

The 5 Most Important Equations in All of Physics

The first Spiritual Physics Research Series Discussions

Final Friday, Jan. 29, 2021

First Church Unitarian of Littleton, MA

Spiritual framing by Rev. Lara Hoke

Physics research slide presentation by Doug Sweetser

Slide designs by Elle Sweetser

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

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

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

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

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About Doug Sweetser in 3 slides (1/3)

- Married, 58, 5' 7", diabetic with a cow heart valve
- Darra and Elle are my wife and daughter respectively
- MIT class of 1984, degrees in Biology and Chem. Eng.

Note: not physics or math

- Brandeis 2000 masters in software engineering
- Work for Synopsys as a software release engineer

My focus is on being creative (2/3)

Creativity is imagination bound by logic

Have taken Niela Miller's Zoom art exploration workshops

Jam with the UUukes - soon again I hope!

Imaginative in the kitchen as seen on Instagram

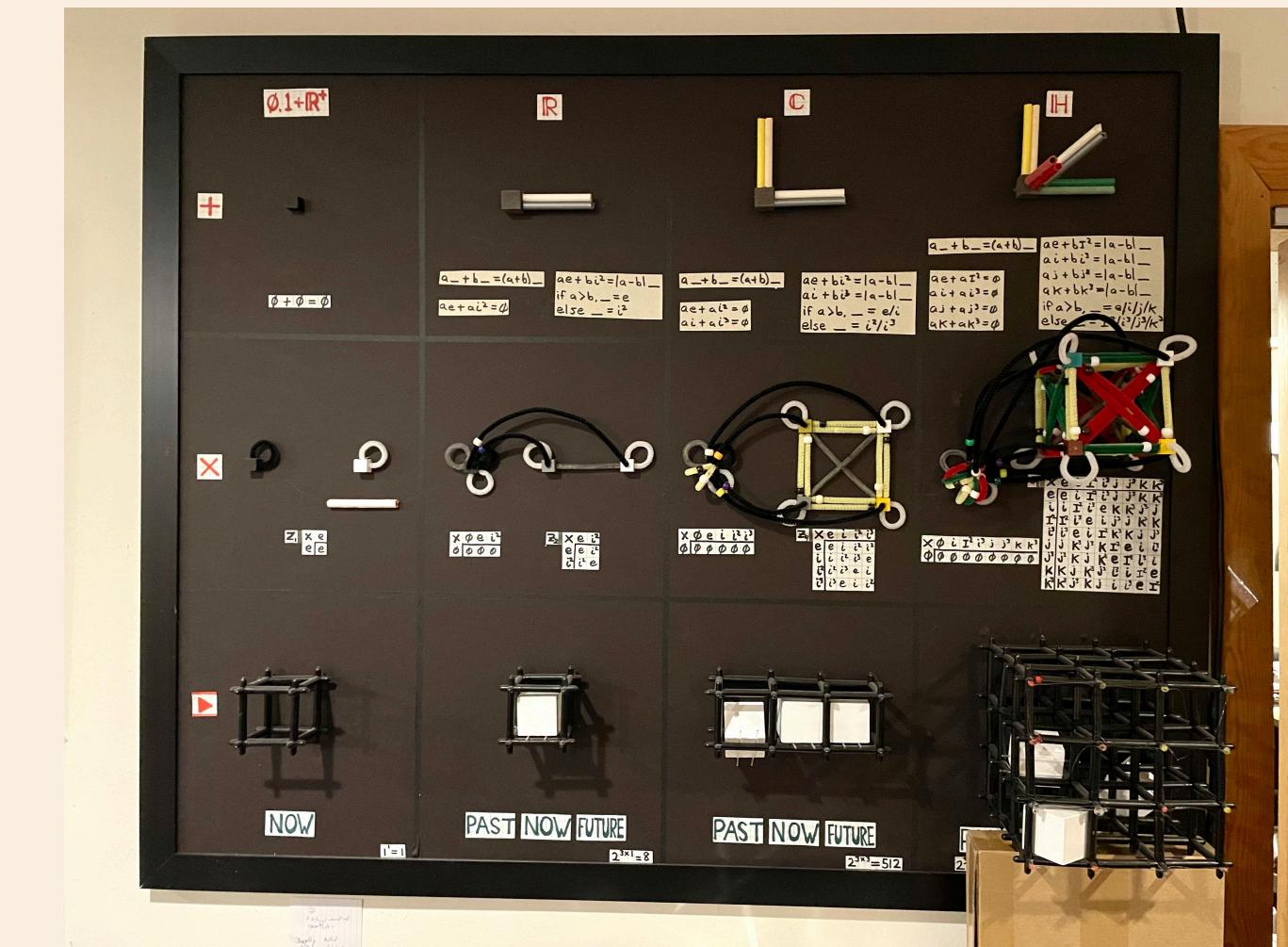
Use logic to deconstruct and destroy imaginative acts

Sometimes the logic leads to better things

Doug, an ultra-orthodox fringe physicist (3/3)

- Fringe physics = someone without a degree or job in physics who tries to make a contribution
- No fringe physicist has made a significant contribution to physics
- Professionals block the fringe with reasonable cause
- My goal is kill my own proposals (this has happened)

The Dec. 6th Rev. Lara Hoke sermon on Buddhism was the direct motivator

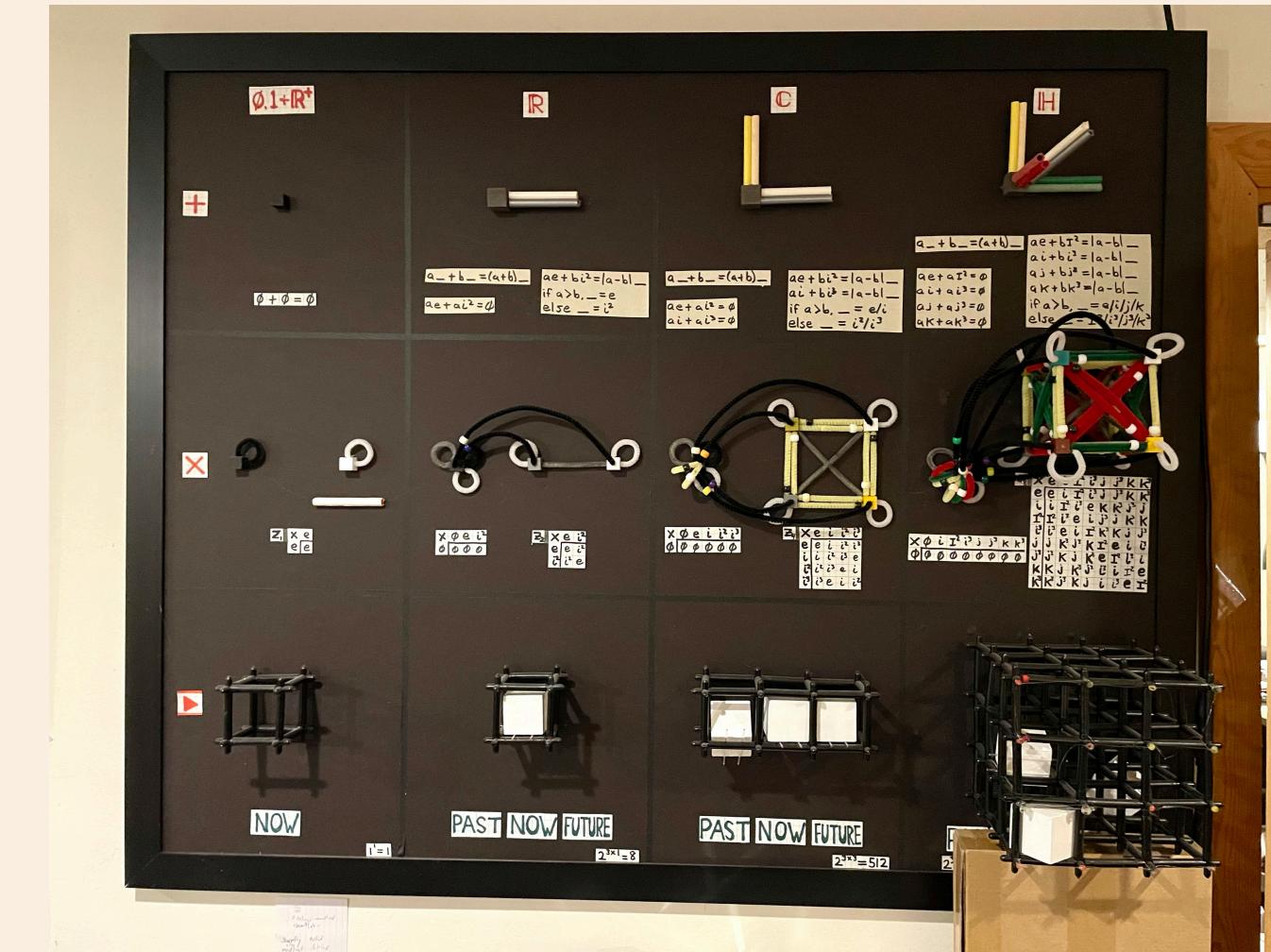


As Rev. Hoke was reading a quote from Thich Nhat Hanh ,
I was thinking about this work of art/number theory
that hangs in my basement

On multiple occasions for that service,
my work on numbers said overlapping things

Physics ≠ Buddhism

What looks trivial
should not be treated trivially.



Back to the question of this evening:

What are the most important equations in all of physics?

The standard answer: ____ guy's equations

Newton's equations (for classical physics)

Maxwell's equations (for light)

Einstein's equations (for gravity)

Schrödinger's equations (for classical QM)

Dirac's equations (for relativistic QM)

Lots of people's standard model (for particles)

[Emmy Nother's Theorem] (for symmetry and conservation laws)

Each standard answer is important for
a part of physics, not for all of physics

Only numbers are important for all of physics

The interconnectedness of everything
happens with numbers

Start simple with one number, zero

0

Oops,
that is too simple - no possible tension

Less simple: one zero for time, three zeroes for 3D space

This is here-now $(0, 0, 0, 0)$

We share time

We cannot share the same space

A 4-part space-time zero is in standard physics

It is considered useful but boring

What is here-now?

Think about its opposites...

(0, 0, 0, 0)

No past, no future

No up, no down

No left, no right

No near, no far

Your here-now is different from my here-now

Because we share now but not here

Do simple math with here-now

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

Here-now plus here-now is identical to here-now

The present only leads to the present

Try to feel the next moment arriving

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

Identical means there
can never be a feeling
for the next moment arriving

Do more math with here-now

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

My biggest ongoing riddle: what does times, “x”, mean?

Times means to repeat, but to repeat zero times is
to not repeat even once

Calculus is the study of change

For calculus to work, one needs a “mathematical field”:

- Addition (and its inverse, subtraction)
- Multiplication (and its inverse, division)

Here-now has its addition and its inverse

Here-now has multiplication and

because there is just one thing, it has its inverse

Here-now is NOT a mathematical field

In the 11 part definition of a mathematical field,
there is the stipulation that the identity element for
addition must necessarily be different from the
identity element of multiplication

Here-now fails that requirement

To create, sit quietly with failure

In my case, I walk my dog or do dishes or putter...

Here-now is not a mathematical field

Here-now is not about the study of change

My new name for here-now: a mathematical canvas

Here-now cannot change

The study of change (calculus) must be painted on
that which cannot change, the mathematical canvas

Note: the official name was found, a “zero ring”

I prefer the art reference to jargon

Introduce unity into space-time

$$(1, 0, 0, 0)$$

This is part of standard physics

It is considered useful but boring

Spoiler: I think it is worthy of deep reflection

Unity is the here-future ~~here-future~~ here-past

(1, 0, 0, 0)

The here-past is positive???

This past washing-dishes-Tuesday,

I thought of my past-here as a positive number

The here-past cannot be changed

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

We only get older,
increasing our here-past

(58, 0, 0, 0)

This March 4, I will add one to this number of years

This talk led me to see the here-past as positive, awesome!

All the math of here-now and here-past

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

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

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

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

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

- The canvas
- here-past cannot be changed
- The battle between light and darkness

The here-past is not a canvas

$$(1, 0, 0, 0) + (1, 0, 0, 0) \neq (1, 0, 0, 0)$$

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

When restricted to only two numbers,
adding unity to itself is not allowed

In zero versus unity, what is here-now wins

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

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

Here-now plus here-past retains the memory
of the here-past here-now

Here-now times here-past cannot revive
the here-past here-now

The here-future is negative???

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

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

One day in the here-future plus one day in the here-past
makes here-now

Up-now times itself is here-future because
it takes one step from up-now to reach here-future

These 3 are all examples of the group Z_1 ,
“the trivial group”

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

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

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

Three ways to represent the identical thing, the group Z_1

Group identity versus individually different... ponder

Two of these equations are illegal

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

$$\cancel{(0, 0, 0, 0) \times (0, 0, 0, 0) = (0, 0, 0, 0)}$$

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

$$\cancel{(1, 0, 0, 0) \times (1, 0, 0, 0) = (1, 0, 0, 0)}$$

In standard physics, 4 numbers like this are call “vectors”

Vectors can be added and subtracted,

but 2 vectors cannot be multiplied

Vectors can be any number of dimensions
This is my age-here-shoe_size vector

(58, 0, 0, 0, 9)

In standard physics, vectors have been one of the most useful ideas ever devised

All equations written in technical physics books are vector equations or its generalization, tensors

Only 1, 2, and 4 numbers be treated just like
number to +, -, x, / (the details here are crazy!)

$$(1, 2, 3, 4) + (1, 2, 1, 2) = (2, 4, 4, 6)$$

$$(1, 2, 3, 4) - (1, 2, 1, 2) = (0, 0, 2, 2)$$

$$(1, 2, 3, 4) \times (1, 2, 1, 2) = (-14, 6, 8, 2)$$

$$(1, 2, 3, 4) / (1, 2, 1, 2) = (2, 1, -2, 5)$$

The details are unimportant

+ - x / all just work

Demand numbers must be intimate with each other, able to mix in all ways

$$(1, 2, 3, 4) + (1, 2, 1, 2) = (2, 4, 4, 6)$$

$$(1, 2, 3, 4) - (1, 2, 1, 2) = (0, 0, 2, 2)$$

$$(1, 2, 3, 4) \times (1, 2, 1, 2) = (-14, 6, 8, 2)$$

$$(1, 2, 3, 4) / (1, 2, 1, 2) = (2, 1, -2, 5)$$

Be open to diverse relationships

Be open to surprise

See an “x” for 4 numbers? That is not standard

Open discussion time....

I hope to deeply listen to you - it has already helped

I am here to share what I know physics knows,
and what physics does not know

I reserve the right to keep the discussion on target

Always-join the words for space-time

Talk about space-time, not time or space alone

Talk about energy-momentum, not energy or momentum alone

Here is an example:

Time travel is not a thing: space-time travel is

We are all space-time traveling here-now

and it is boring

As it says on the back of the t-shirt



Resources:

https://bit.ly/SPR_site

https://bit.ly/SPR_1_slides

https://bit.ly/SPR_1_video

https://bit.ly/SPR_zoom

<https://teespring.com/visualphysics>