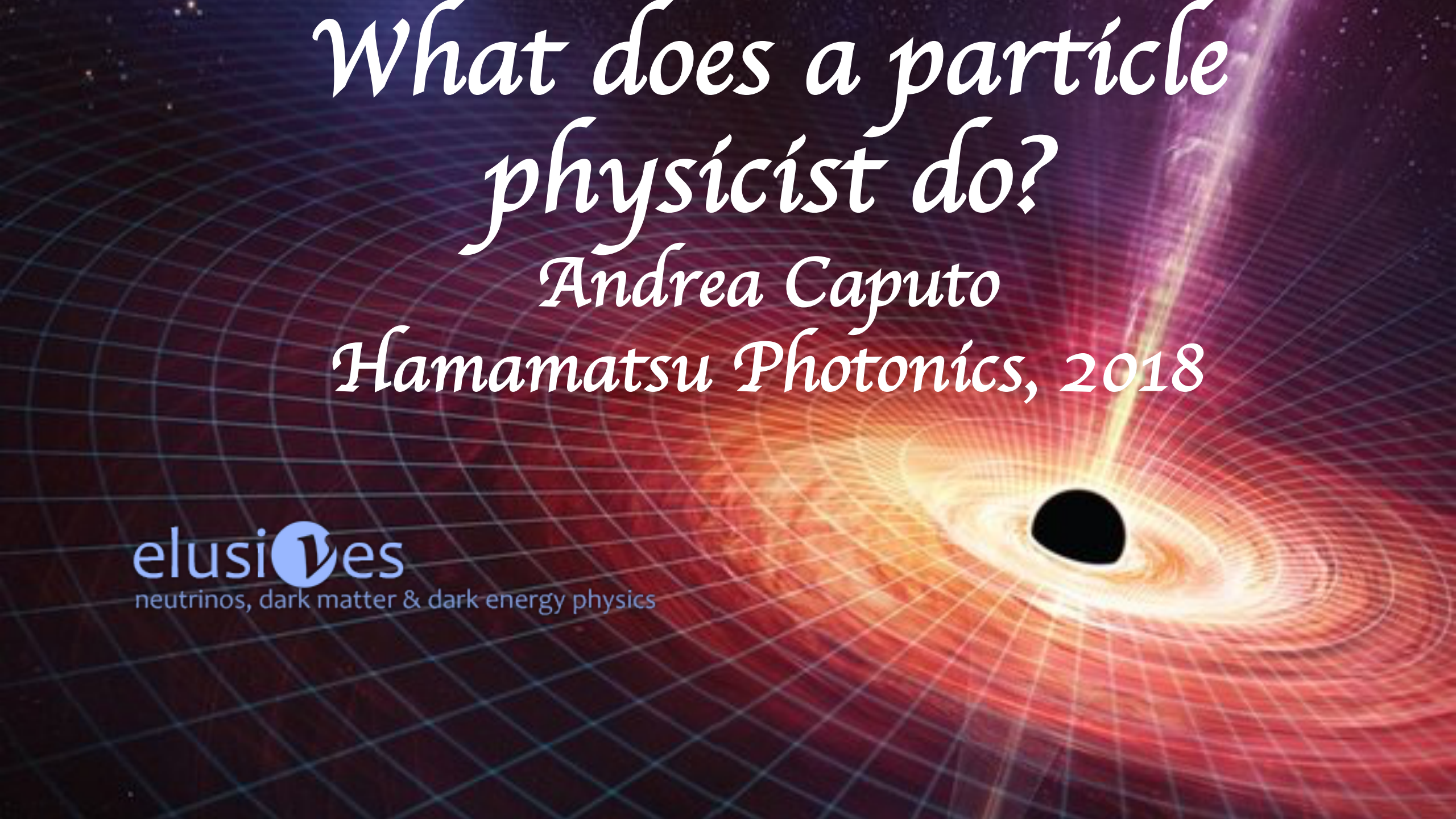
What does a particle physicist do?

Andrea Caputo
Hamamatsu Photonics, 2018

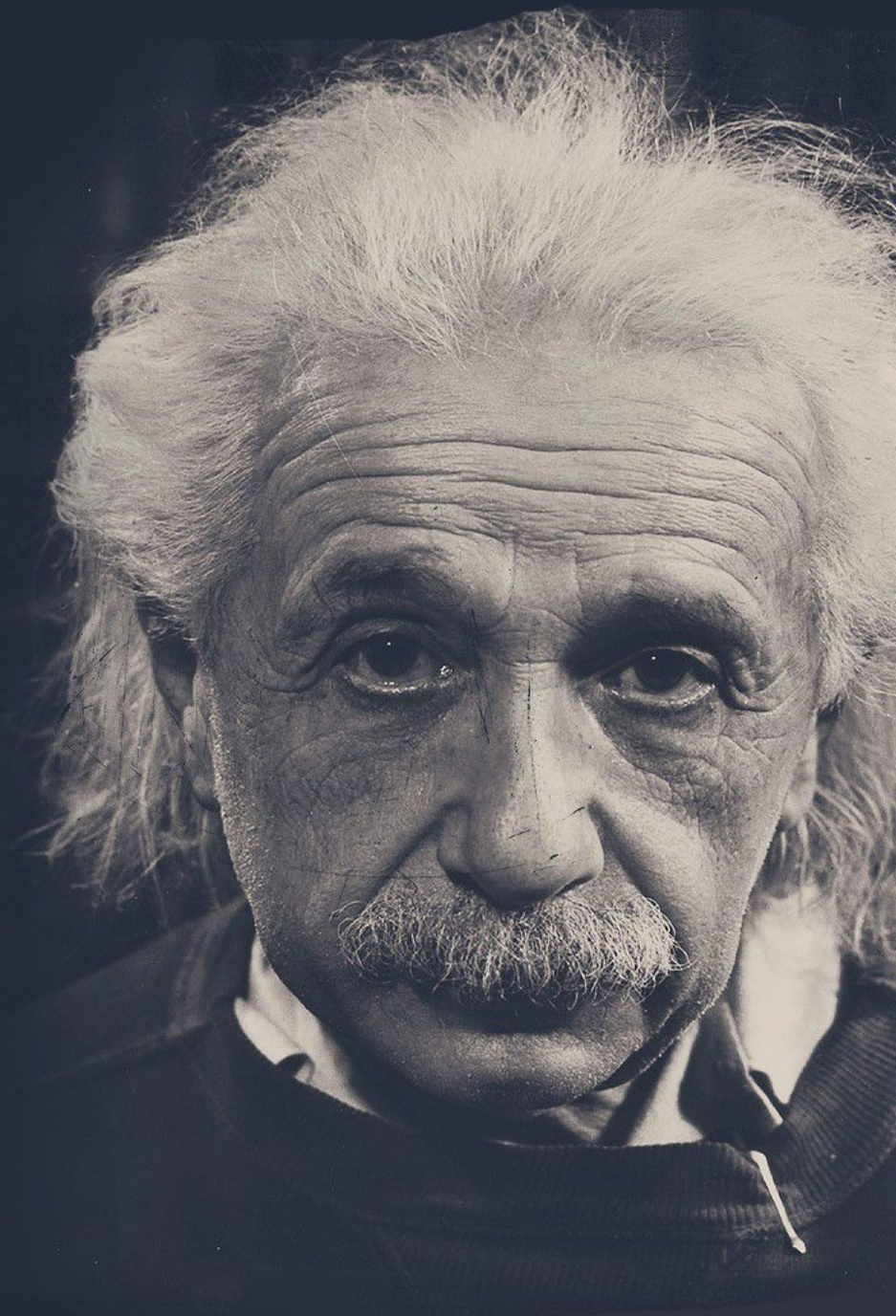


elusives
neutrinos, dark matter & dark energy physics


KEEPER

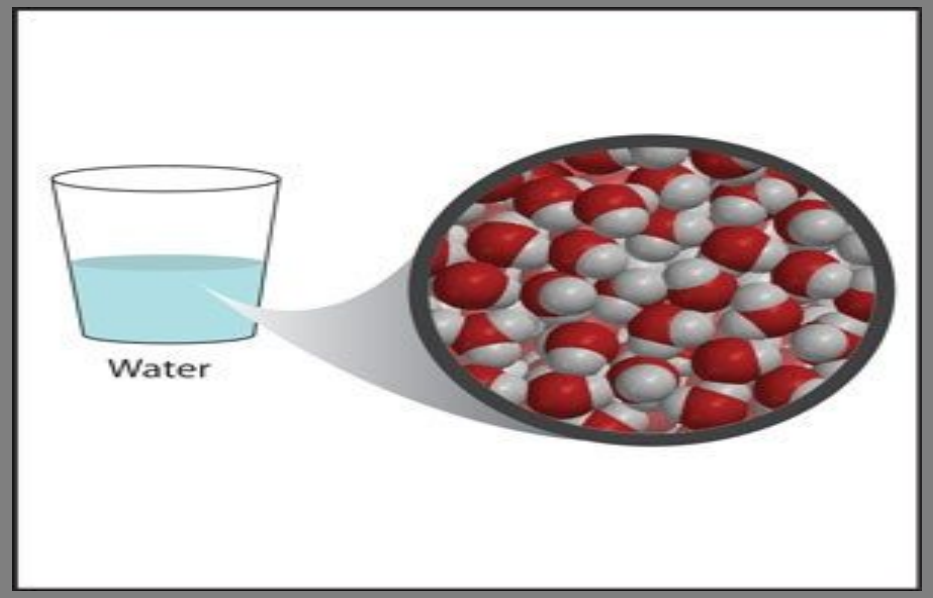
We study how our world works

We study matter and its interactions



=1,700,000,000,000,000,000,000 molecules

These molecules go around and bounce off each other. We have our single water particle.



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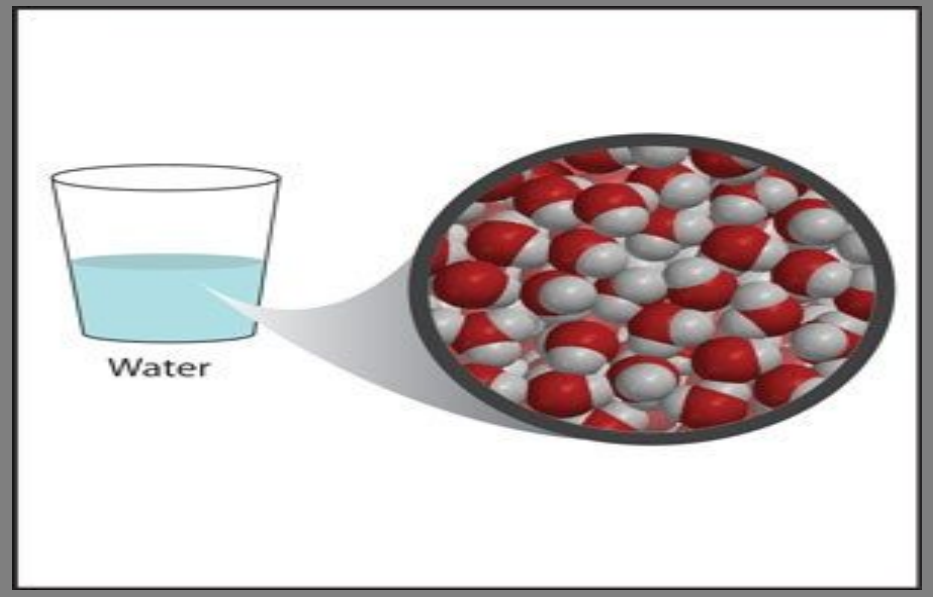

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End of the story??

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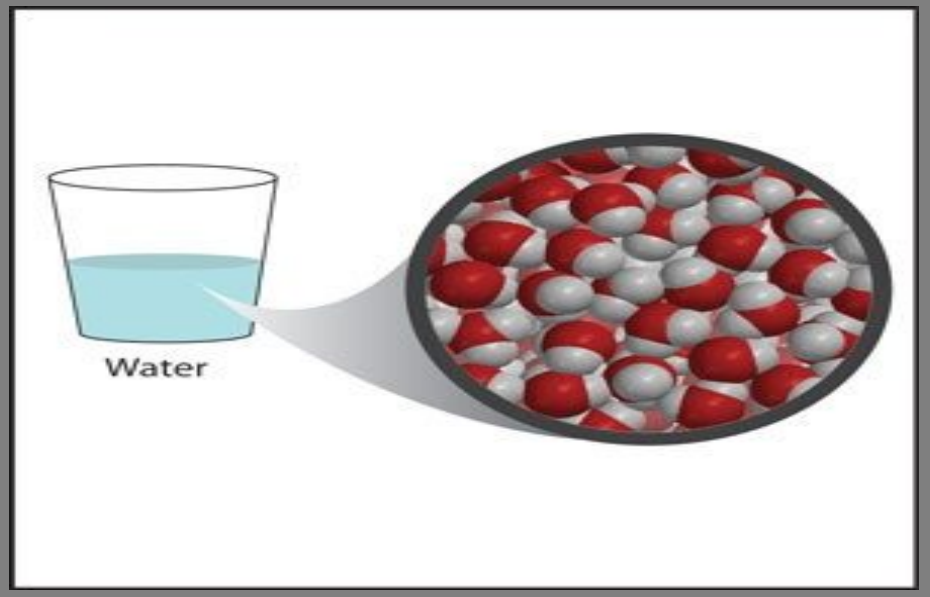

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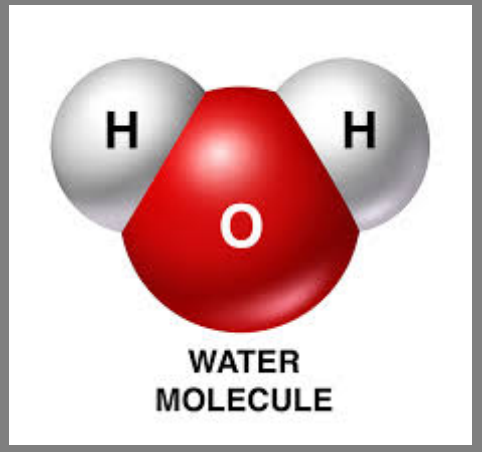
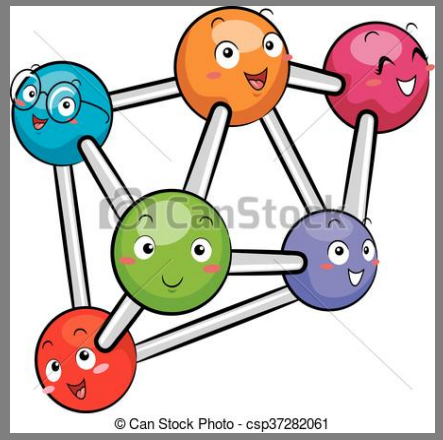
Molecules are made of atoms!





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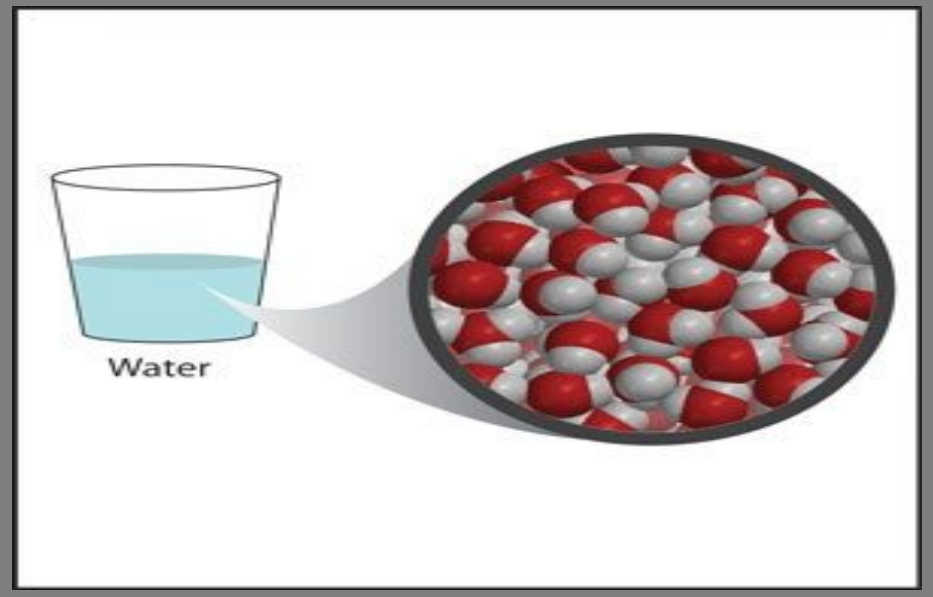

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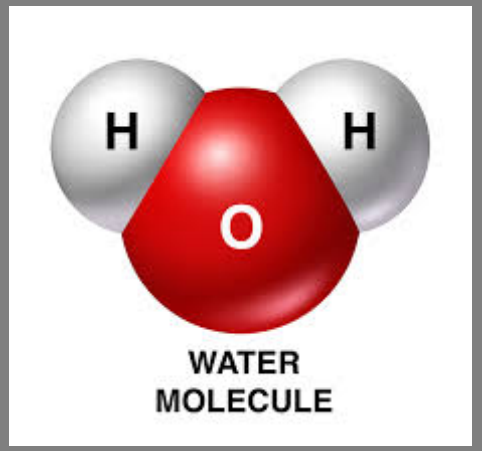
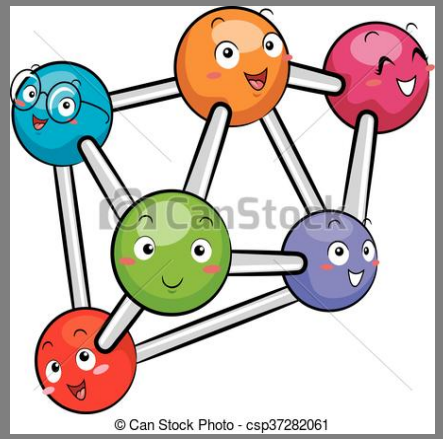
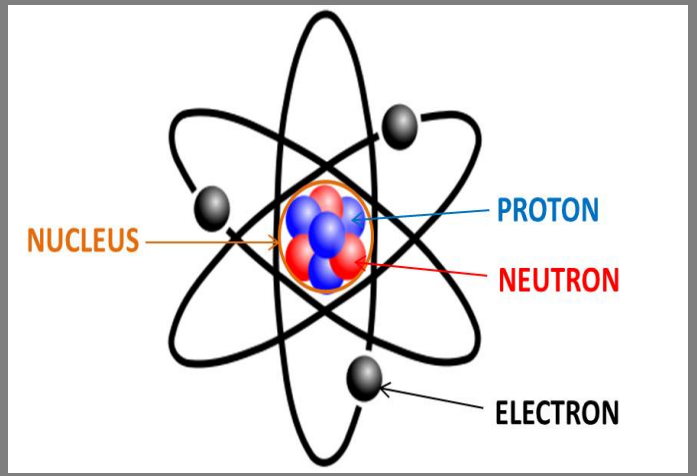


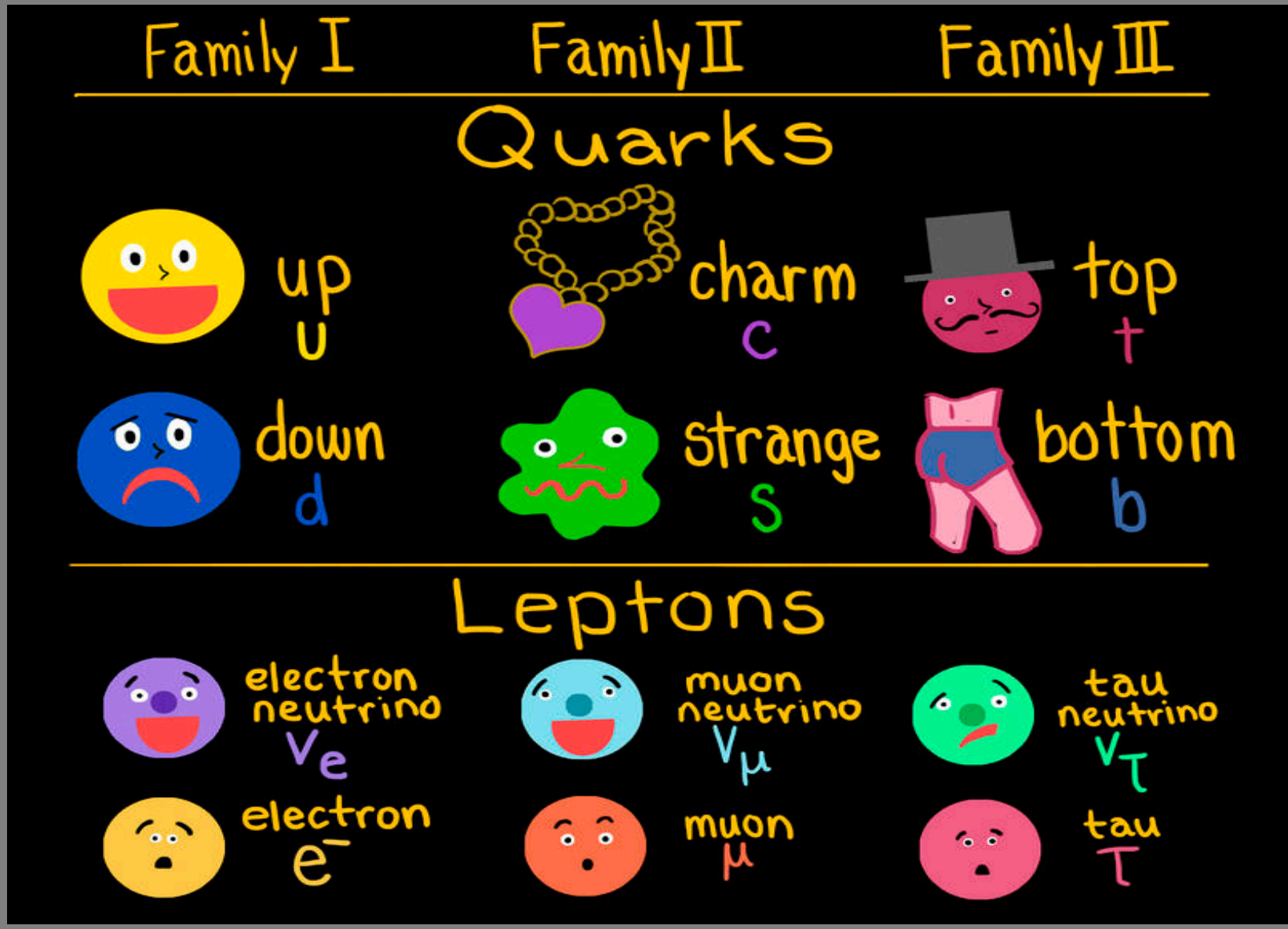


..and atoms are made of..



We classify matter in:

1)QUARKS



FERMIONS

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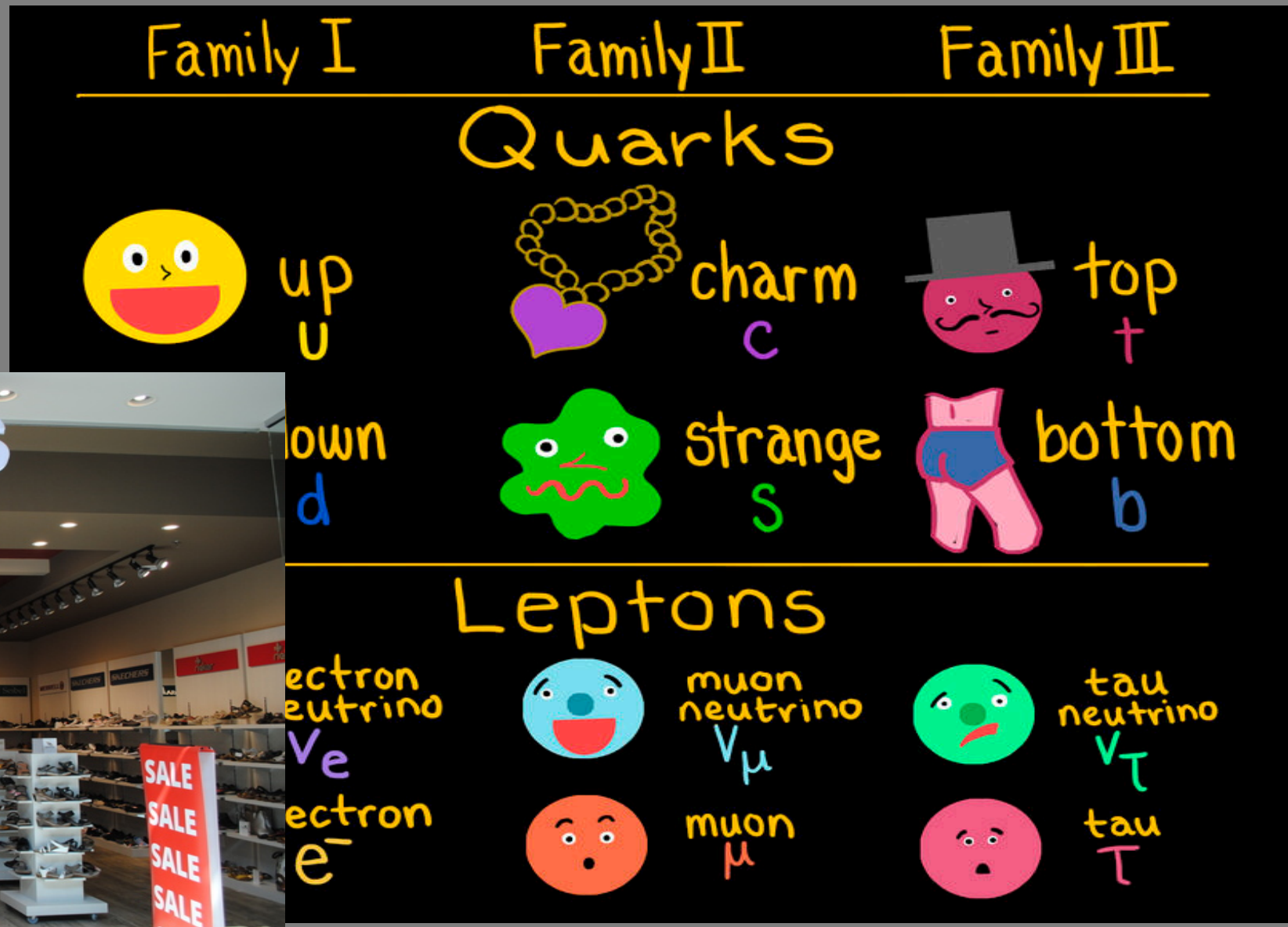

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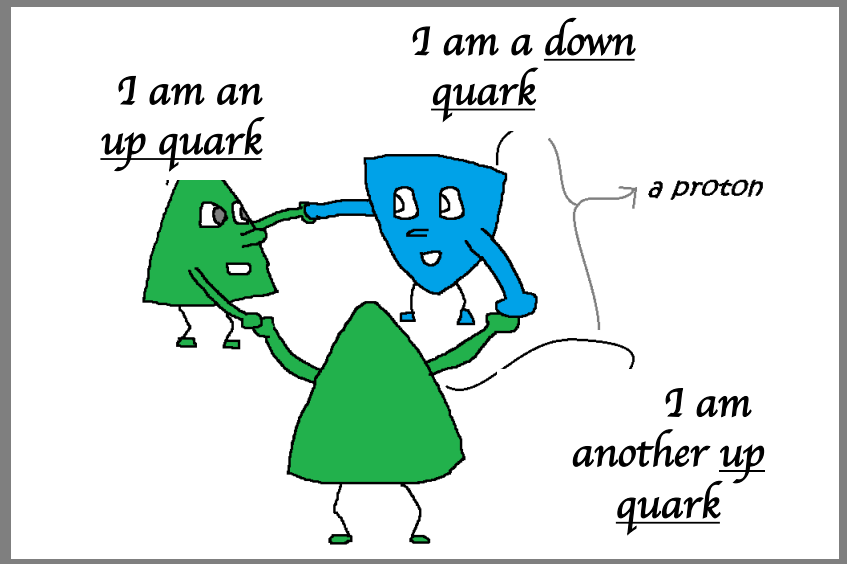
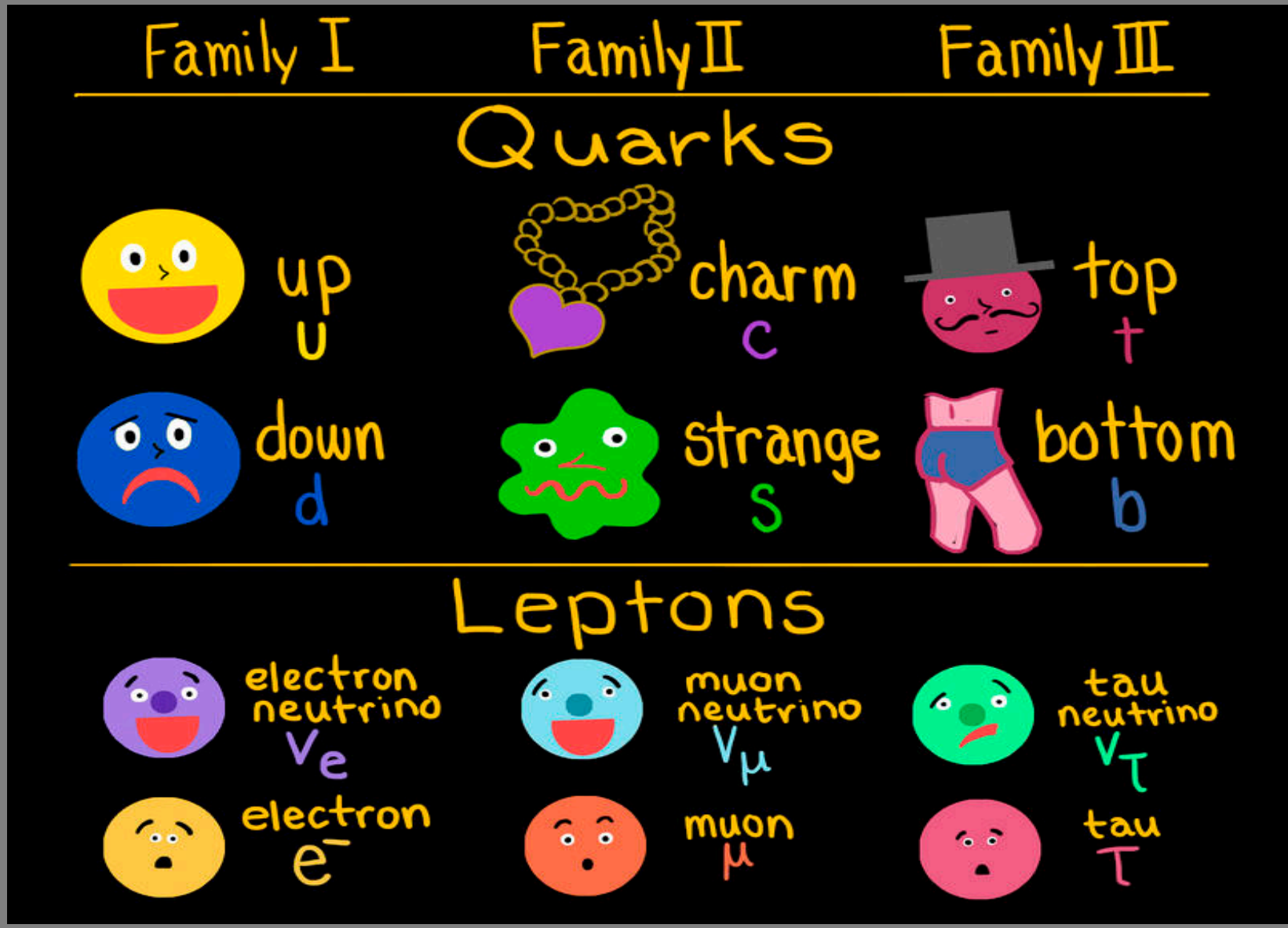


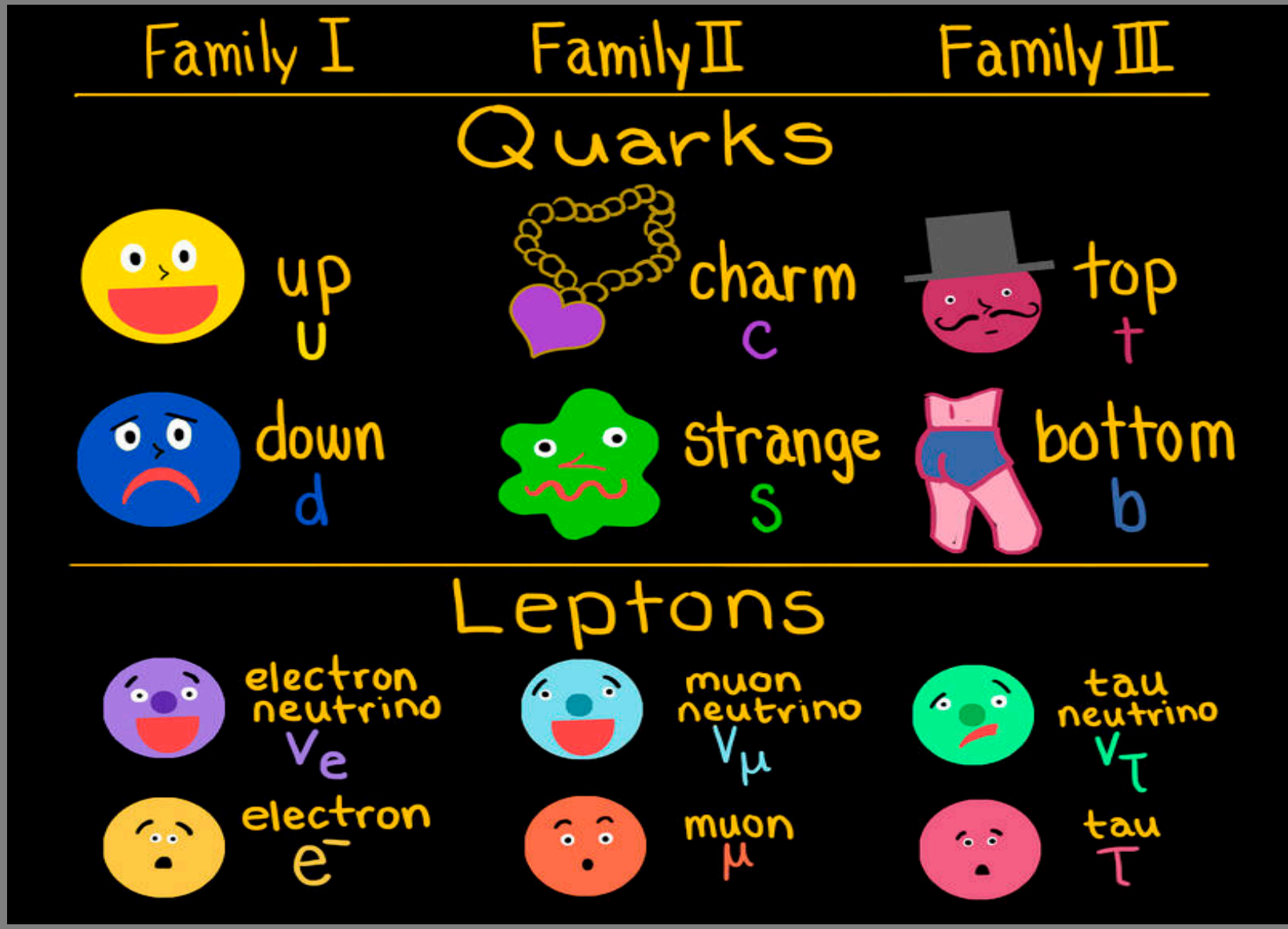


FERMIONS

We classify matter in:

1)QUARKS

2)LEPTONS



FERMIONS

The matter component I have discussed are NOT able to talk to each other

They need help to do that! They are somehow shy

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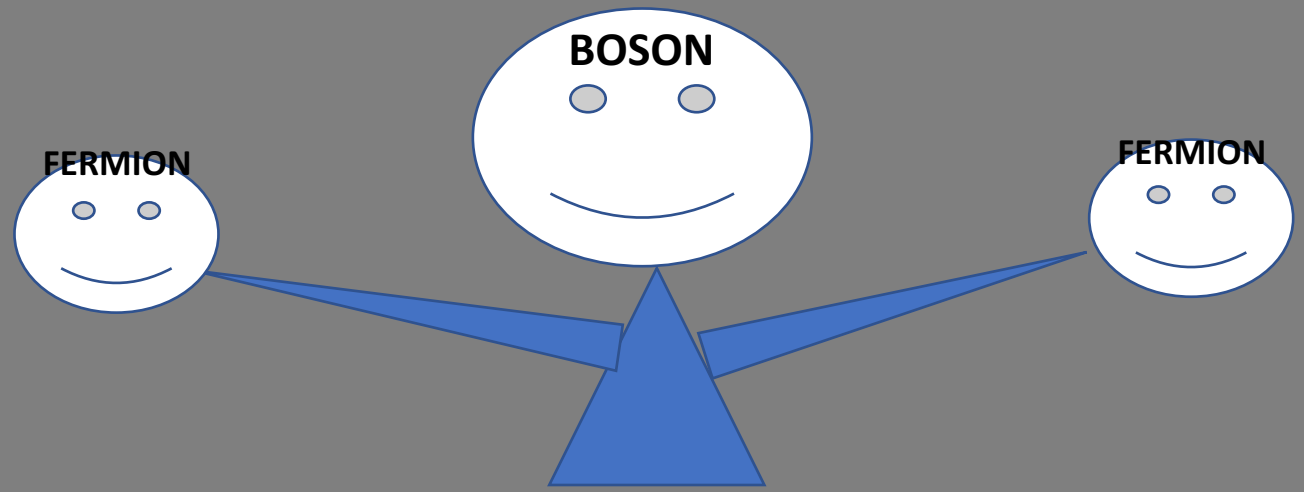

So, there are around in the universe what we call BOSONS, which are the particle that bring information

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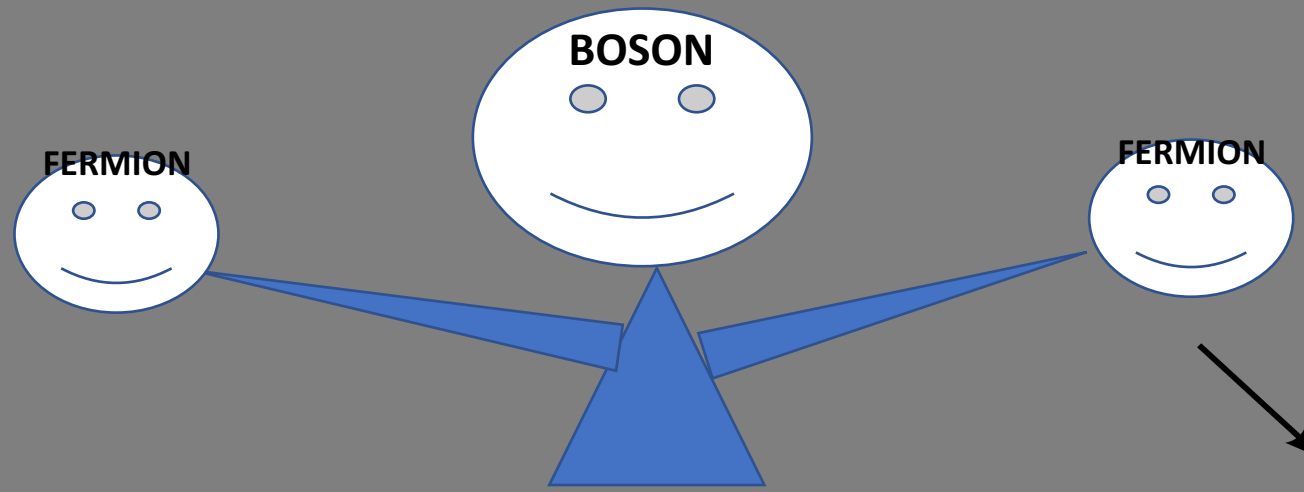
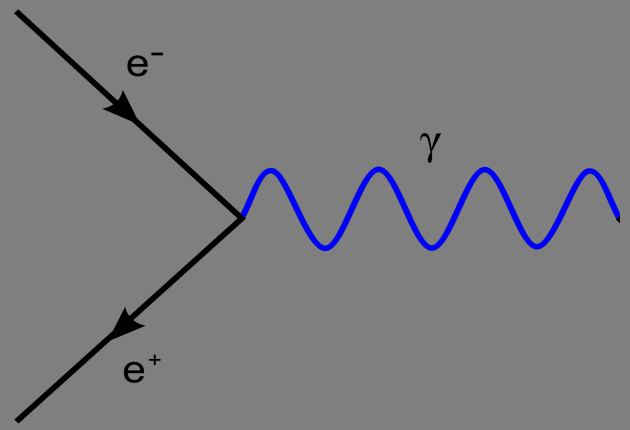




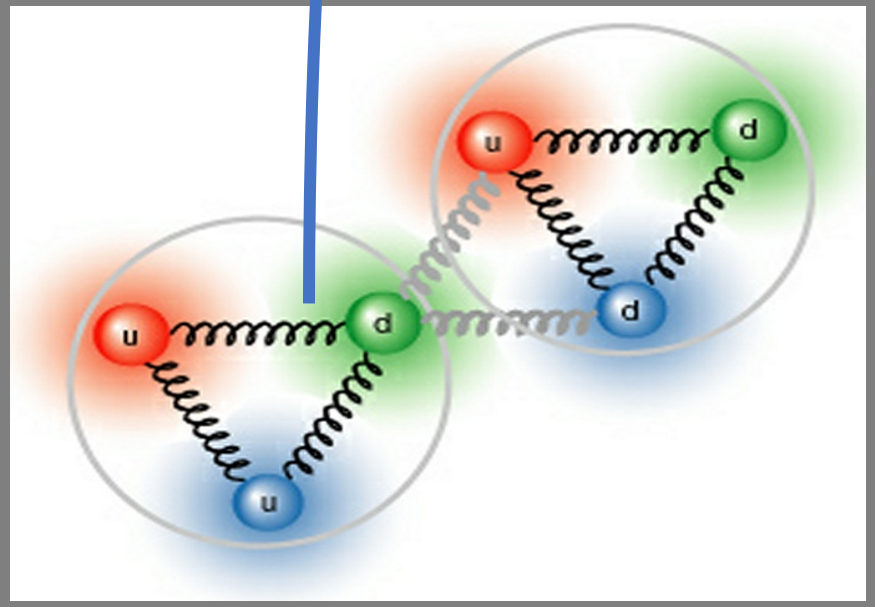
So, there are around in the universe what we call BOSONS, which are the particle that bring information

There are four fundamental forces at work in the universe, each of them has a different messanger:

1)Strong Force

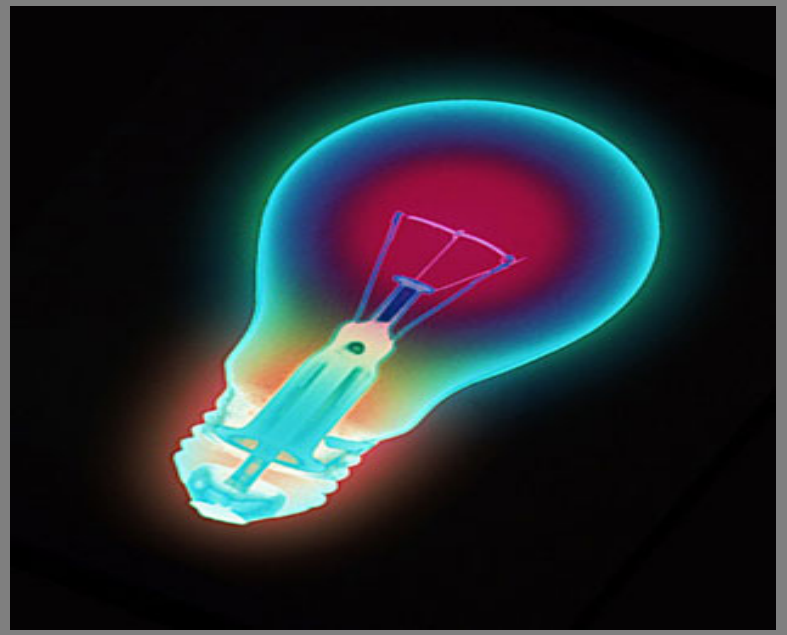
Messanger=GLUON

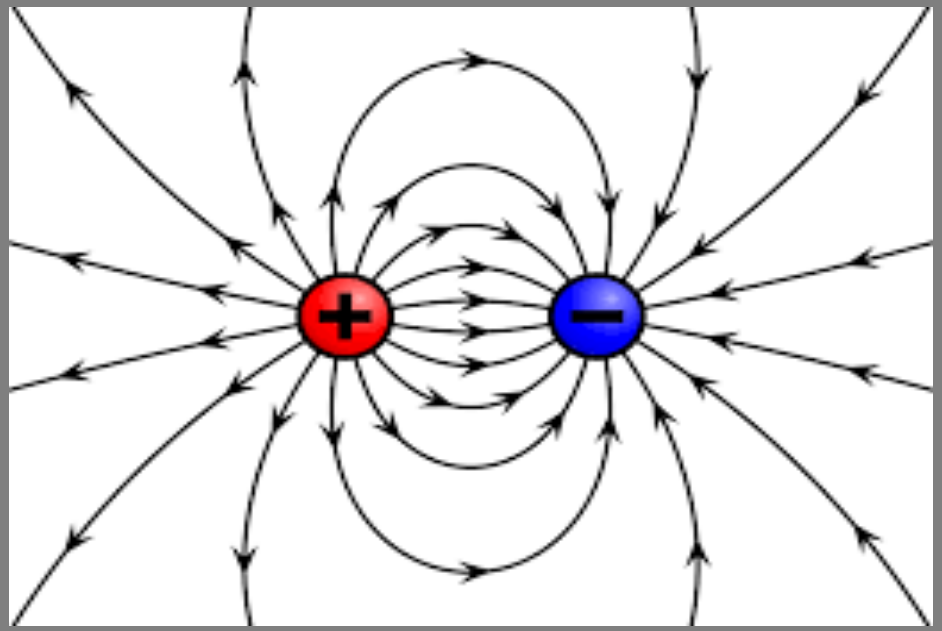
-Quark Interaction
-Strongest force



Messanger:Photon

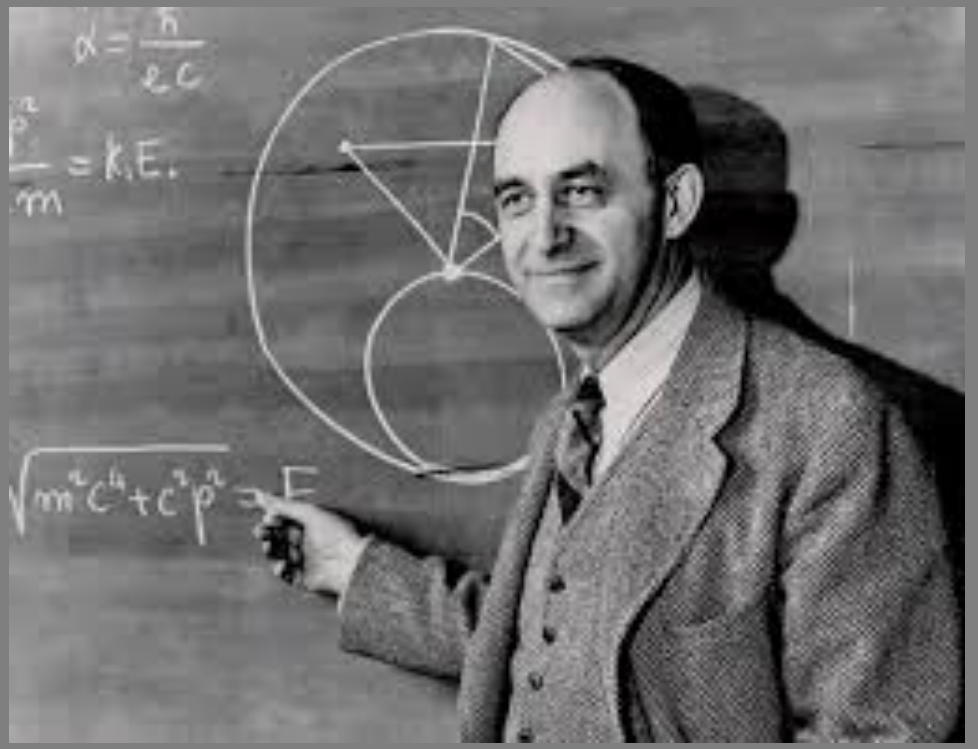
2)Electromagnetic Force





Messanger: W, Z

3)Weak Force



-Weaker than Strong and Electromagnetic forces, but stronger than gravity
-Is the only interaction in which neutrinos (and maybe dark matter)are involved

4)Gravitational Force

-The weakest force
-The force due to masses

How do we study these particles and forces?

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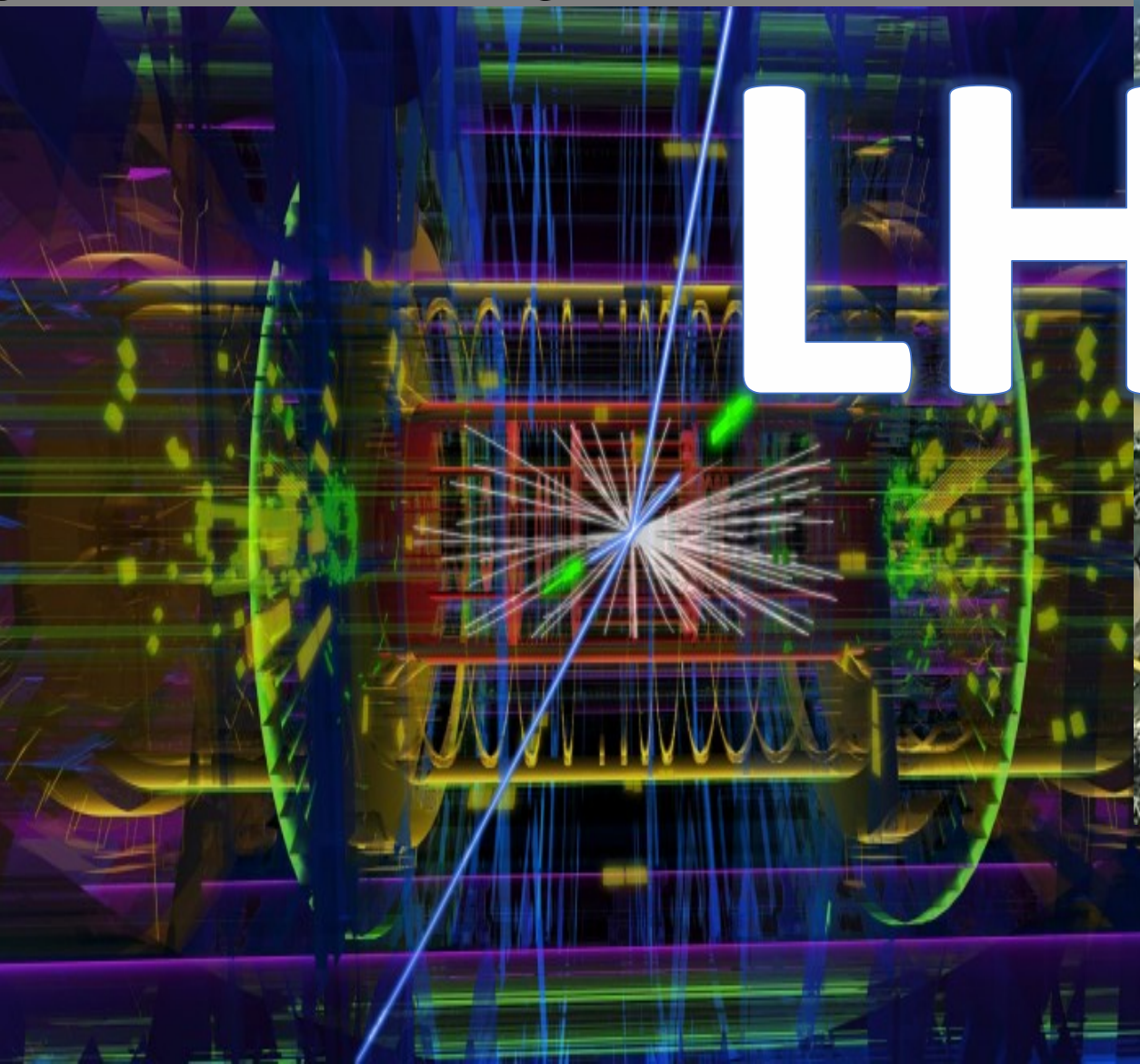
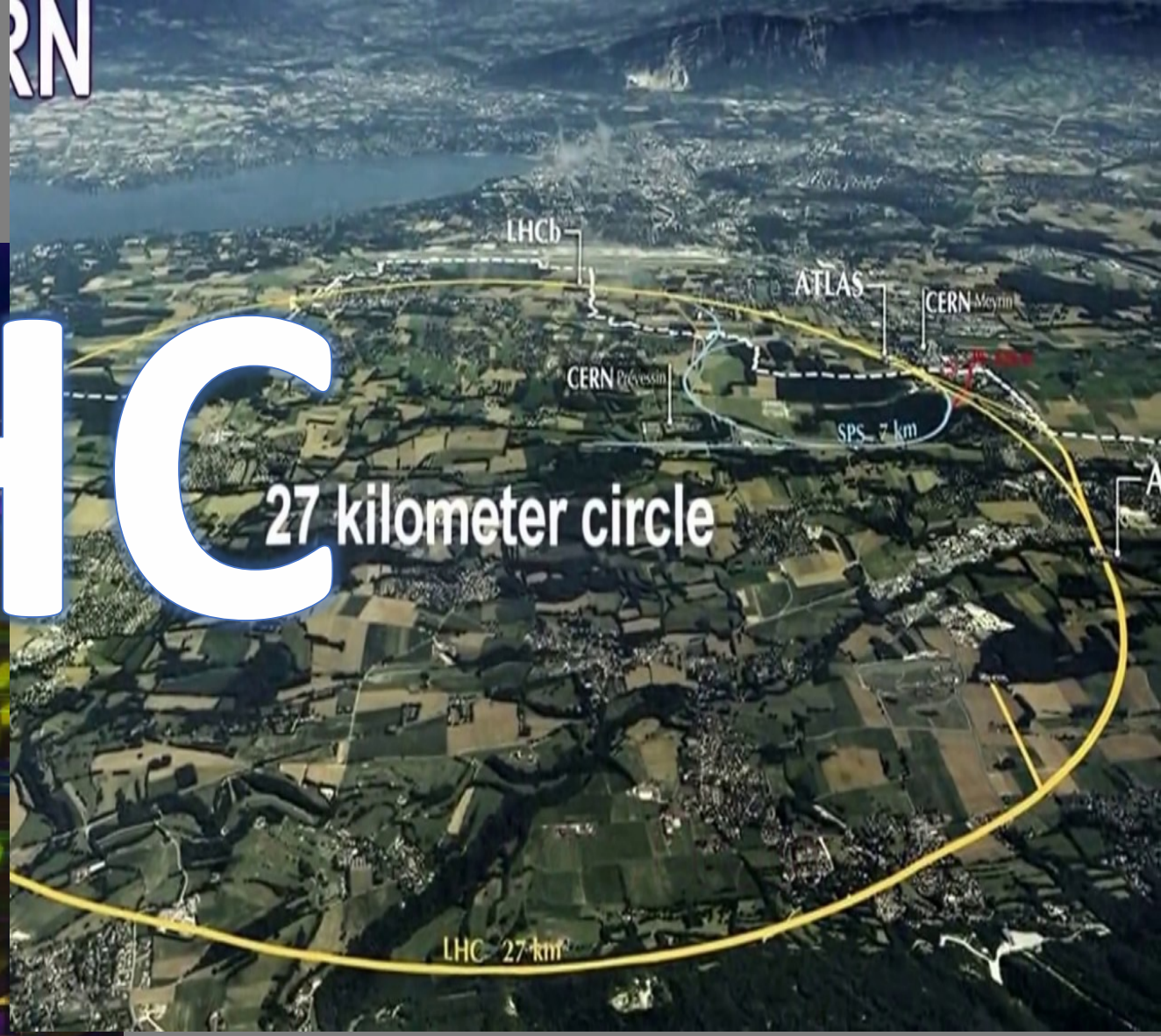
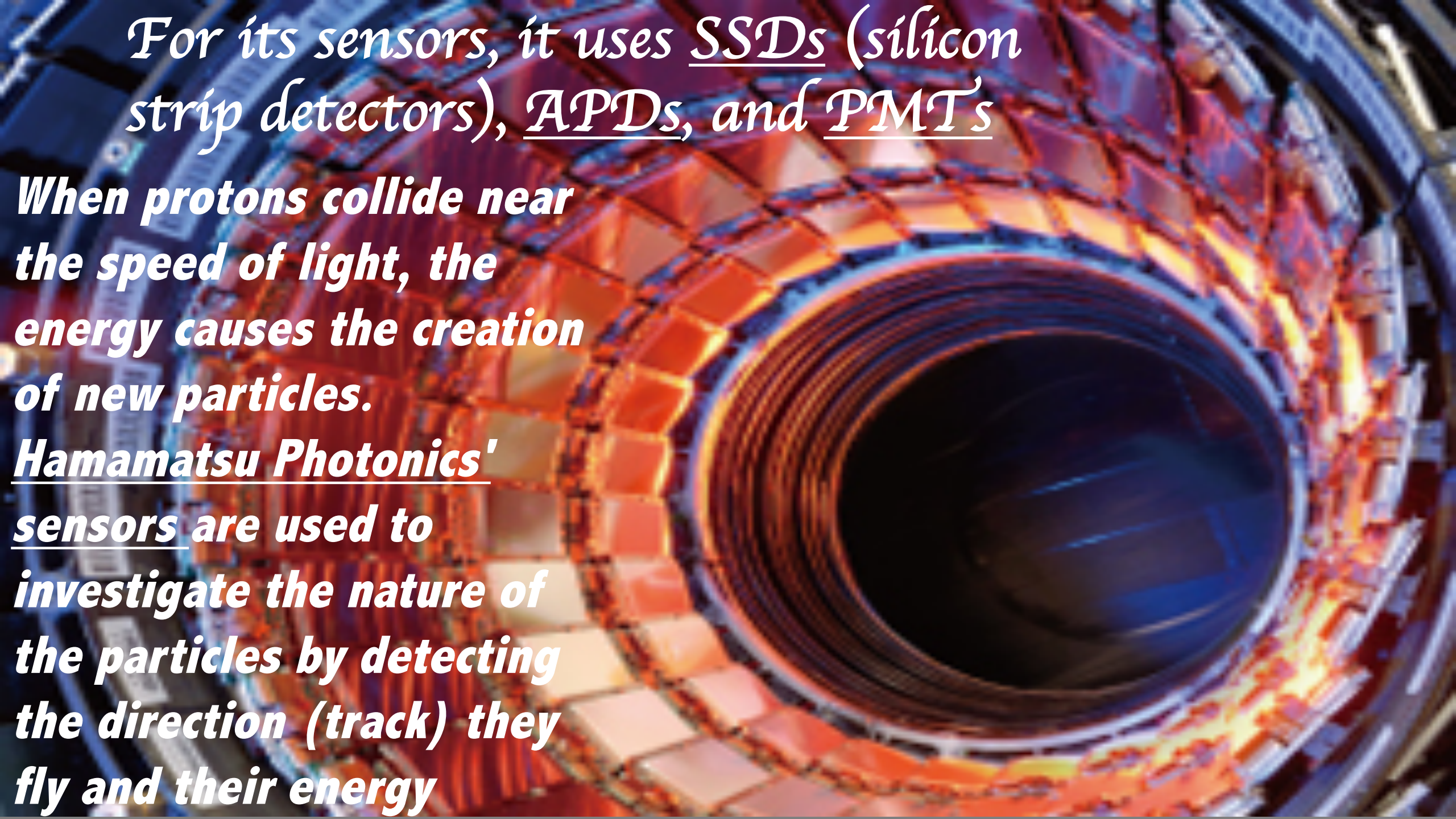




LHC



For its sensors, it uses SSDs (silicon strip detectors), APDs, and PMTs

When protons collide near the speed of light, the energy causes the creation of new particles. Hamamatsu Photonics' sensors are used to investigate the nature of the particles by detecting the direction (track) they fly and their energy

ご清聴ありがとうございました