



Dreams of a Final Theory

Hirosi Ooguri

Before I tell you
my dreams...



My thoughts go out to
people whose lives
have been disrupted.

On 11 March 2011,
I was at the Kavli IPMU.





Public talk at Caltech & distribution of slides with Japanese translation



Raising disaster relief fund

I asked myself:

What is the point of **useless** research?

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I will come back to this after telling you what my research is about.



As a kid, I was impressed by the story of Hideki Yukawa, who uncovered deep secret of subatomic world by the **power of his pure thought.**



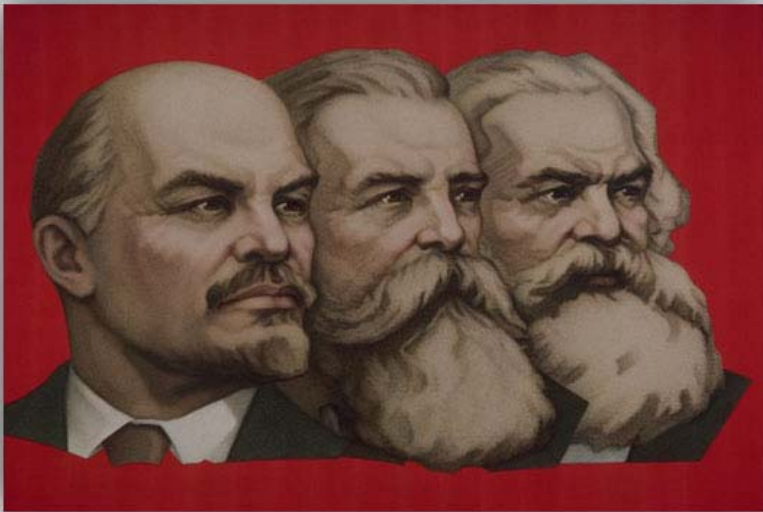
I entered the graduate school of Kyoto University

... in 1984.

This turned out to be a fateful year.

1984

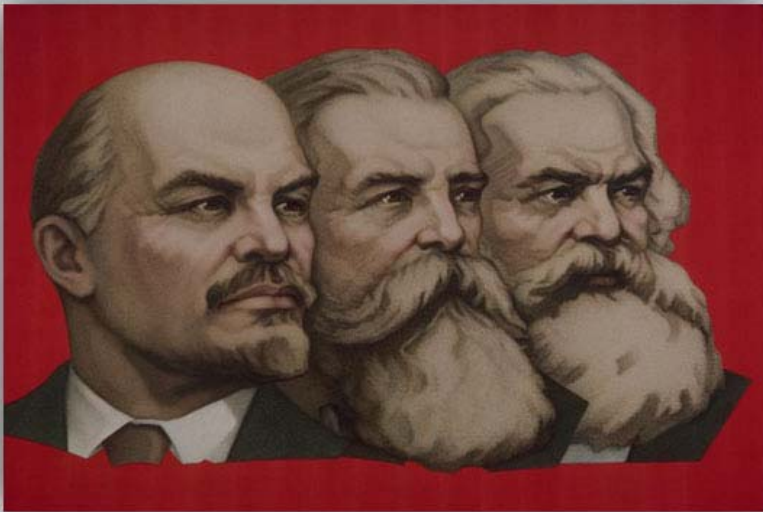
Superstring Revolution



Rules of the game
were changed.

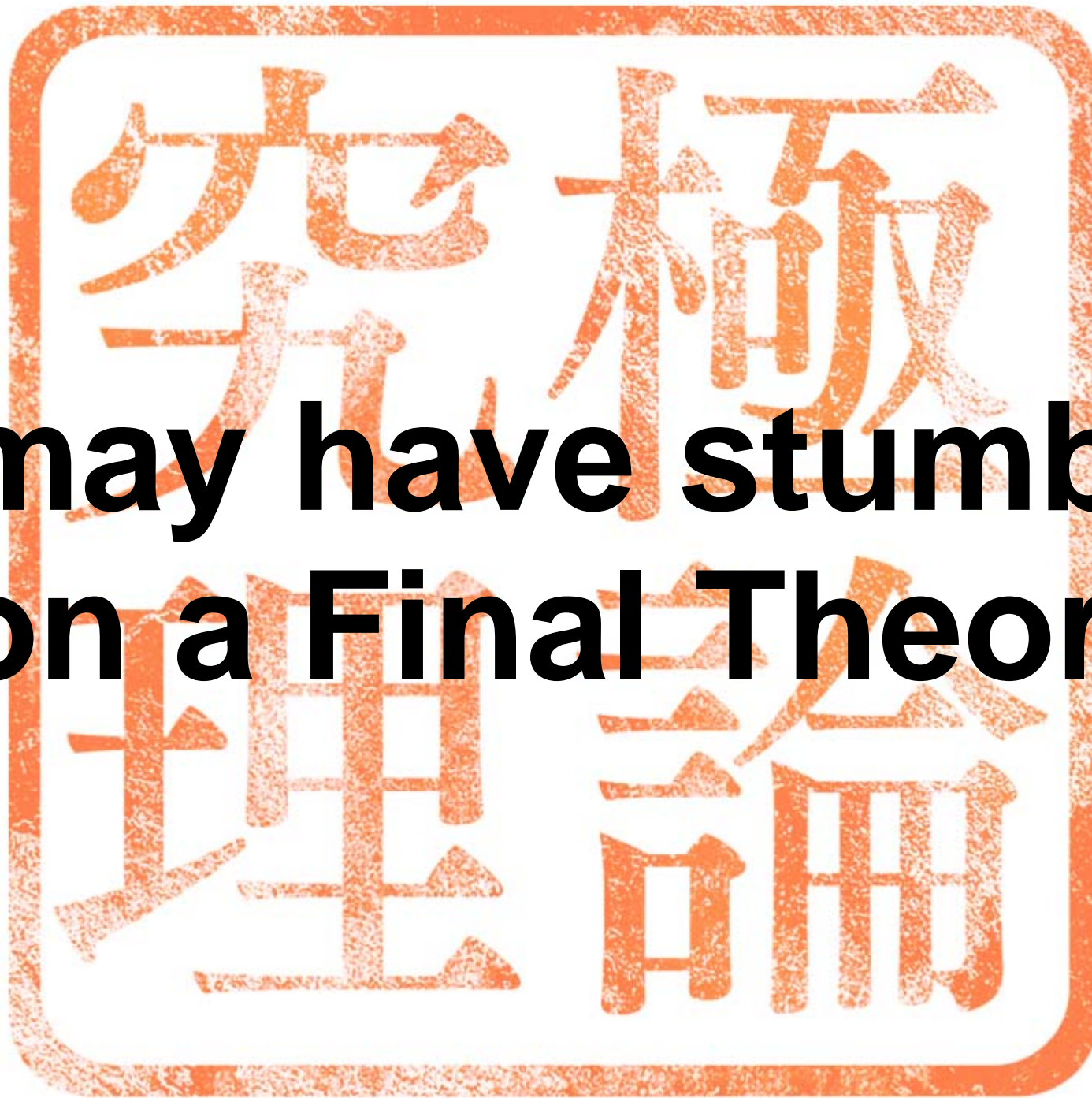
1984

Superstring Revolution



A freshman could
be a front runner.





**We may have stumbled
upon a Final Theory.**



究極のメニュー

THE ULTIMATE MENU



The purpose of my life
is to find out
the most fundamental
laws of nature.

Human



Cells



Atoms



Nucleus + Electrons



Protons + Neutrons



Quarks



What are quarks made of ?



Will this go forever ?

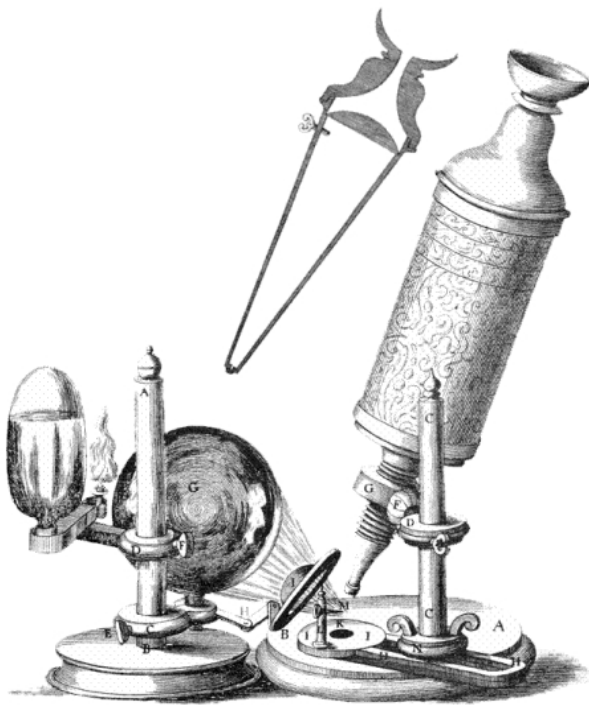


Will it end somewhere ?

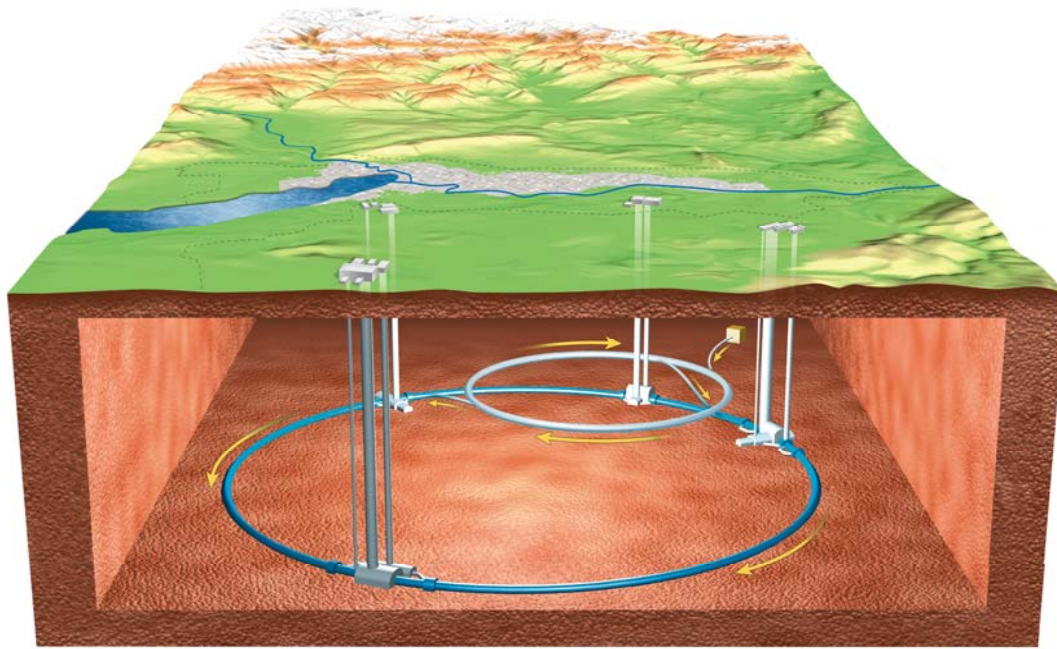


A final theory exists.

Optical Microscope

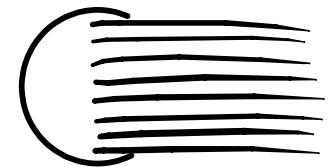
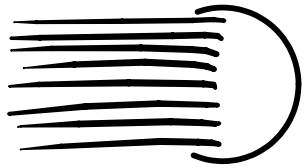


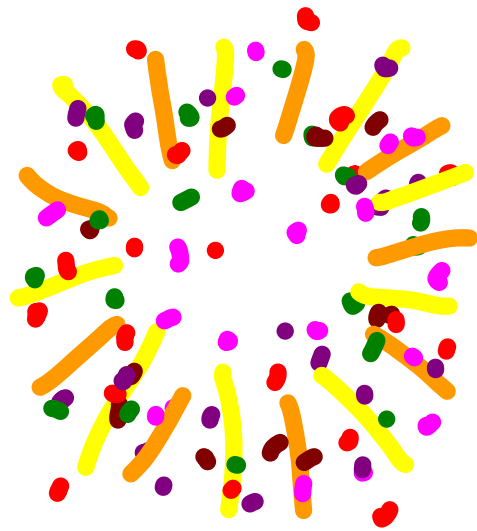
$$\frac{1}{10,000,000} \text{ m}$$



LHC at CERN

1
----- m
10,000,000,000,000,000,000,000

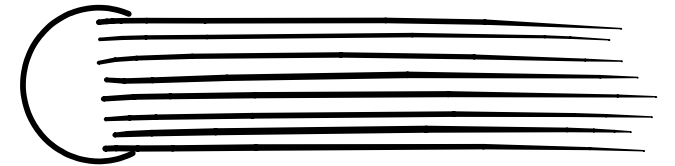
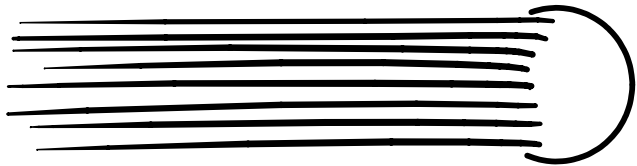


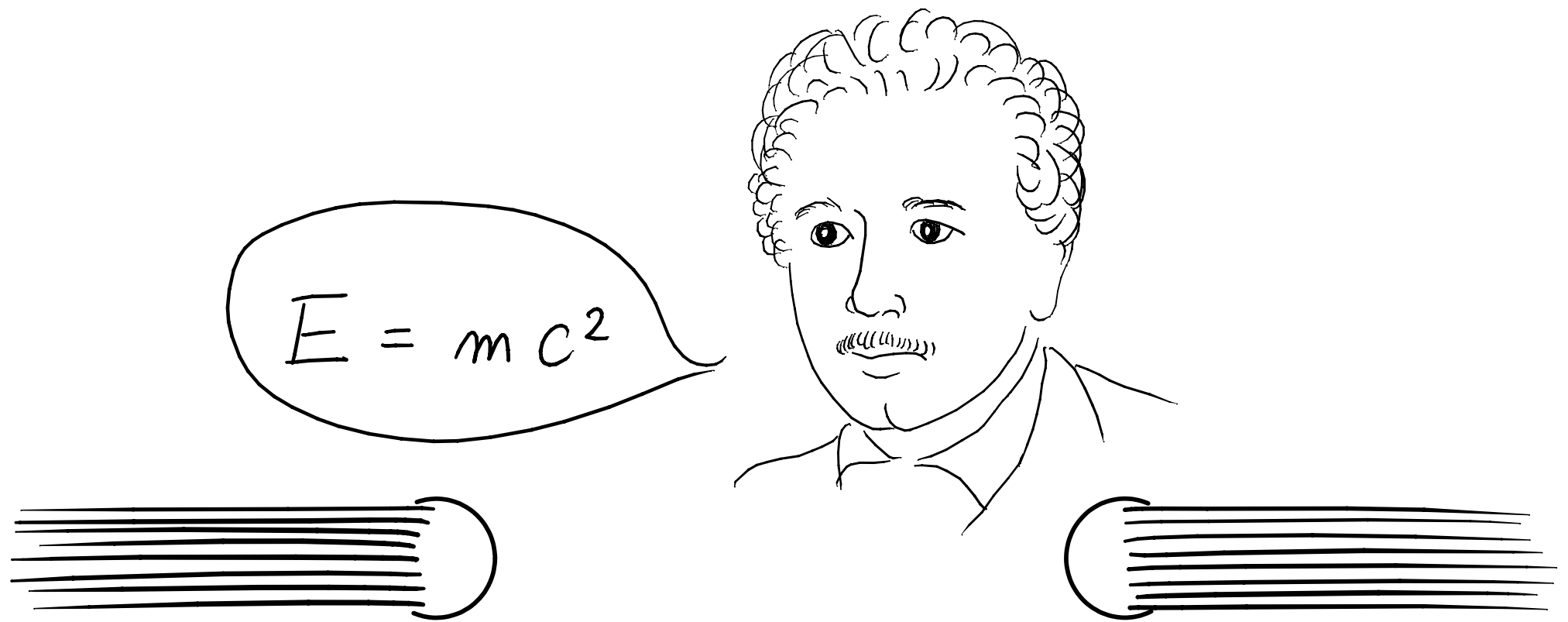




ATLAS detector at LHC

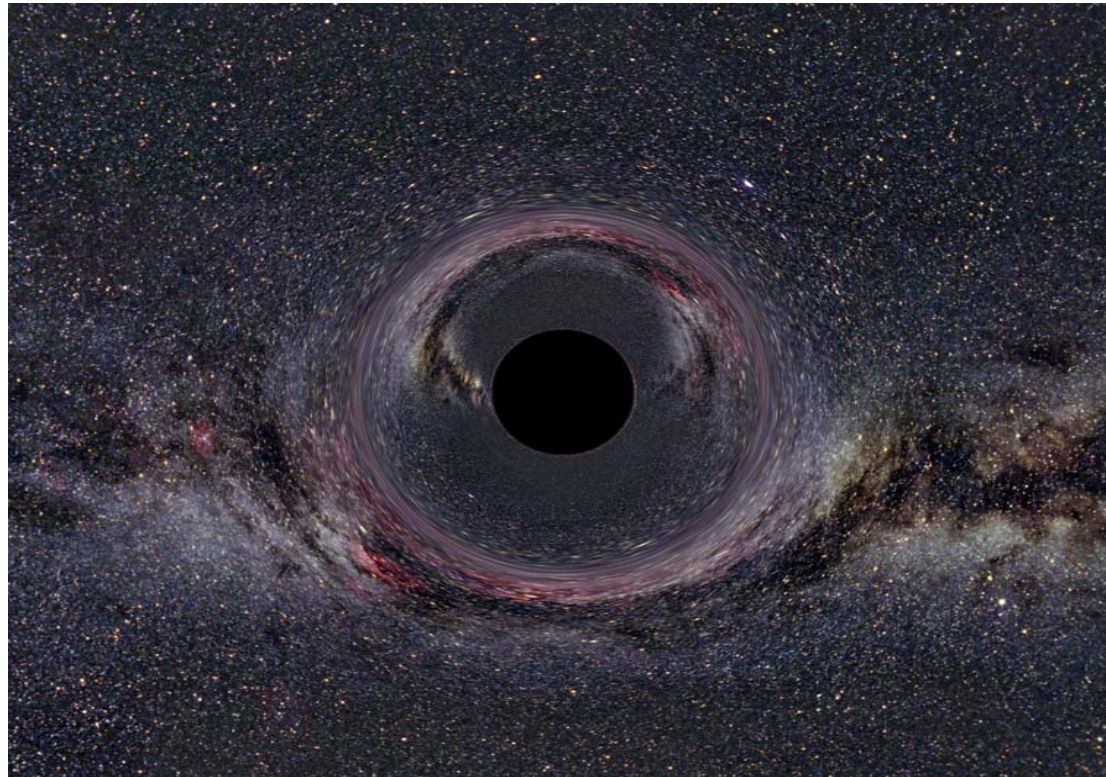
More energy?



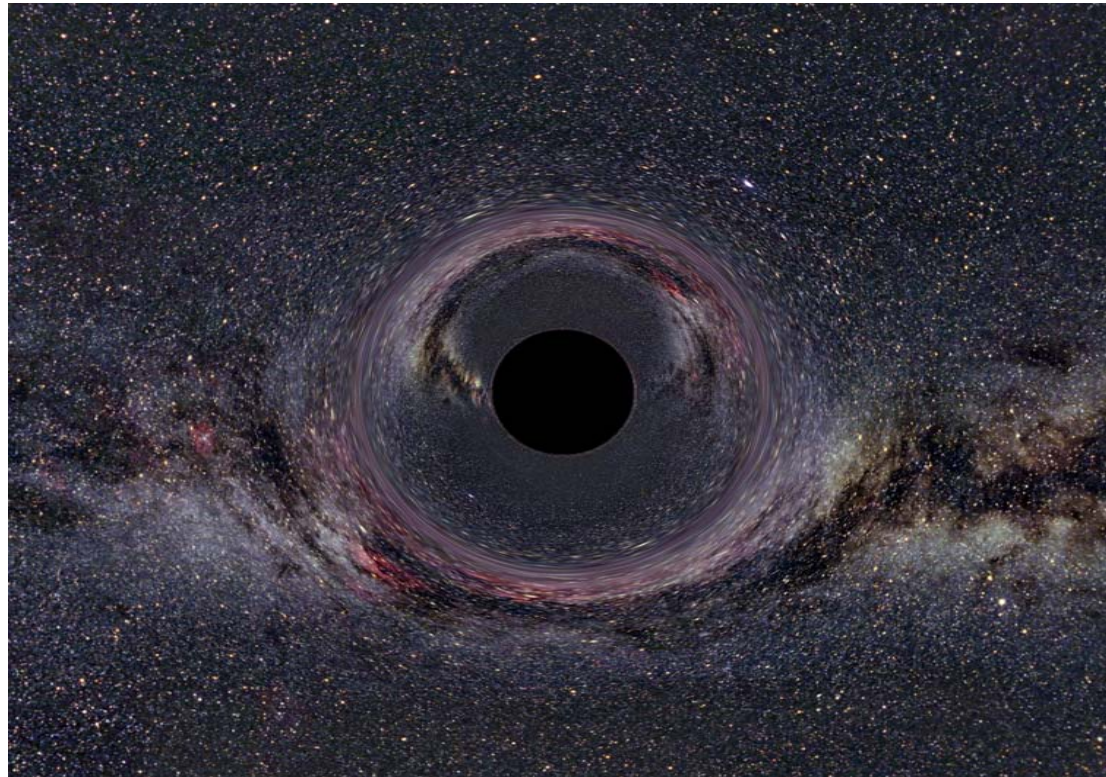


Energy = Mass

A black hole is created.



Fabric of space and time
is torn apart.




The end of short distance frontier

A final theory exists.



That would be an
unattainable goal.



**In 1984, we stumbled upon
a promising candidate.**



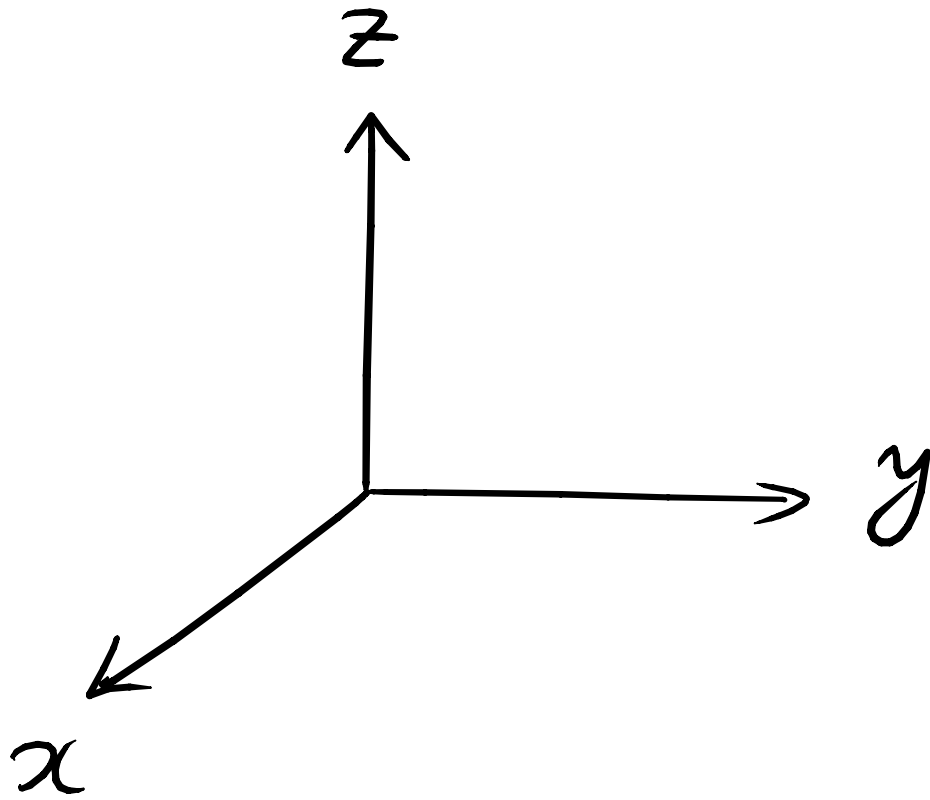
**We may have found
a Final Theory.**

The theory is crazy...

Superstring theory claims that everything is made of strings.

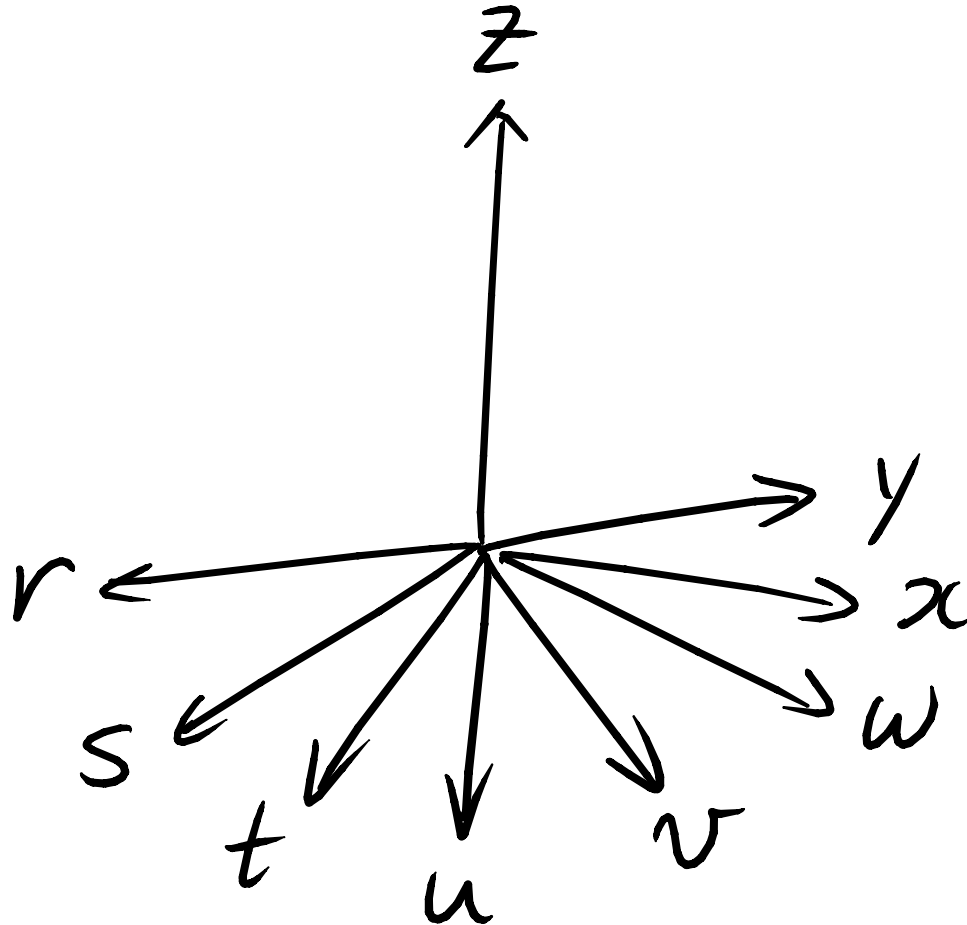


We live in 3-dimensional space.



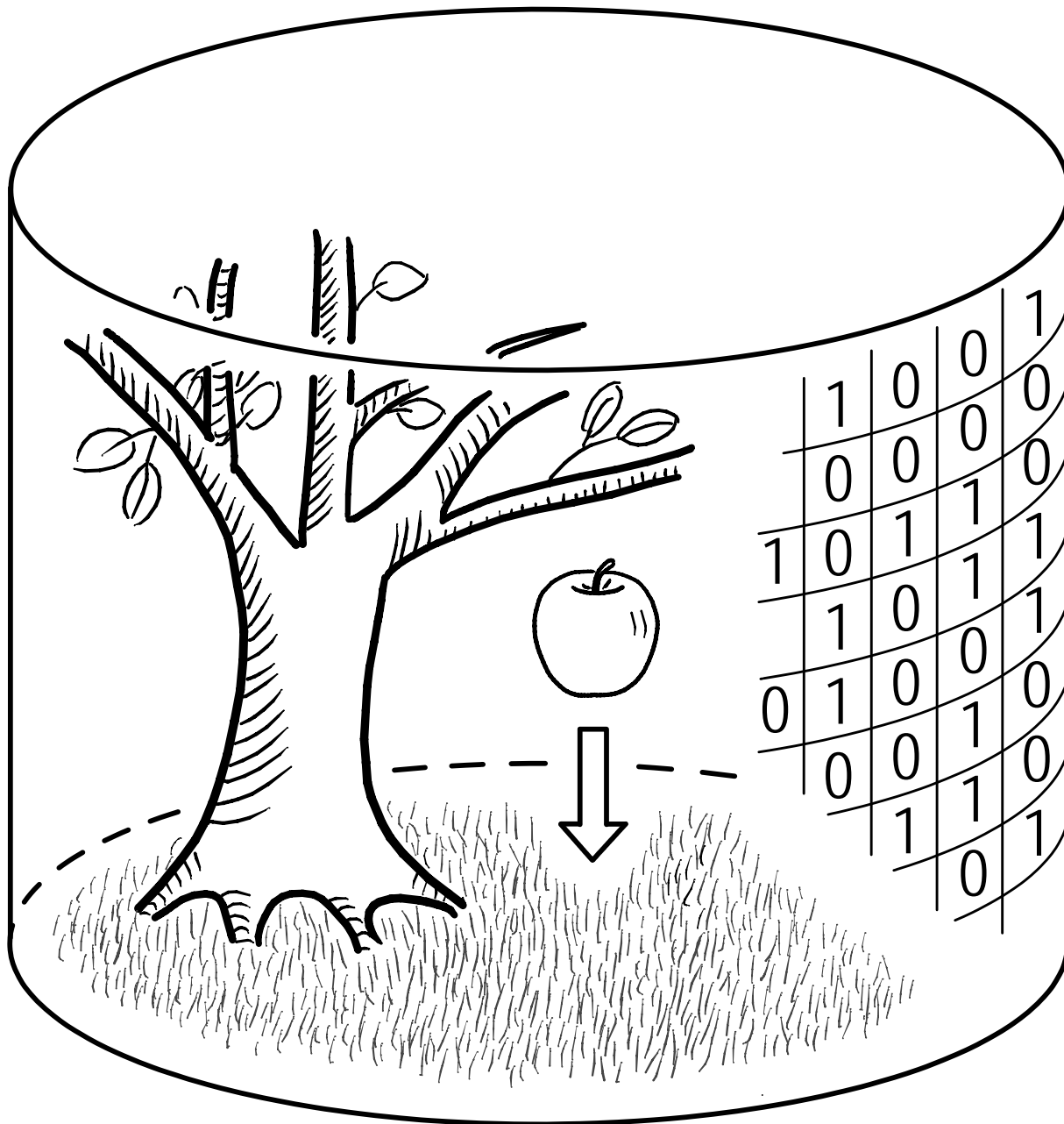
z: height
y: width
x: depth

Superstring theory says that space has **9 dimensions**.



**Gravity is
an illusion.**

**Space is itself
an illusion.**



Crazy enough to be right.

GS 幻 冬 舎 新 書



幻冬舎新書

『重力とは何か』

5月30日発売



幻冬舎新書

『重力とは何か』

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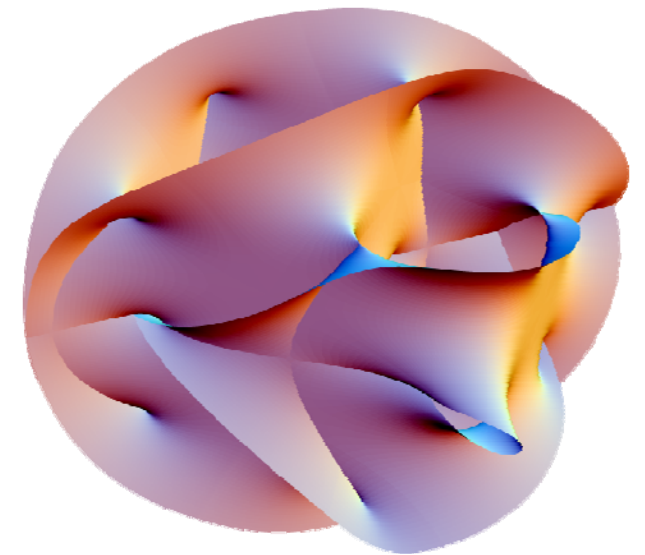
宇宙を
支配する
力の正体

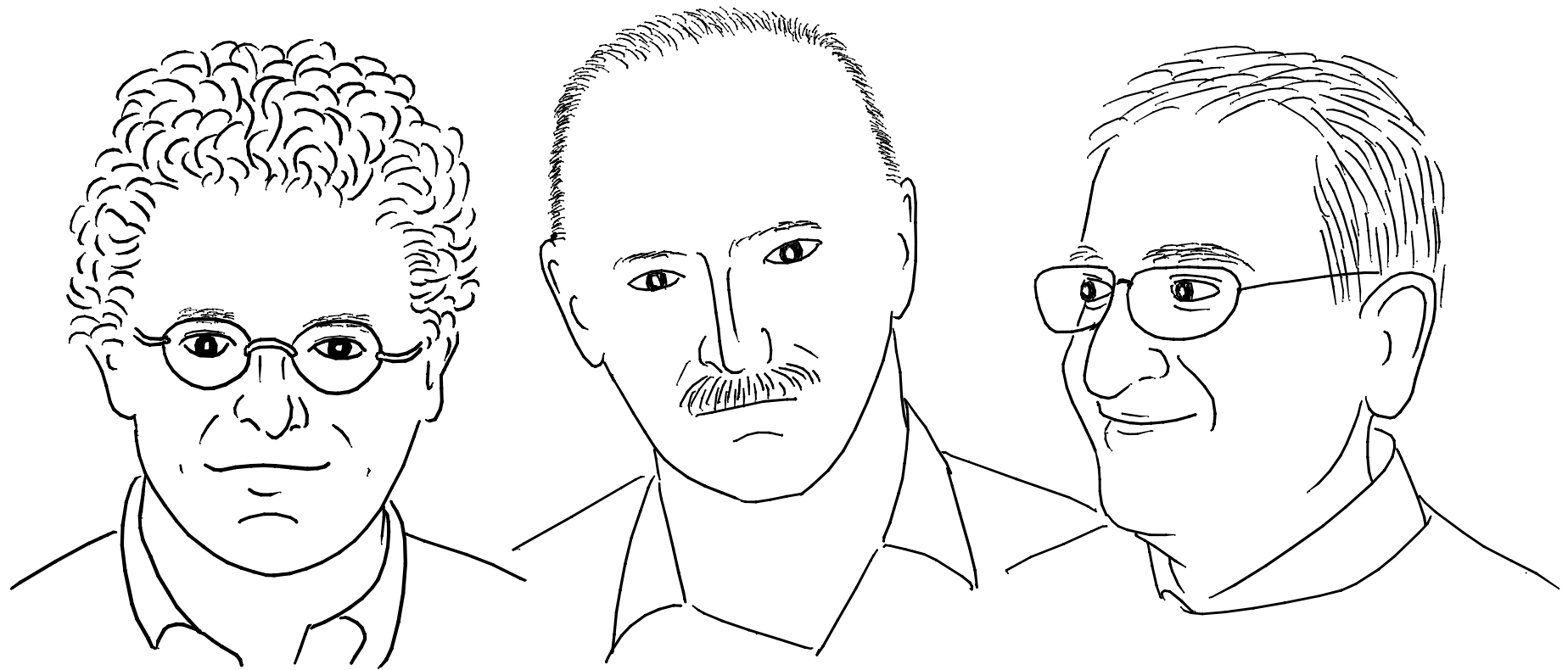
最先端の理論が直感でわかる、
エキサイティング宇宙論。

A blue rectangular area containing text and an illustration. The illustration shows a tree on the left with an apple falling from it. Below the apple is a downward-pointing arrow. To the right of the tree is a cylinder filled with binary code (0s and 1s).

幻冬舎新書 新刊

I thought it is beautiful
that the **hidden**
6 dimensions
encode secret
of our universe.





**It took me 10 years to
decipher 6 dimensions.**



Our method helped solve
information paradox of
Stephen Hawking .

A parade of beautiful ideas
and wonderful surprises.

It has been a great ride.

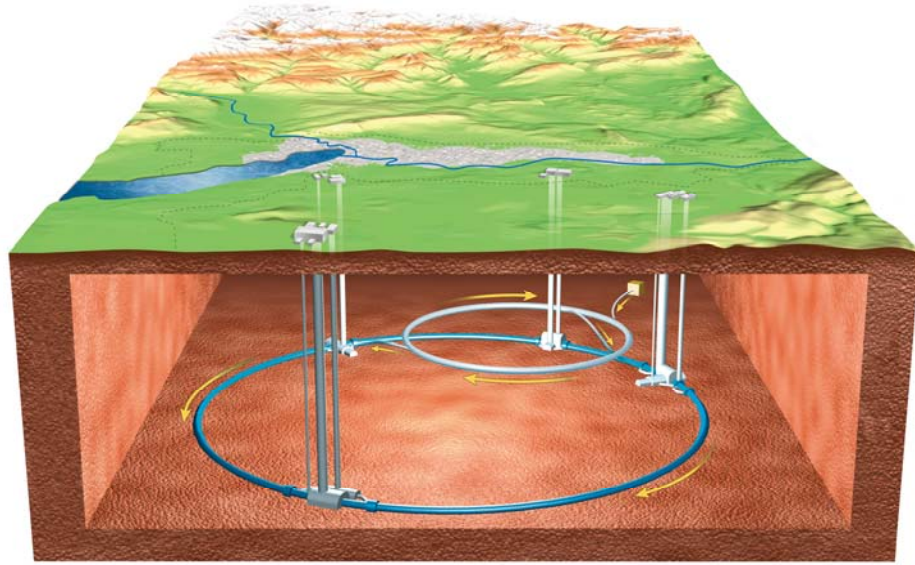


I asked myself:

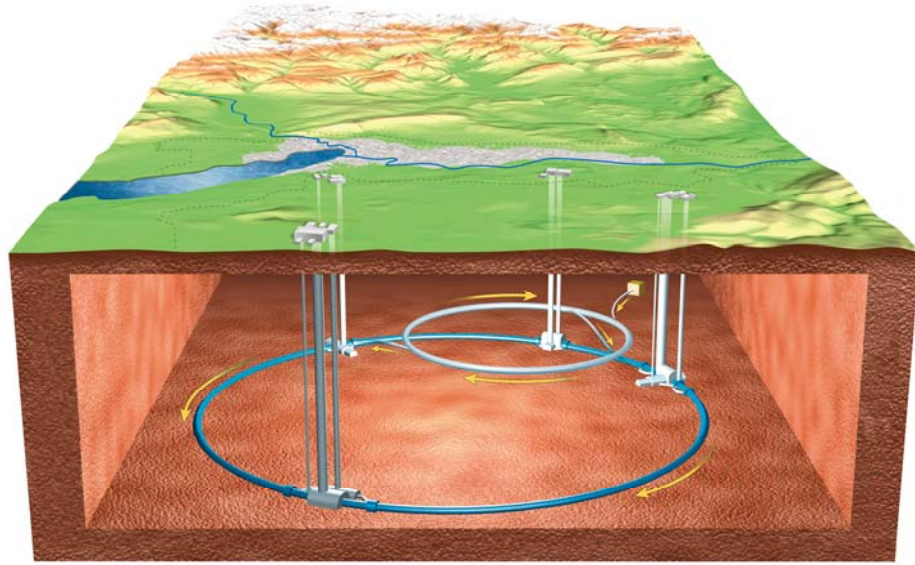
What is the point of
my **useless** research ?

Fundamental discoveries
in science have produced
profound dividends
to humanity.

Healthy progress in science
requires diverse portfolio,
**from foundations
to applications.**



CERN invented
the web browser.



CERN invented
the web browser.

YAHOO!

"While we cannot predetermine where scientific research will lead, we believe that true innovation comes when people can dream with freedom and focus. "



Jean-Lou Chameau
President, Caltech

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"I believe that this philosophy of encouraging curiosity as well as the pursuit of what may appear useless knowledge remains an advantage for the country that needs to be protected and nurtured. "



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We cannot tell for sure
which useless knowledge
will produce great
dividends in near future.

The only tried and true
compass is our curiosity
to explore and understand
this world.

Dream with
freedom and focus