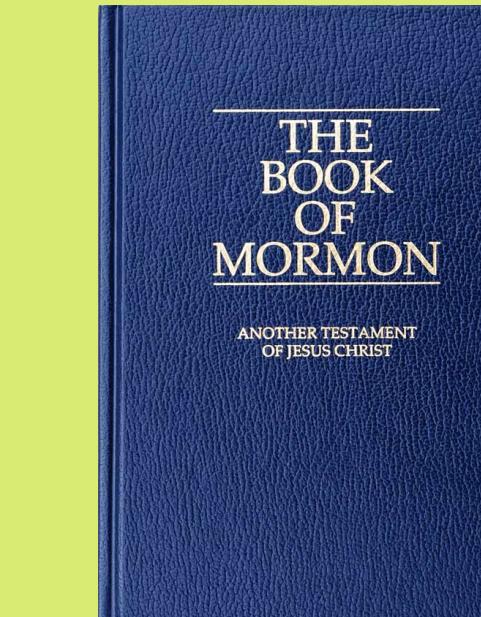
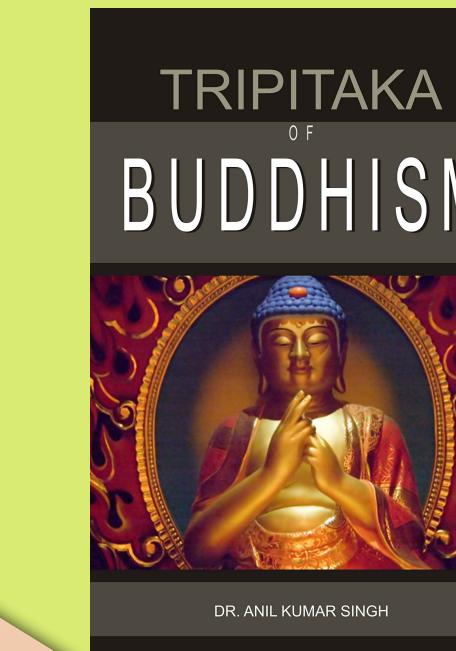
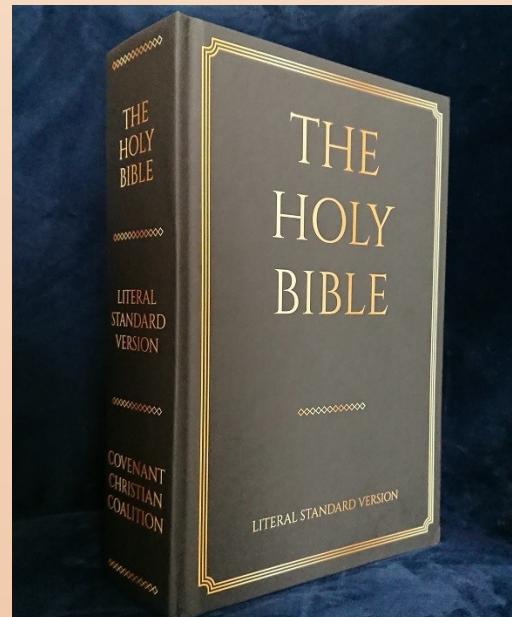
New testament - loving male (if you accept)

Koran - the one God that is all and too much

Tripitaka - Goal of enlightenment, not God

The Book of Mormon - Jesus in the USA

The Book of Shadows - diverse pagan covens



# My own personal definition

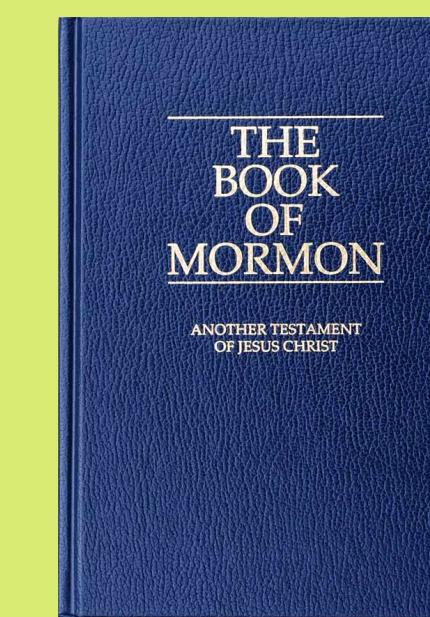
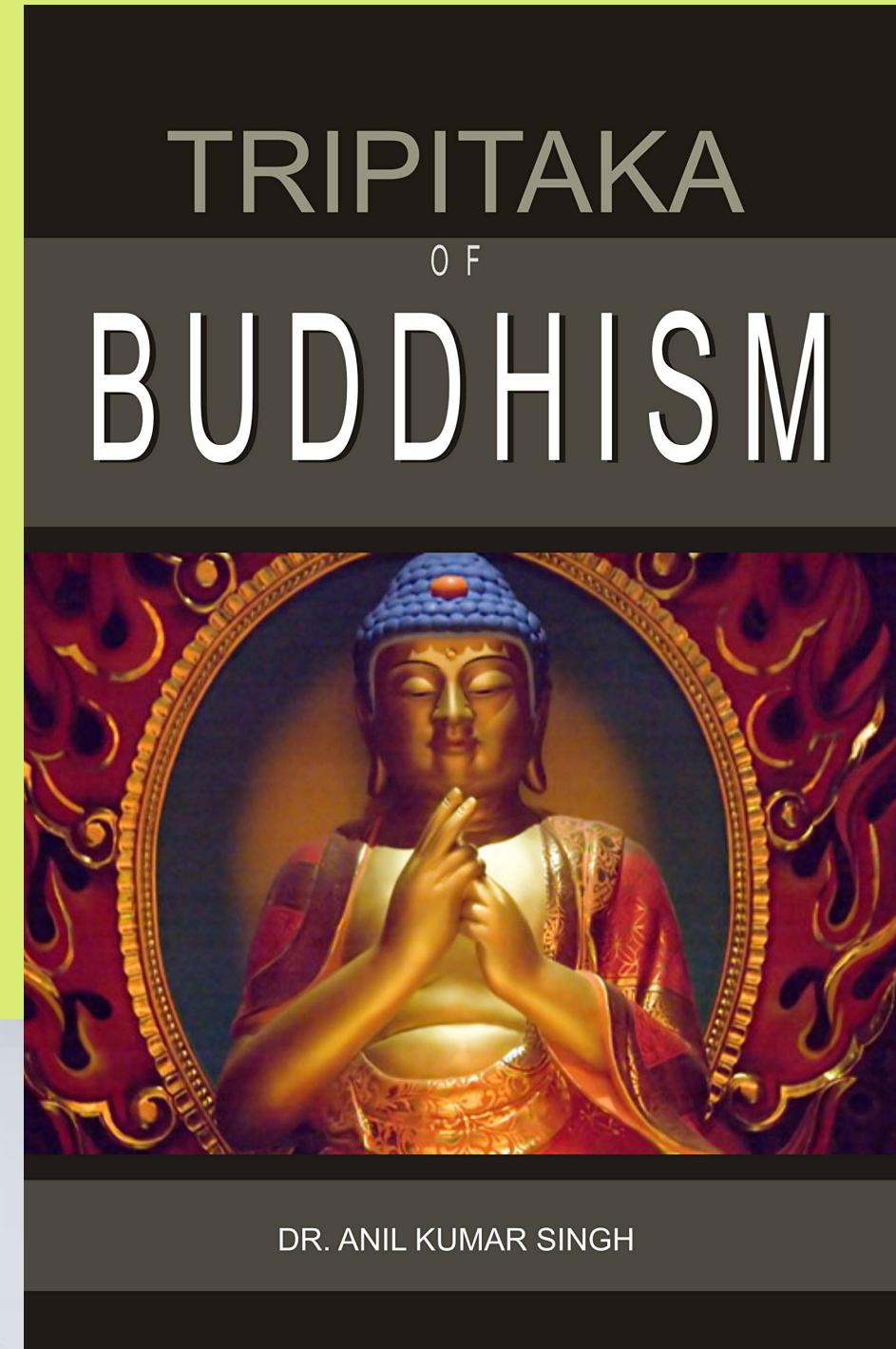
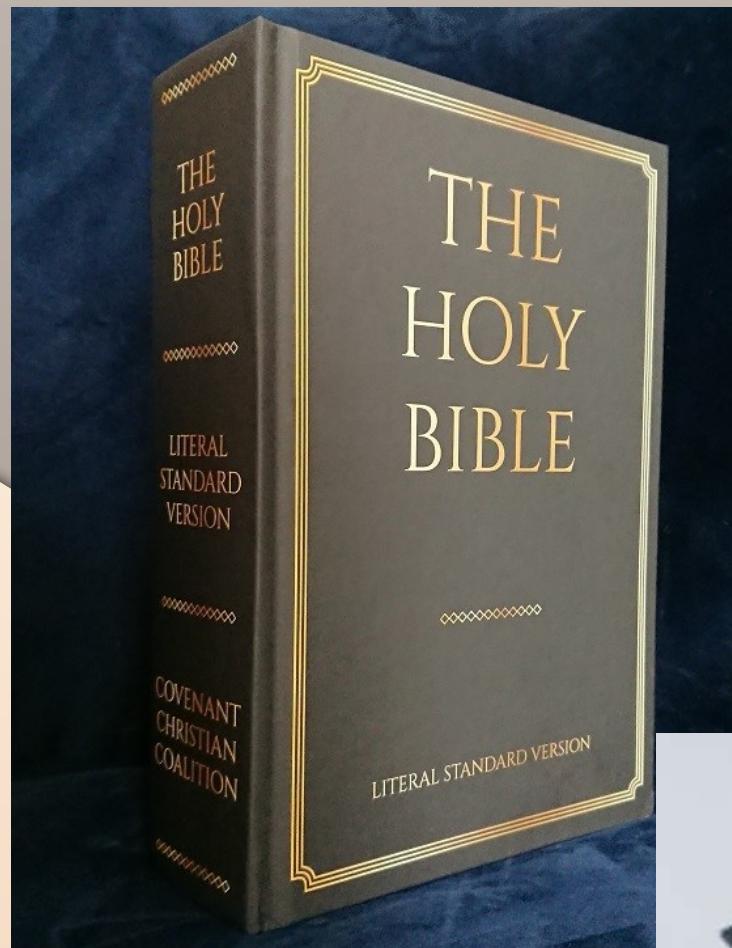
God is every event that ever was anywhere-when  
and

Every event ever that will be anywhere-when  
And

The only door between the past to the future  
Is through you and me

Physics study is close to  
this definition of God!

As a Unitarian Universalist with this definition  
of God, I embrace the diversity of God



Mages & Q enter, in position of enterer. M places T in Dept. proceeds  
to center. In a circle, names goes out circumambulates, first  
small & returns to N. Put off thy shoes, for this is Holy ground. Does  
so. M guides to south. Avante cable tow, & leads circumambulate to E.  
proclaims. Take heed O Lords of teh Watch Towers of the East. The Lady  
will be initiated P & W. continues, & proclaims in south, "I & my  
returning to South, M kneels. M in other religions the postulant  
kneels, as the priests claim supreme power, but in Art Magis x are  
taught to be humble, so we kneel to welcome them. Gives fivefold  
salutation, (P. I. O. S. B. B.) Be pleased to kneel. -source E.

M Art ready to swear that thou wilt always be true to me

M I am. M Thou must first be purified. Does so.  
M Art always ready to defend & protect thy Brothers & Sisters of the A.  
M I am.

M Art Armed?

M With a knife in my hair, M releases & raises M.  
M Then on this knife wilt thou swear absolute secrecy, M swears.  
M I hereby SIGN & consecrate thee with the first sign.Lakes sign over  
Now I present ~~the~~ with the to thee the working tools. First the M.S.  
with this, as with the Athame. thou canst form all M.Cs, dominate & sub-  
due, & punish all rebellious Ss & Ds & even persuade the As & Gs. With thi  
in your hand, you are the ruler of the C. Salutes, Next I present the A,  
this is the true M weapon, it has all the properties of the M.S.  
it is more convenient to carry & use, Salutes. Next I present the T.L.T.  
its use is to form all instruments used in the ART, it can only be pro-  
perly used in a circle, Salutes, Next I present the hand, its use is to  
call up & control certain As & Gs, to whom it would not be safe to use  
the M.S. Salutes next I present the pentacles..these are for the purpose  
of calling up appropriate Ss, Salutes, Next I present the Censer of incense  
This is to encourage ~~manumana~~ & welcome G.Ss & to banish E.S. Salutes  
Next I present the S. This is the sign of power & domination, it is also  
to cause suffering & purification. For to learn you must suffer & be  
purified, Art Willing to learn., M I Am, Salutes.

M Next I lastly, I present these cords, they are of use to bind the  
Sigils in the art, also the material basis, to enforce thy will.  
Also they are ~~manumana~~ necessary in the oath, Salutes.

(NOTE. If the ceremony ends here, with t's making of a P & W,  
Circumambulate & proclaim as follows.) With 3 knells of bell at each  
Hail ye mighty ones, The Lady n has been consecrated P & W. Hail &

farewell,  
M on next page.

# Quantum Mechanics, your definition?

## 13 listed in the chart to choose from...

Interpretation	Year published	Author(s)	Deterministic?	Ontic wave-function?	Unique history?	Hidden variables?	Collapsing wave-functions?	Observer role?	Local dynamics?	Cou fact defi
Ensemble interpretation	1926	Max Born	Agnostic	No	Yes	Agnostic	No	No	No	
Copenhagen interpretation	1927-	Niels Bohr, Werner Heisenberg	No	Some <sup>[54]</sup>	Yes	No	Some <sup>[55]</sup>	No <sup>[56][57]</sup>	Yes	
de Broglie-Bohm theory	1927-1952	Louis de Broglie, David Bohm	Yes	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	Phenomenological	No	No	
Quantum logic	1936	Garrett Birkhoff	Agnostic	Agnostic	Yes <sup>[c]</sup>	No	No	Interpretational <sup>[d]</sup>	Agnostic	
Time-symmetric theories	1955	Satosi Watanabe	Yes	No	Yes	Yes	No	No	No <sup>[58]</sup>	
Many-worlds interpretation	1957	Hugh Everett	Yes	Yes	No	No	No	No	Yes	III
Consciousness causes collapse	1961-1993	John von Neumann, Eugene Wigner, Henry Stapp	No	Yes	Yes	No	Yes	Causal	No	
Many-minds interpretation	1970	H. Dieter Zeh	Yes	Yes	No	No	No	Interpretational <sup>[e]</sup>	Yes	III
Consistent histories	1984	Robert B. Griffiths	No	No	No	No	No <sup>[f]</sup>	No	Yes	
Transactional interpretation	1986	John G. Cramer	No	Yes	Yes	No	Yes <sup>[g]</sup>	No	No <sup>[h]</sup>	
Objective collapse theories	1986-1989	Ghirardi-Rimini-Weber, Penrose interpretation	No	Yes	Yes	No	Yes	No	No	
Relational interpretation	1994	Carlo Rovelli	No <sup>[59]</sup>	No	Agnostic <sup>[i]</sup>	No	Yes <sup>[j]</sup>	Intrinsic <sup>[k]</sup>	Possibly <sup>[l]</sup>	
QBism	2010	Christopher Fuchs, Rüdiger Schack	No	No <sup>[m]</sup>	Agnostic <sup>[n]</sup>	No	Yes <sup>[o]</sup>	Intrinsic <sup>[p]</sup>	Yes	

"I think I can  
safely say no one  
understands  
quantum mechanics"  
Richard Feynman

# Einstein was always impress with QM success, Not with the ontology- why it worked



"Quantum theory yields much, but it hardly brings us close to the Old One's secrets. I, in any case, am convinced He does not play dice with the universe." Letter to Born

"Einstein, stop telling God what to do." Bohr

# Einstein would not be happy with any of the 13 I don't embrace the diversity of QM interpretations



His objects were subtle and evolved.

We must be missing IDEAS to this day.

Interpretation	Year published	Deterministic?	Ontic wave-function?	Unique history?	Hidden variables?	Collapse without an observer?	Local dynamics?	Coupling defi
Ensemble interpretation	1927–1930	Agnostic	No	Yes	Agnostic	No	No	No
Copenhagen interpretation	1927–1952	Yes <sup>[a]</sup>	Some <sup>[b]</sup>	Yes	Yes	Yes	Yes	Yes
de Broglie–Bohm theory	1927–1952	Yes <sup>[a]</sup>	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	No	No	No
Quantum logic	1936	George Birkhoff, John von Neumann	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	Yes <sup>[d]</sup>	Interpretational <sup>[d]</sup>	Agnostic
Time-symmetric theories	1955	Satoshi Watanabe	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	No	No	No <sup>[e]</sup>
Many-worlds interpretation	1957	Hugh Everett	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	No	No	Yes
Consciousness causes collapse	1961–1993	John von Neumann, Eugene Wigner, Henry Stapp	No	No	Yes	Causal	No	Yes
Many-minds interpretation	1970	H. Dieter Zeh	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	No	Interpretational <sup>[e]</sup>	Yes
Consistent histories	1984	Robert Griffiths	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	No	Yes	No <sup>[f]</sup>
Transactional interpretation	1986	John Cramer	Yes <sup>[a]</sup>	Yes <sup>[b]</sup>	Yes	No	No	No <sup>[h]</sup>
Objective collapse theories	1990	John S. Bell, Hugh Everett III, etc.	Yes	Yes	Yes	Yes	Yes	No
Relational interpretation	2000	Howard Wiseman, Michael T. Truter, etc.	No <sup>[g]</sup>	No <sup>[g]</sup>	No	Agnostic <sup>[i]</sup>	No	Possibly <sup>[j]</sup>
QBism	2010	John C. Stapp	No	No <sup>[m]</sup>	Agnostic <sup>[n]</sup>	No	Yes	Intrinsic <sup>[o]</sup>

# A new idea: use space-time numbers as an Upgrade to complex numbers

All calculation in QM today only use complex numbers

Complex numbers have 2 parts

What ARE they physically??? NO idea

Space-time numbers have 4 parts,  
three for space, one for time

# Upgrade to complex numbers for QM talks have not gone well - the usual silence

I am a flawed spokesman

- No institutional backing
- Physicists know I am not a physicist
- Spotty training at best

8 old guys in a Zoom room for 30'  
No discussions.

I think the ideas will be repackaged by  
others some day

# Complex numbers are about space-time, where space is lumped together (my view only)

Real numbers are different from imaginaries  
Time is different from space

To reverse in time, one needs to remember  
To reverse in space, one needs a mirror

Might as well make space 3D, not 1D.

Pros: complex numbers are a tool without physical meaning

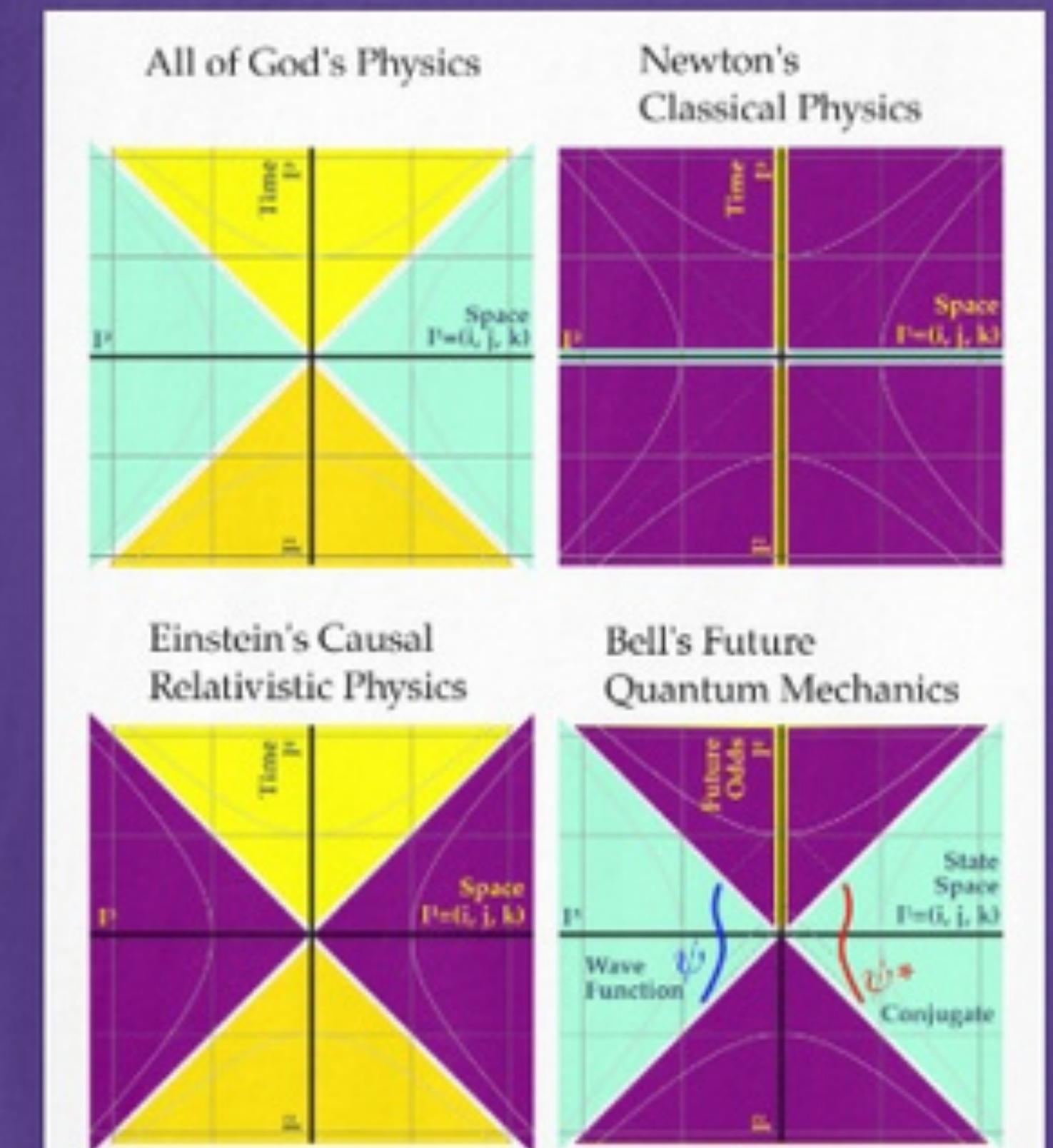
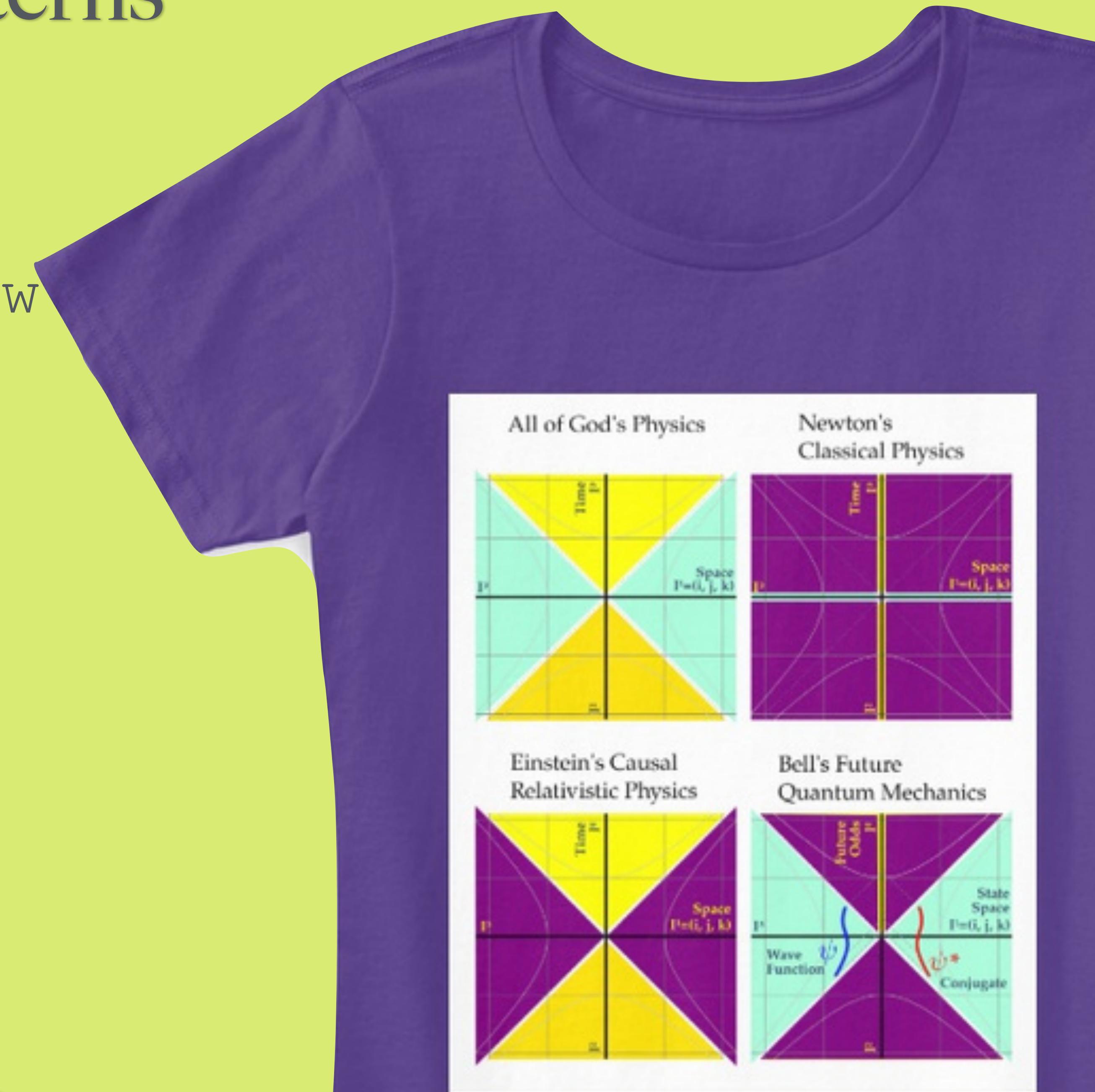
Missing idea I:  
2D complex numbers to 4D space-time numbers  
for a 4D Universe

# Look at the color patterns In the t-shirt

Dark and light yellow

Turquoise

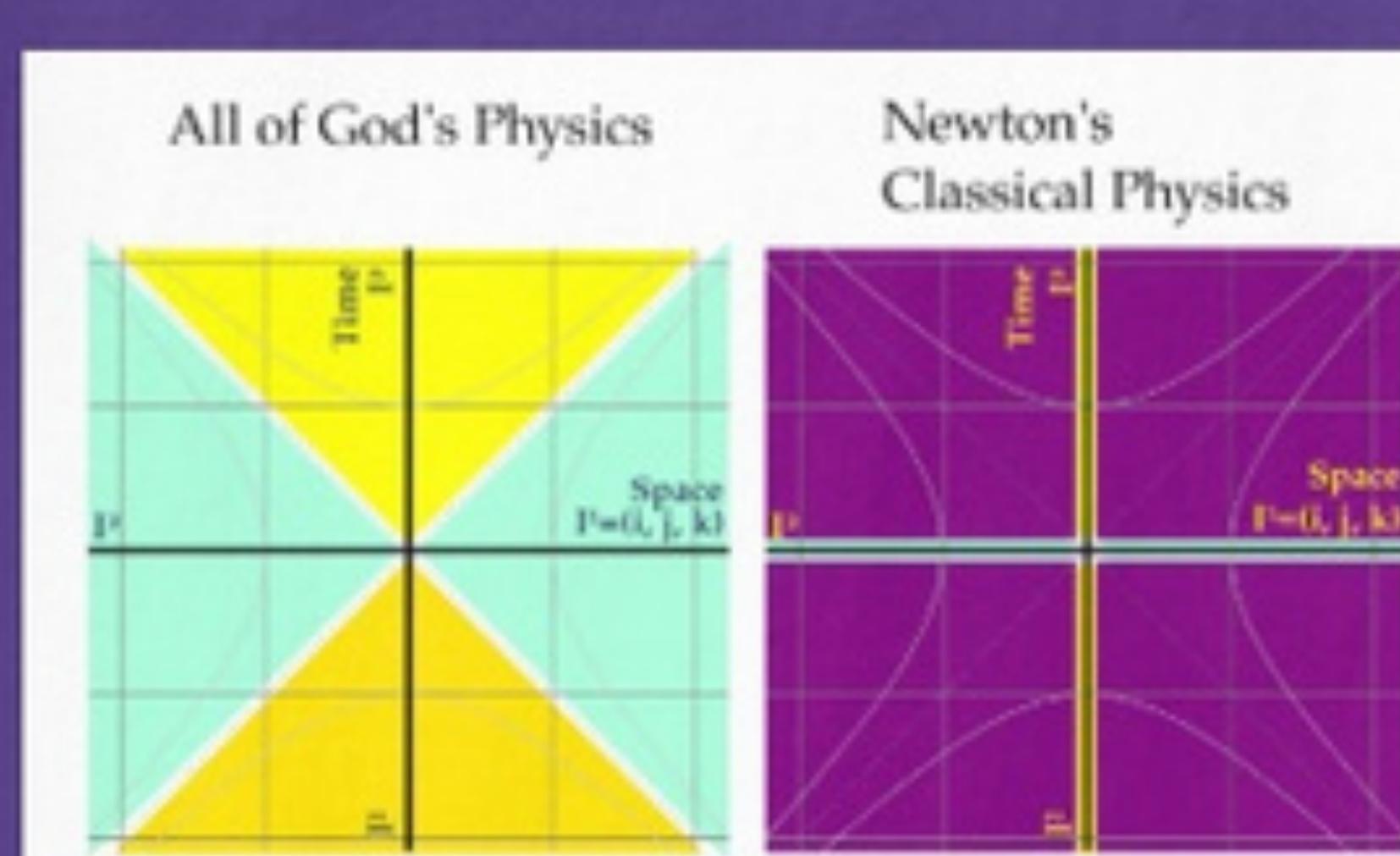
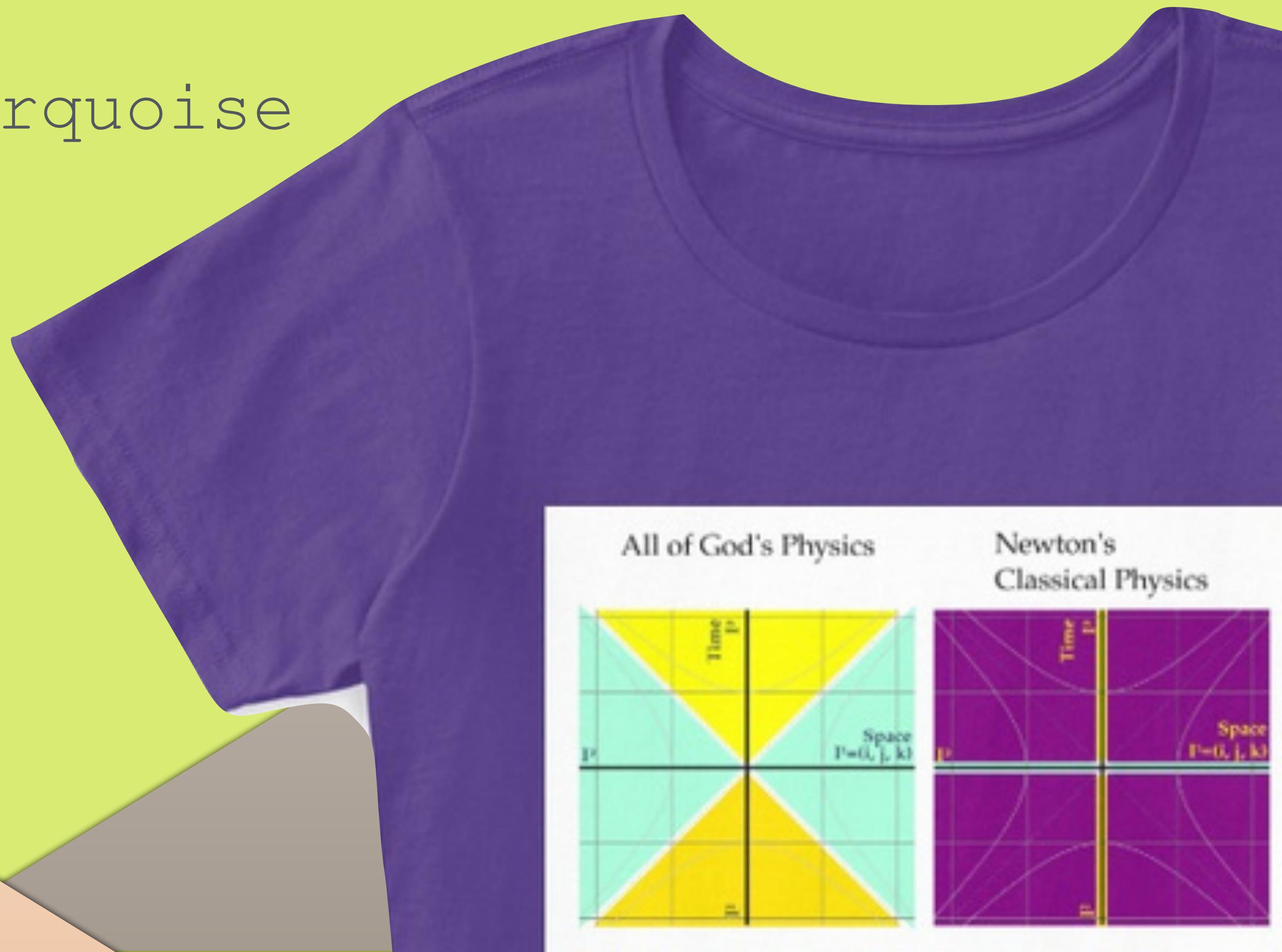
Dark purple



# Look at the color patterns In the t-shirt

All yellow and turquoise

Almost all purple



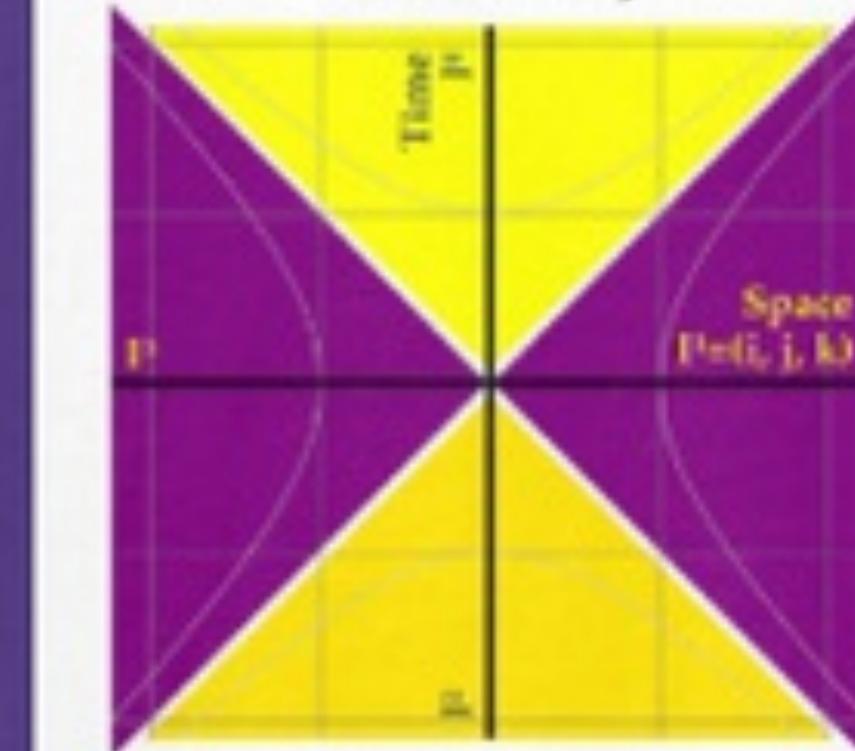
# Look at the color patterns In the t-shirt

Half yellow  
Half purple

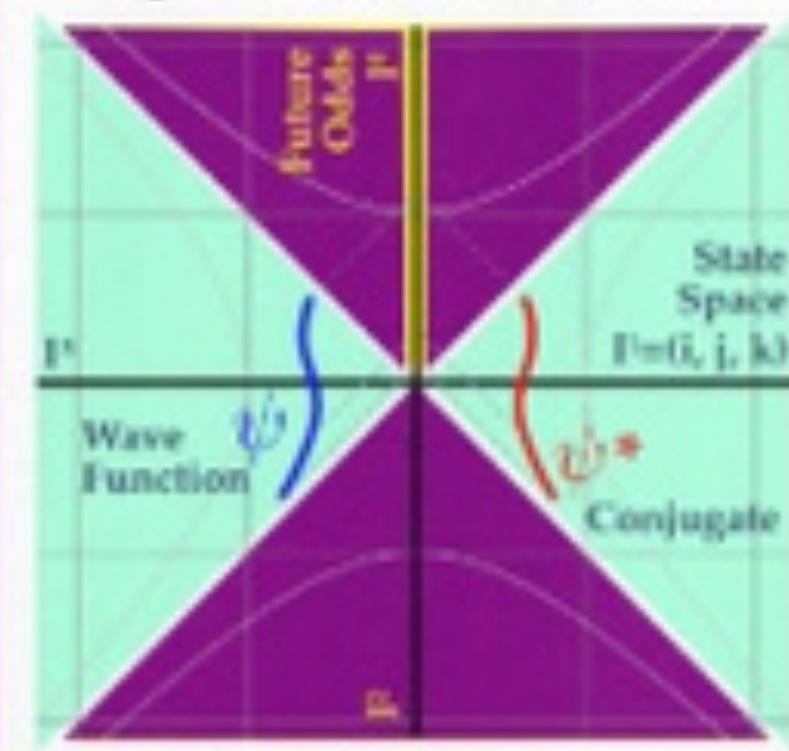
And

Half green  
Half purple

Einstein's Causal  
Relativistic Physics



Bell's Future  
Quantum Mechanics



# The 4 labels

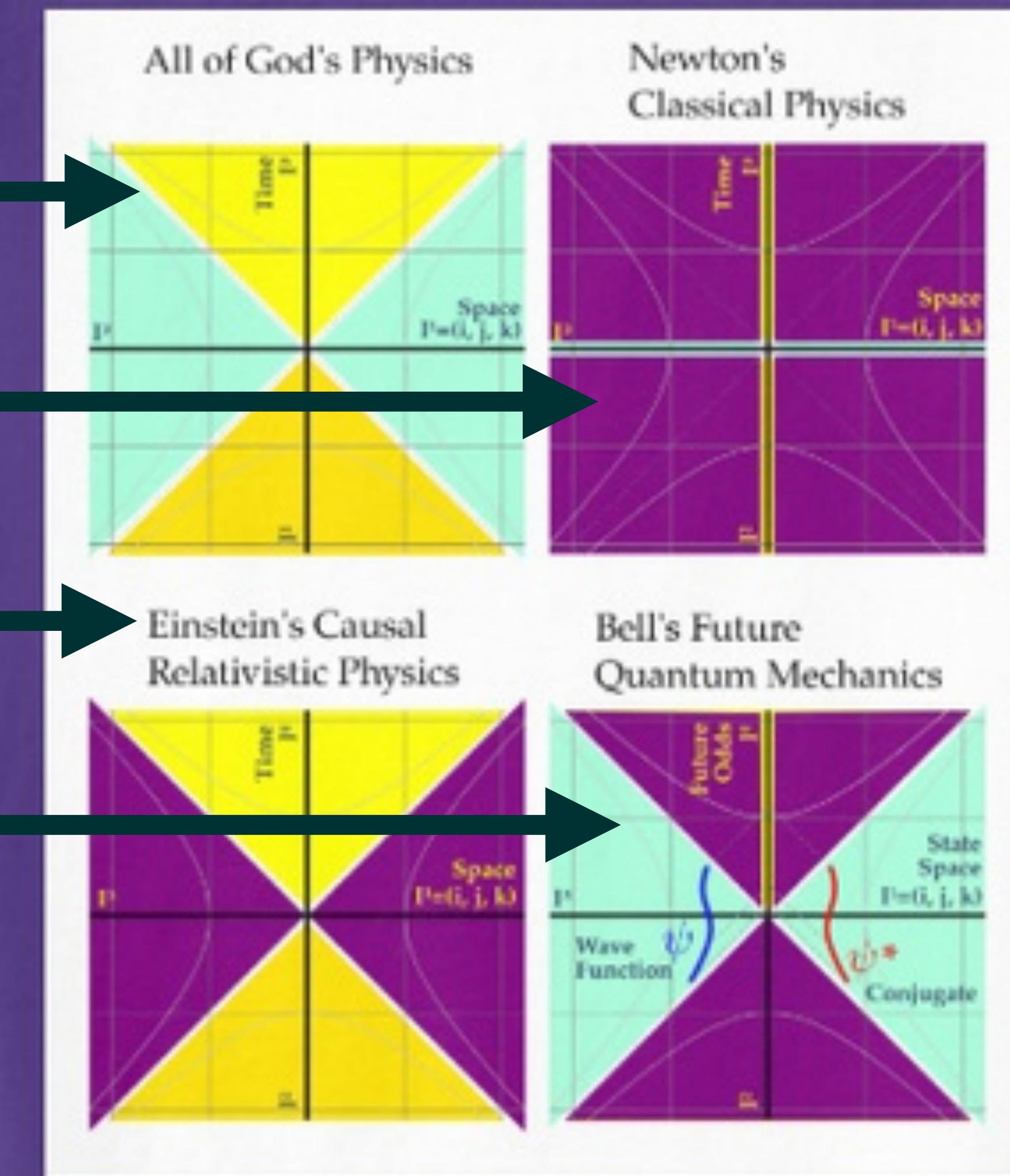
All of God's physics

Newton's classical physics

Einstein's Causal Relativistic physics

Bell's Future QM

Note: no one draws these



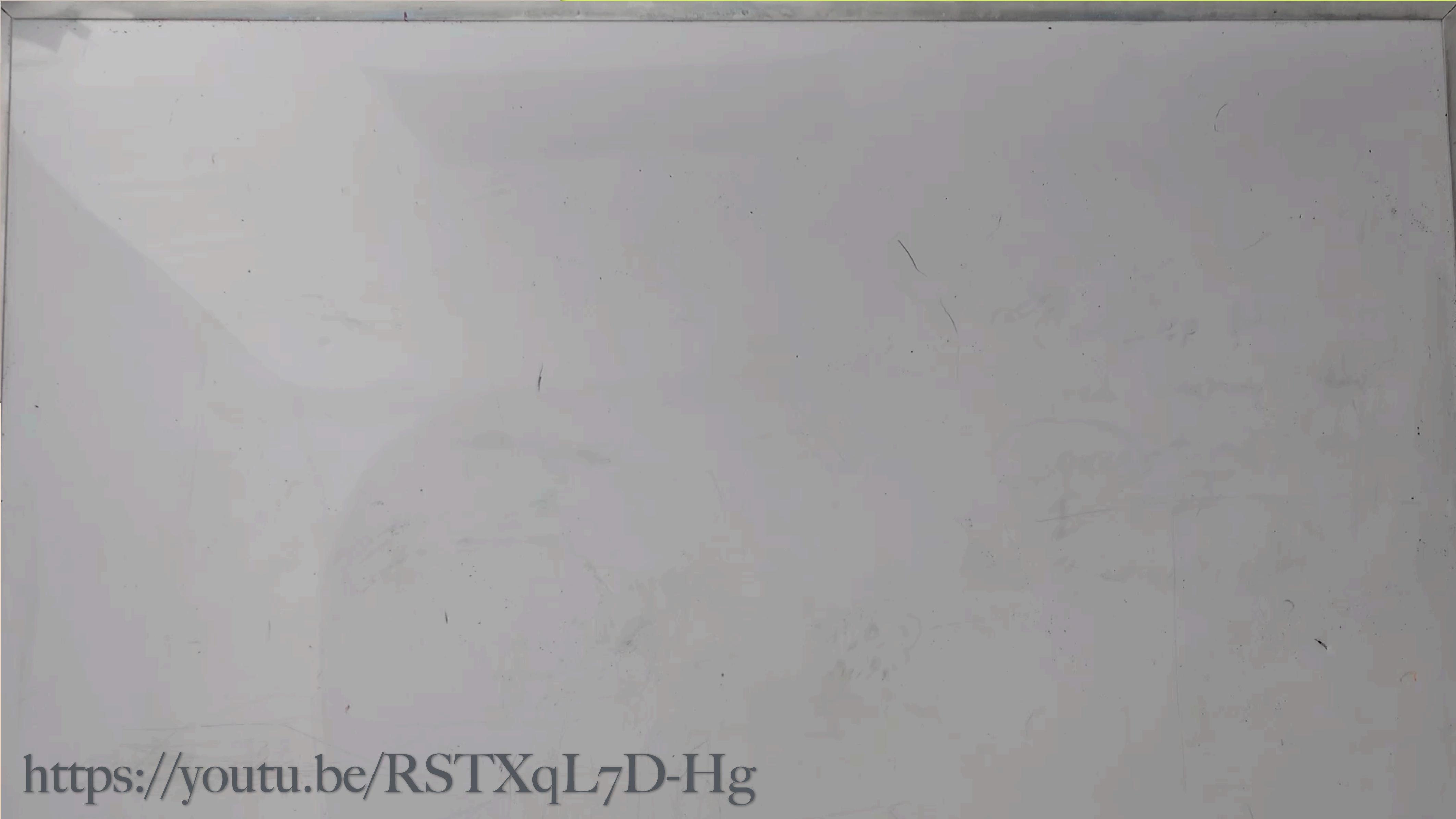
Missing idea 2:  
Use space-like regions of space-time for  
quantum mechanics

# That darn cat of Schrödinger



<https://www.youtube.com/watch?v=IOYyCHGWJq4>

# All Schrödinger cats are space-like separated



<https://youtu.be/RSTXql7D-Hg>



Resources:  
[https://bit.ly/SPR\\_site](https://bit.ly/SPR_site)  
[https://bit.ly/SPR\\_slides](https://bit.ly/SPR_slides)  
[https://bit.ly/SPR\\_videos](https://bit.ly/SPR_videos)  
[https://bit.ly/SPR\\_zoom](https://bit.ly/SPR_zoom)  
[https://bit.ly/SPR\\_t-shirts](https://bit.ly/SPR_t-shirts)