POWER OF 10

ZOOM

FROM MICRO TO MACROCOSMOS

This is a trip at high speed,
jumping distances by factor of 10.

Start with 10^0 equivalent to 1 meter, and increasing sizes by factor of 10s ,or 10^1 (10 meters), 10^2 (10x10 = 100 meters, 10^3 (10x10x10 = 1.000 meters), 10^4 (10x10x10x10 = 10.000 meters), so on, until the limit of our inmagination in direction to the macrocosmos.

Later let's return, a little faster, up to the point where we started and continue our trip in the opposite direction reducing distances of travel by factors of 10 into the microcosmos.

Observe the constancy of the laws of the universe and think about how much the human race still needs to learn...

BON VOYAGE!

10^0

1 meter

Distance
to a bunch of
leaves,
in the garden

10^1

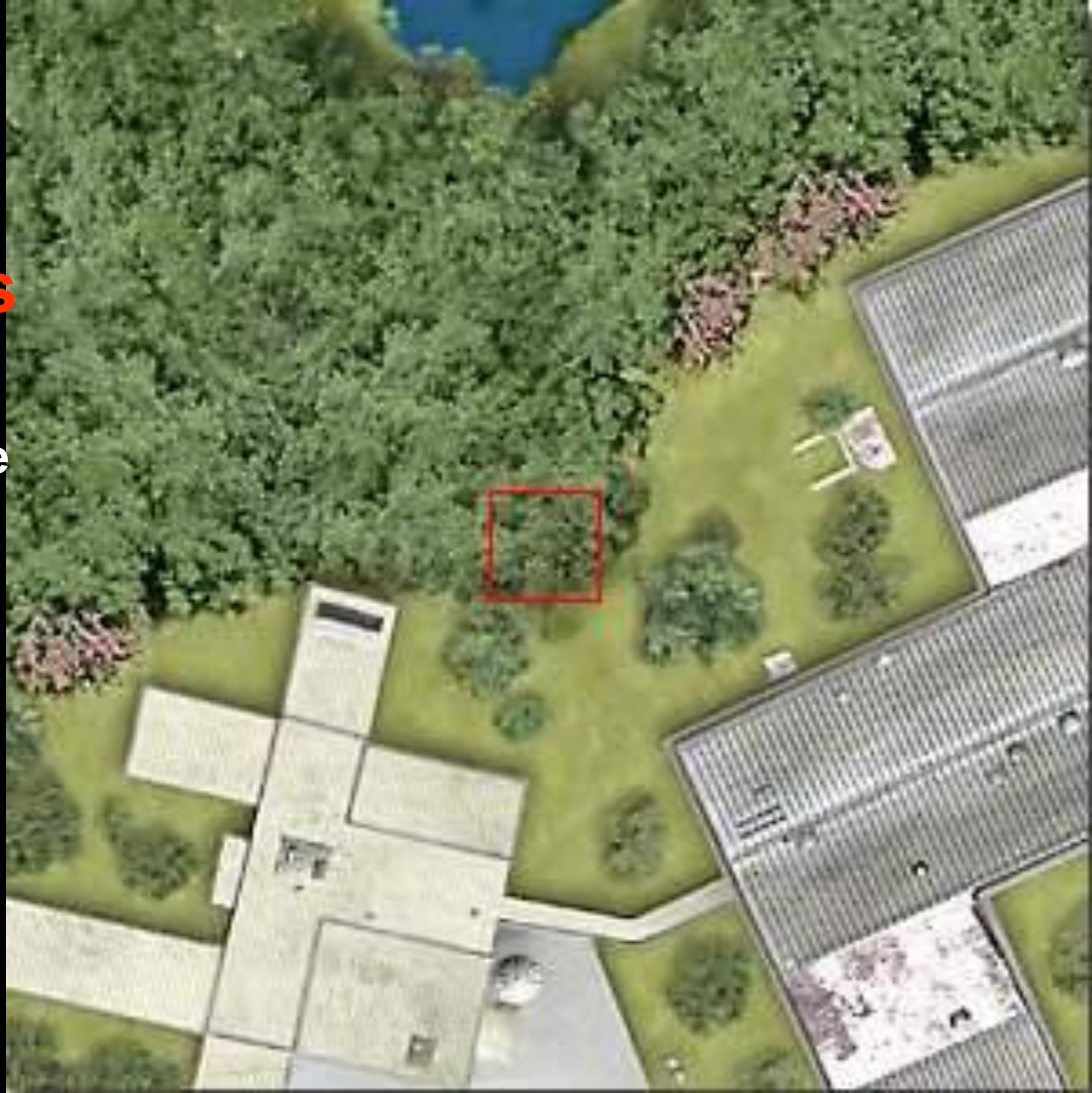
10 meters

Start our trip upwards .... We could see the foliage.

10^2

100 meters

At this distance we can see the limits of the forest and the edifications



10^3

1 km

We will pass from meters to kilometers..

Now it is possible to jump with a parachute ...

10^4

10 km

The city could be observed but we really can not see the houses

10^5

100 km

At this height, the state of Flórida - USA, can be seen..

10^6

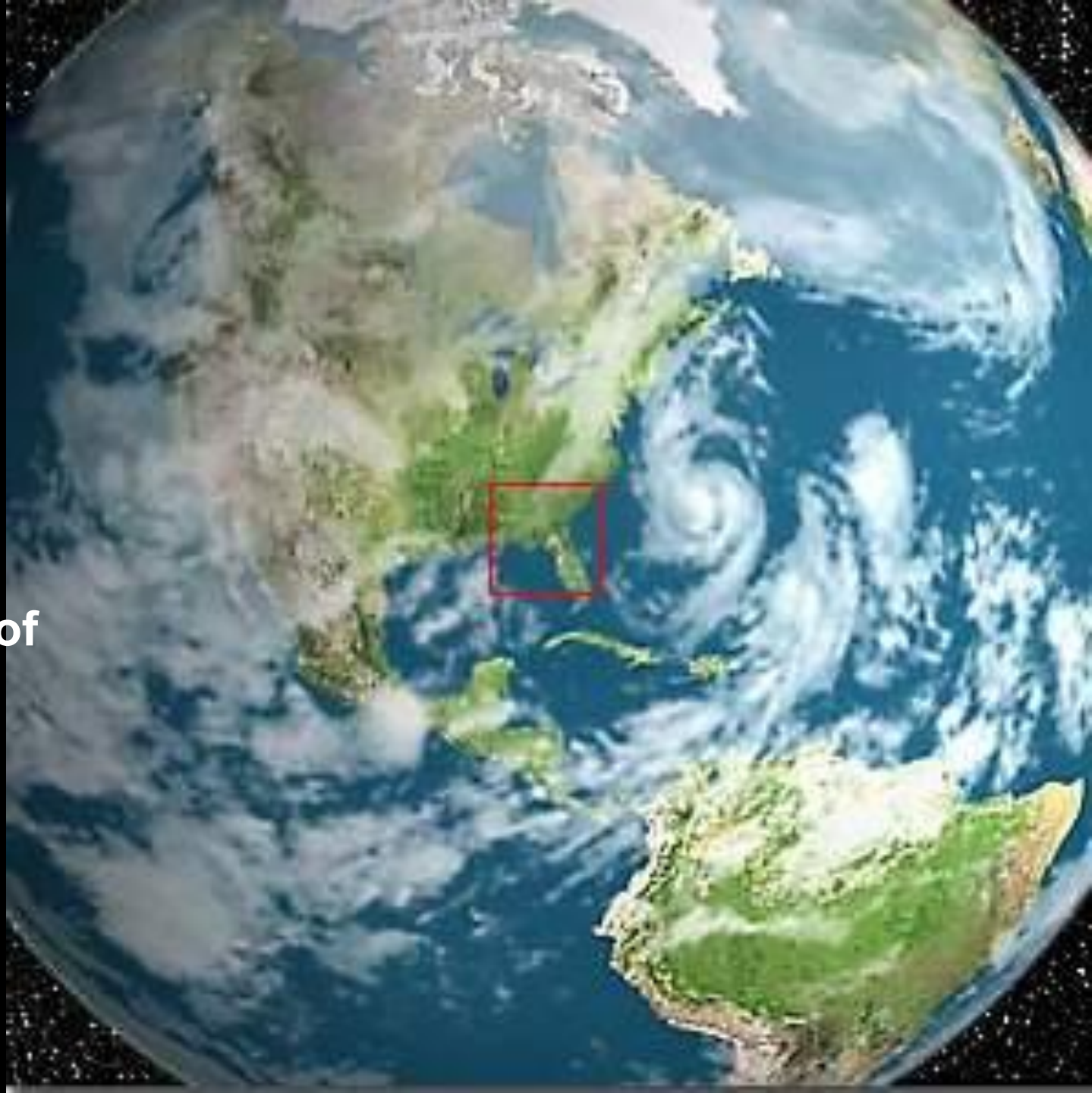
1.000 km

Typical sight from a satellite

10^7

10.000 km

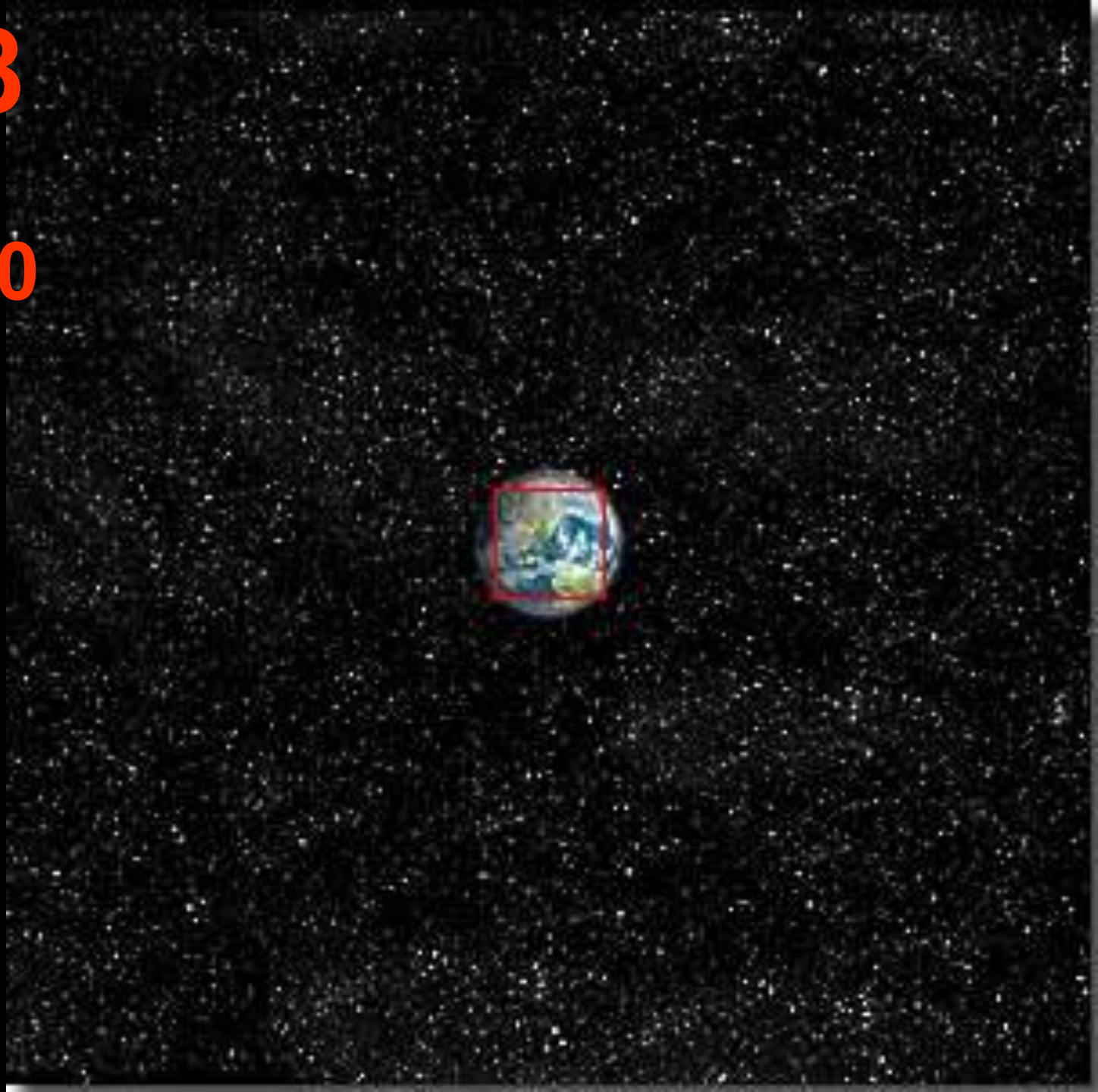
The north hemisphere of Earth, and part of South America



10^8

100.000 km

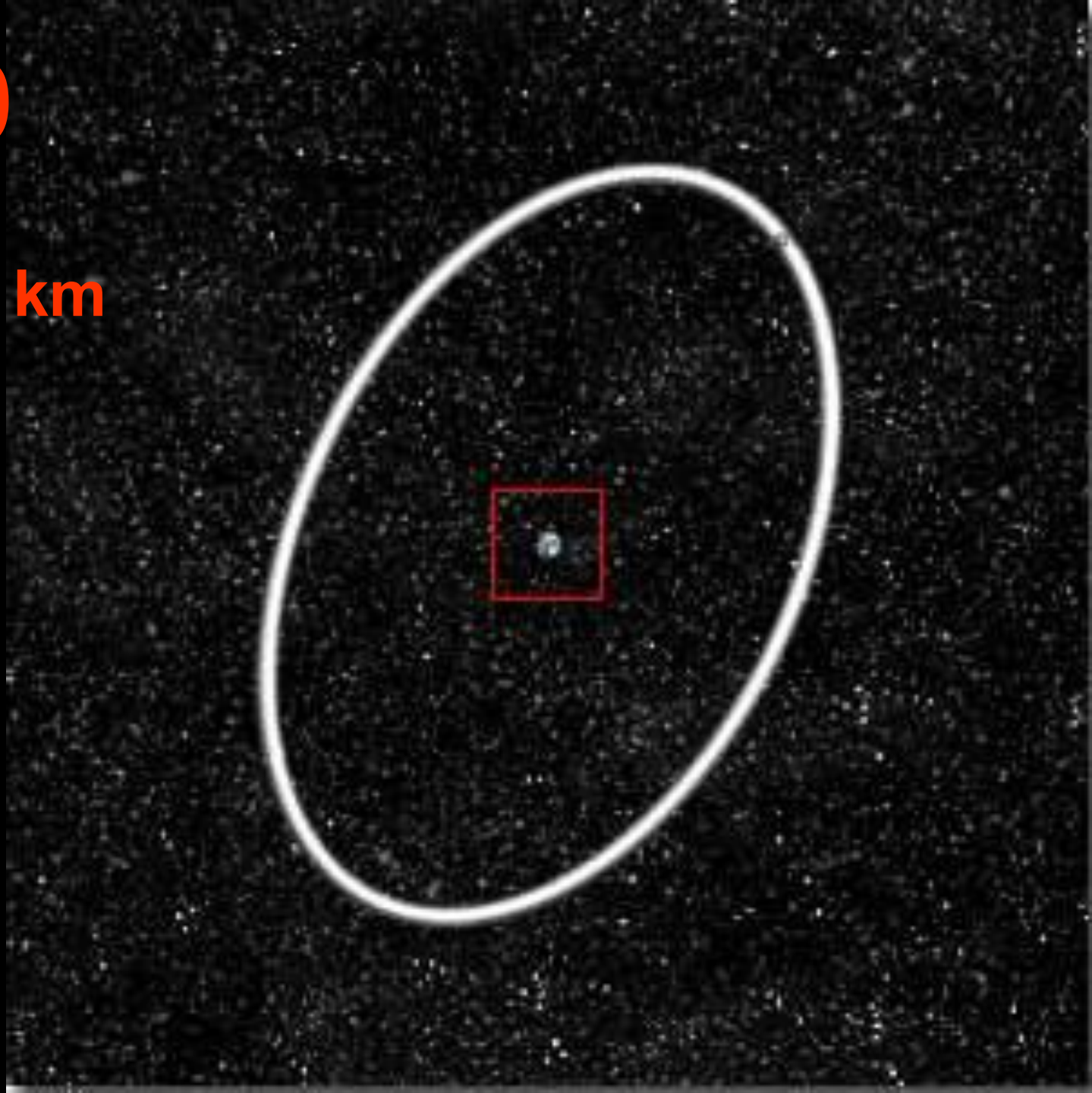
The Earth starts looking small...



10^9

1 millón de km

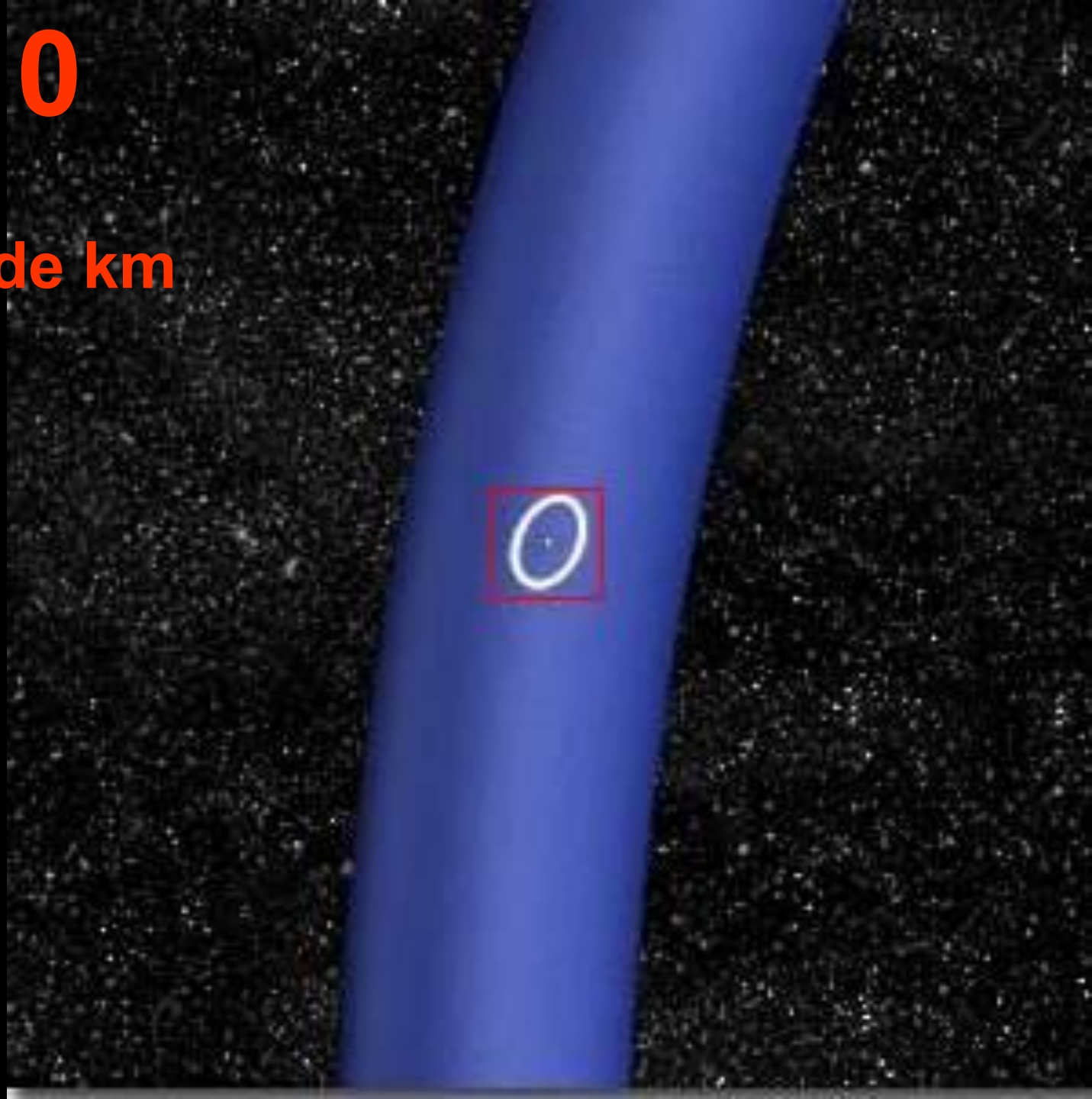
The Earth and the Moon's órbit in white....

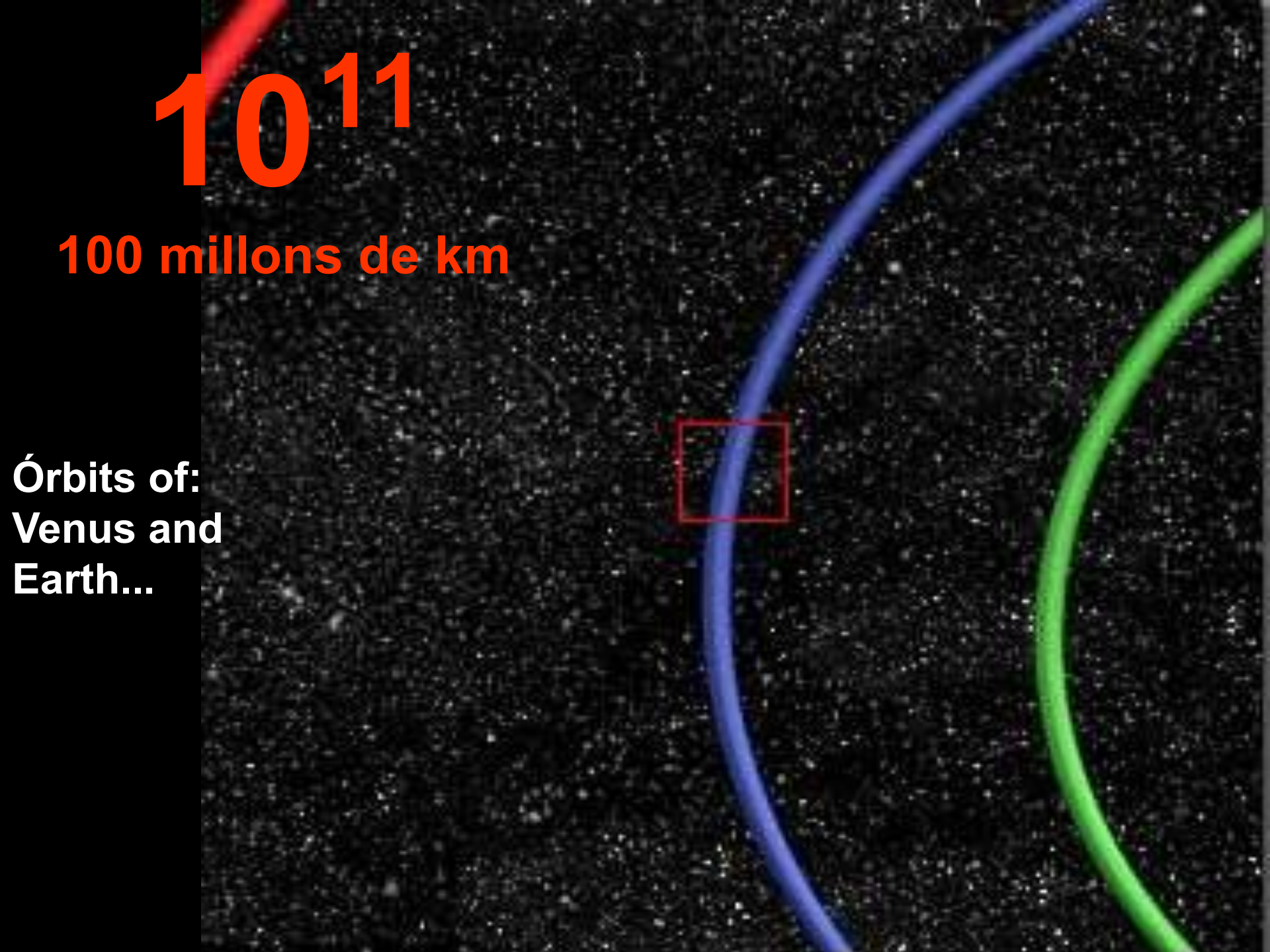


10^{10}

10 Millons de km

Part of the Earth's Orbit in blue

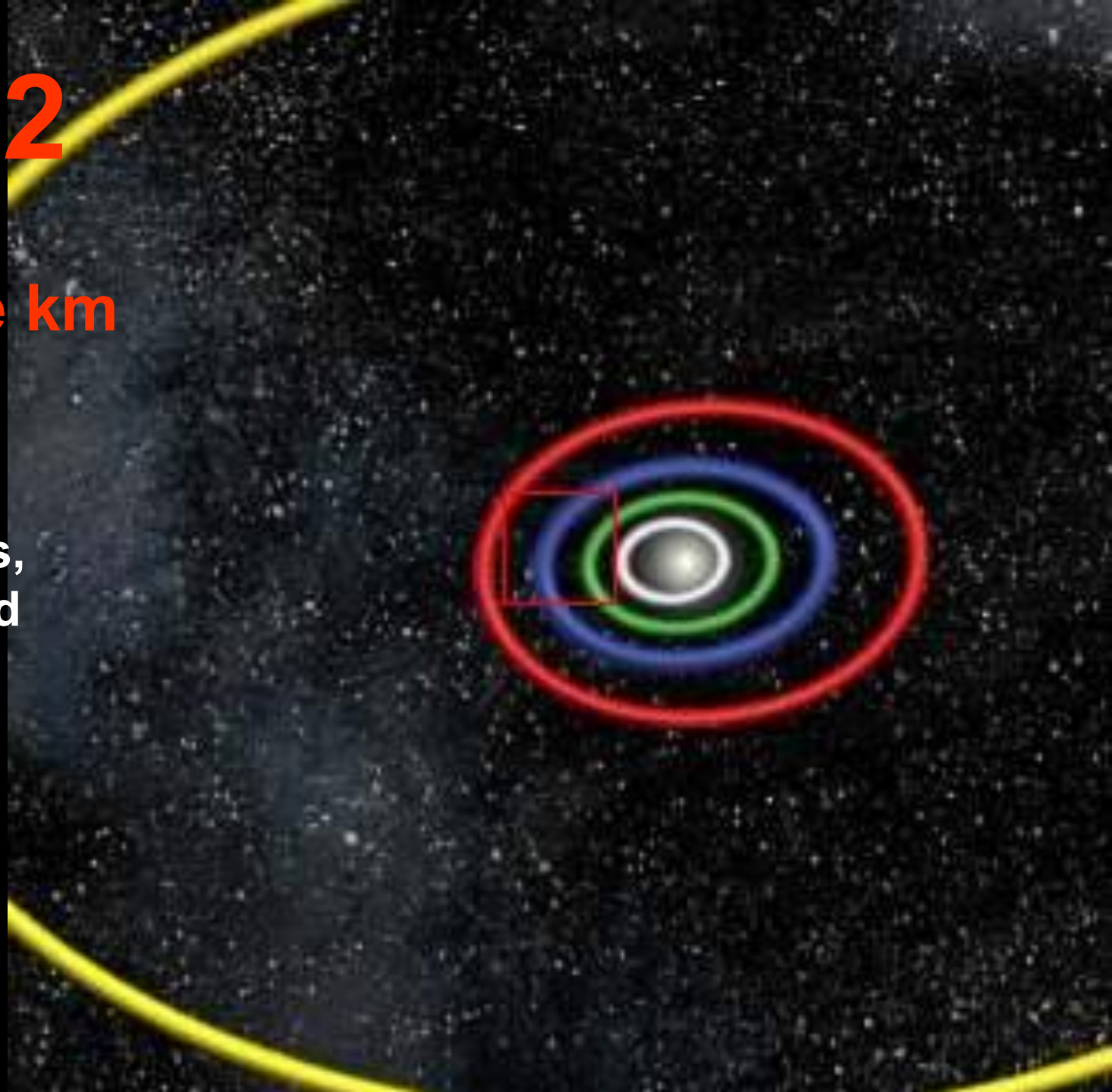



10^{11}
100 millons de km
Órbits of:
Venus and
Earth...

10^{12}

1 billón de km

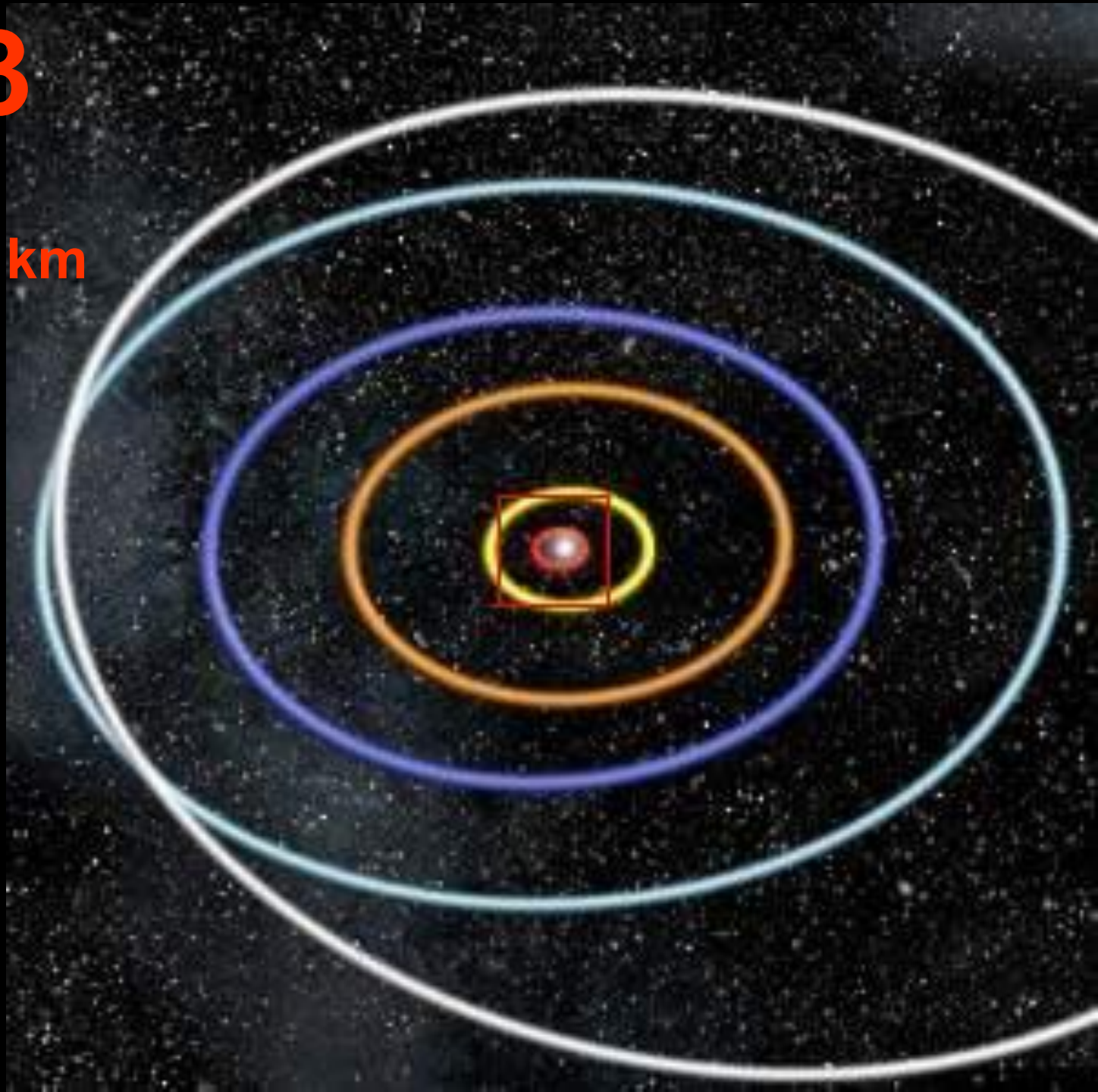
Órbits of:
Mercury, Venus, Earth, Mars and Júpiter.



10^{13}

10 billons de km

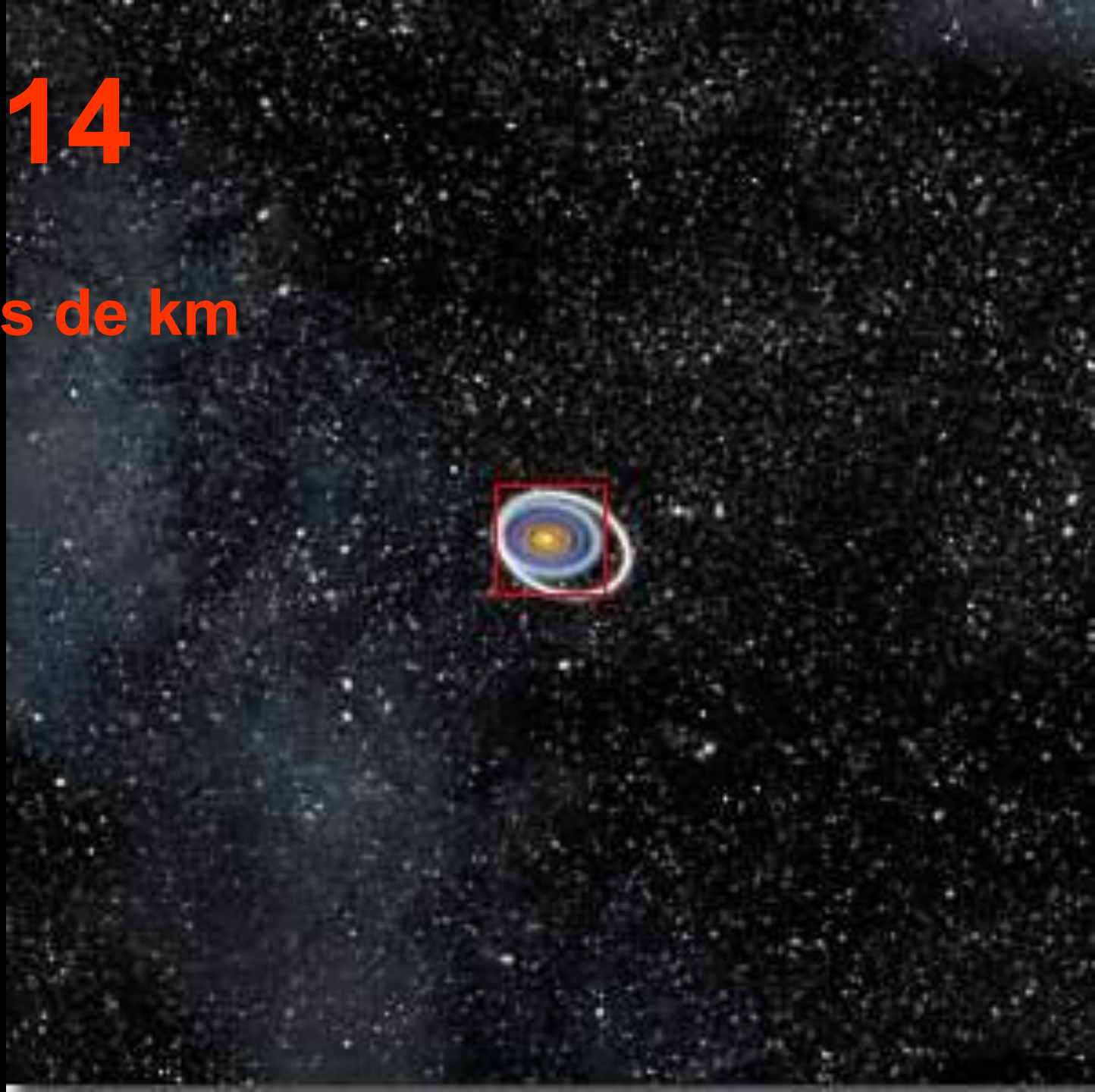
At this height of our trip, we could observe the Solar System and the orbits of the planets



10^{14}

100 Billons de km

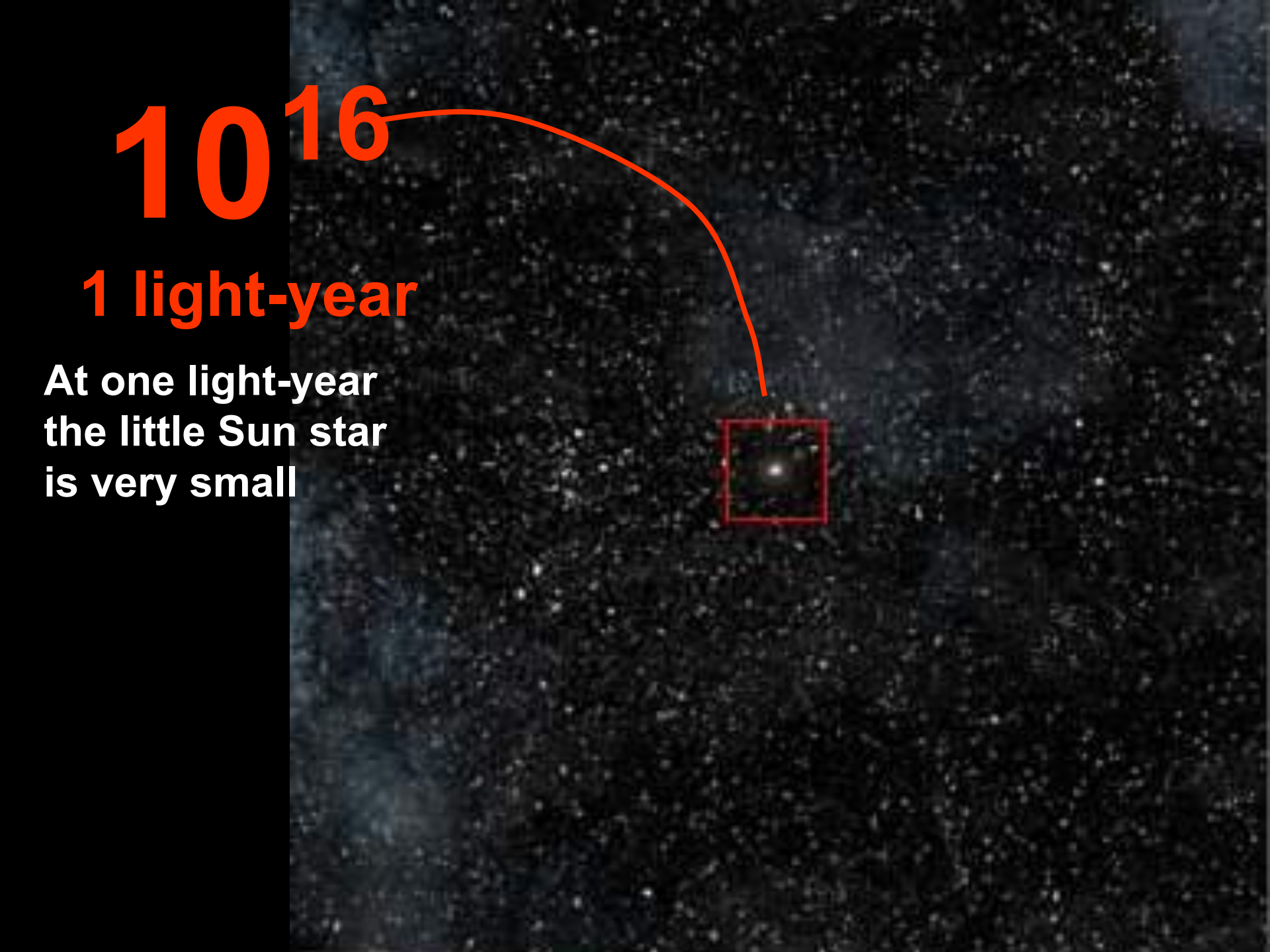
The Solar System starts looking small...



10^{15}

1 trillón de km

The Sun now is a small star in the middle of thousands of stars...


10^{16}
1 light-year
At one light-year
the little Sun star
is very small

10^{17}

10 light-year

Here we will see nothing in the infinity....

10^{18}

100 light-years

“Nothing”
Only stars and
Nebulae...

10^{19}

1,000 light-years

At this distance we started travelling the Via-Láctea (Milky Way), our galaxy.

10^{20}

10,000 light-years

We continued our travel inside the Via-Láctea.

10^{21}

100,000 light-years

We started reaching the periphery of the Via-Láctea

10^{22}

1 millión light-years

At this tremendous distance we could see all the Via-Láctea & other galáxies too...

10^{23} - 10 million light-years

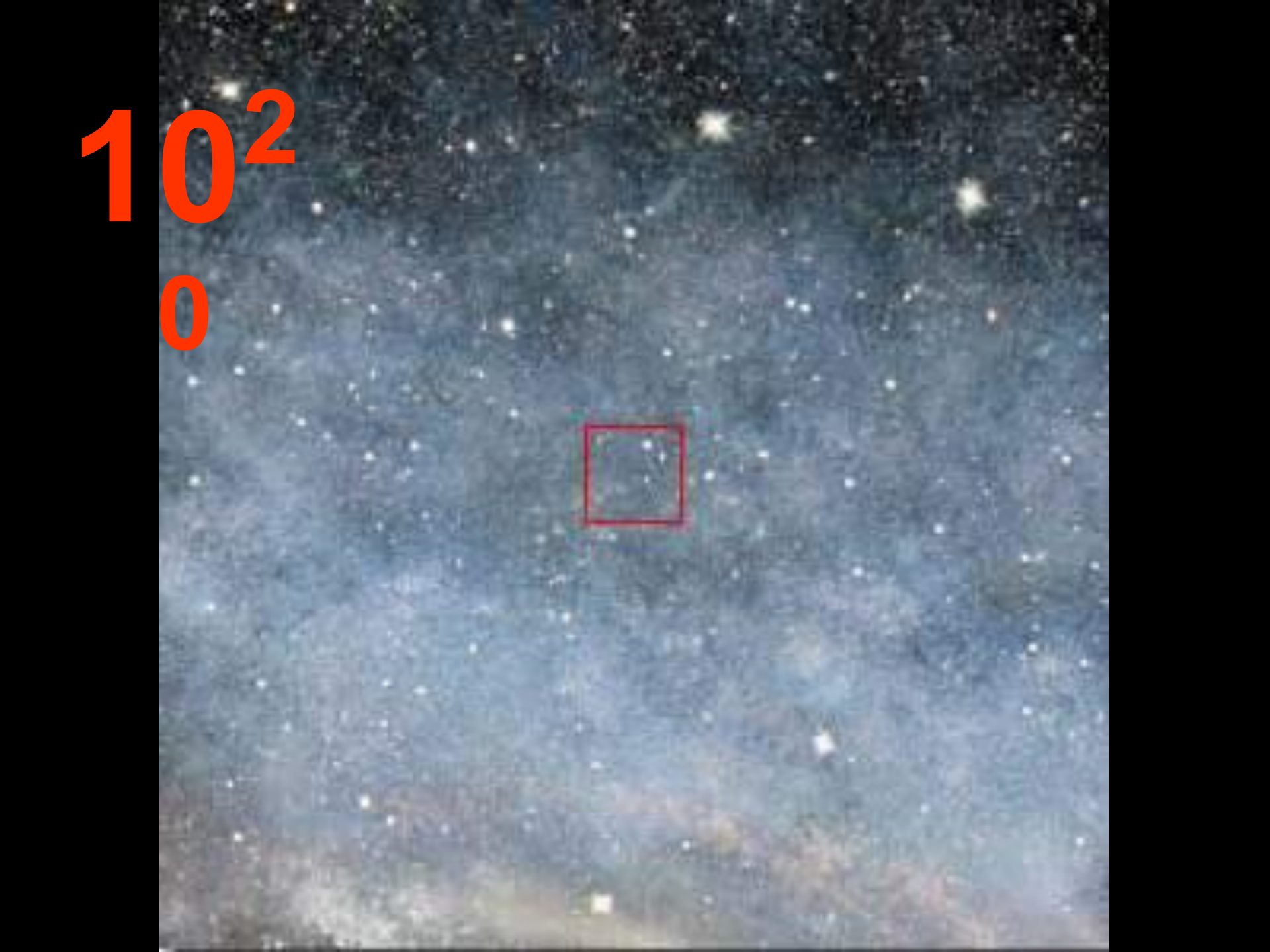
From this distance, all the galaxies look small with inmense empty spaces in between.

The same laws are ruling in all bodies of the Universe.

We could continue traveling upwards with our imagination, but now we will return home quickly


10^2
2


10^2
1


10^2
0

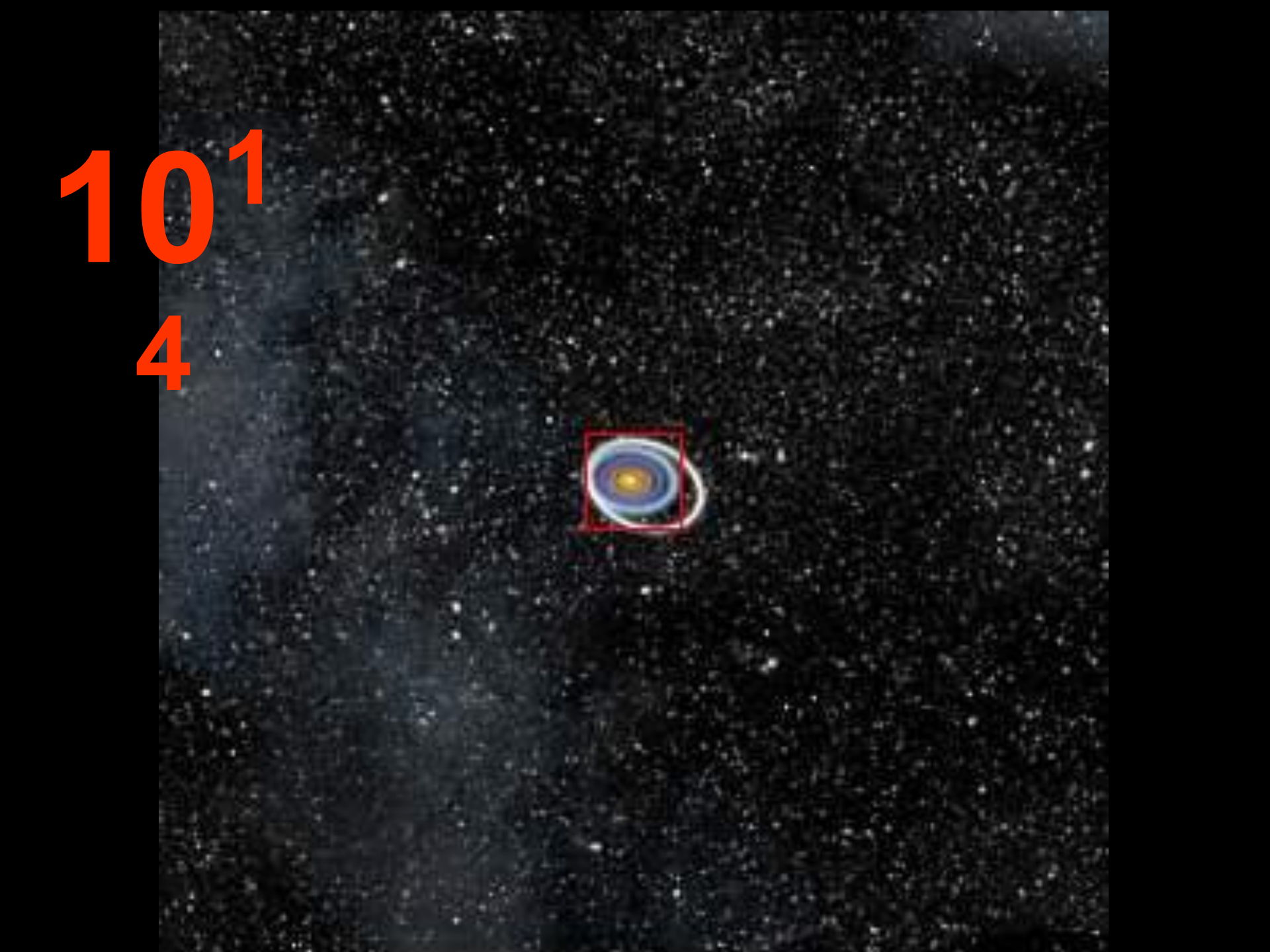

10^{11}
9

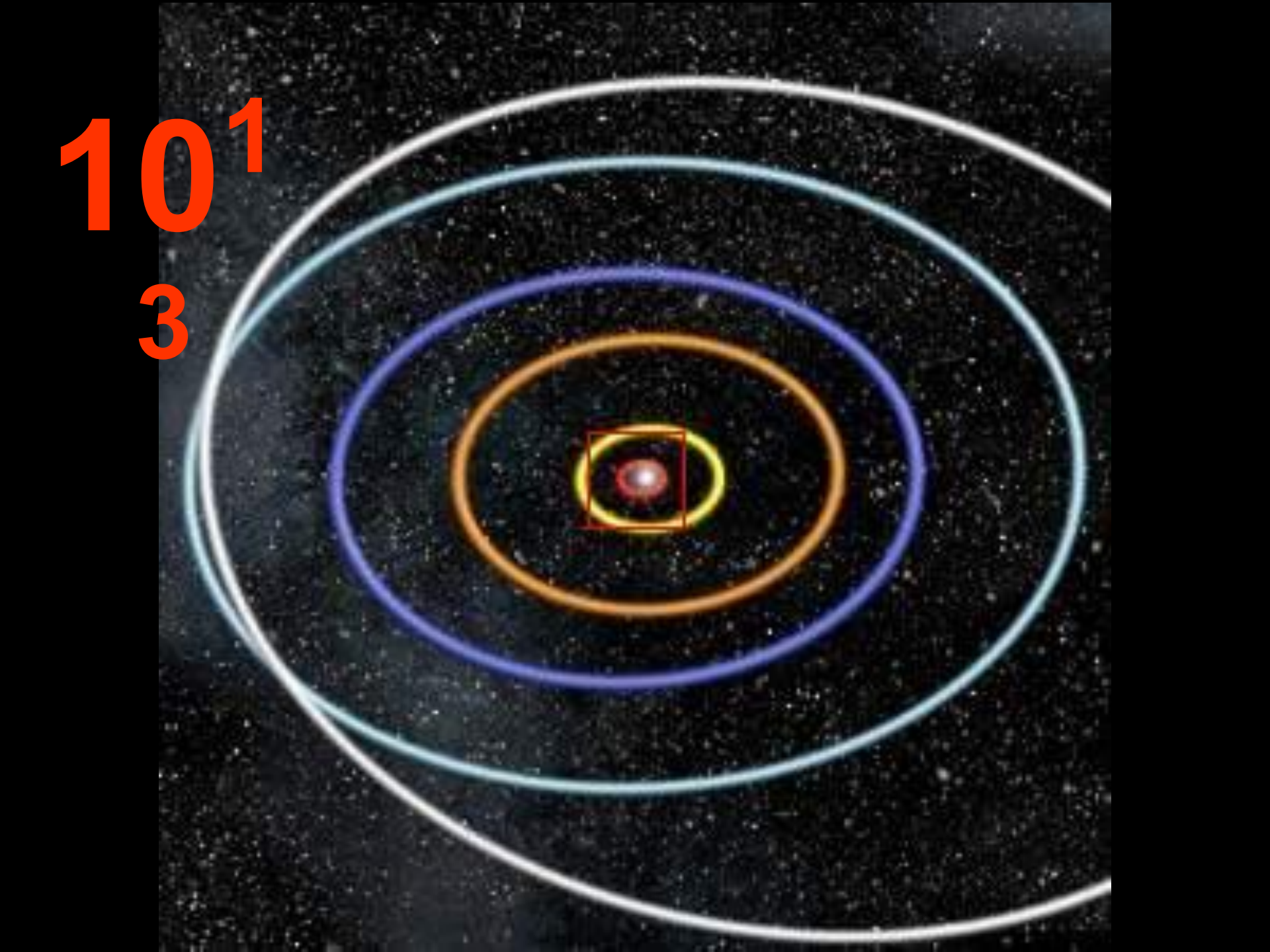

10^{18}

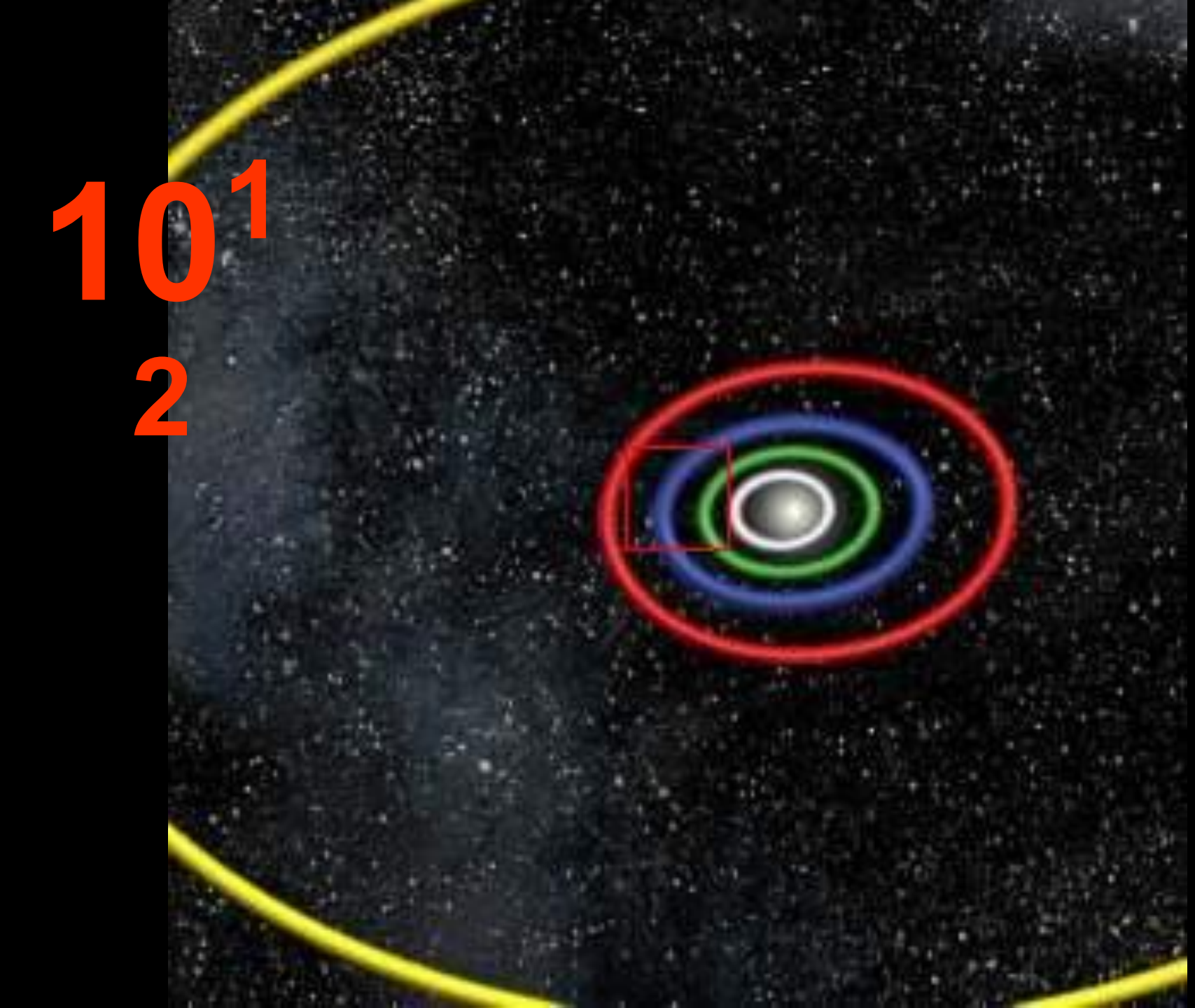

10^{1}
7


10^{16}

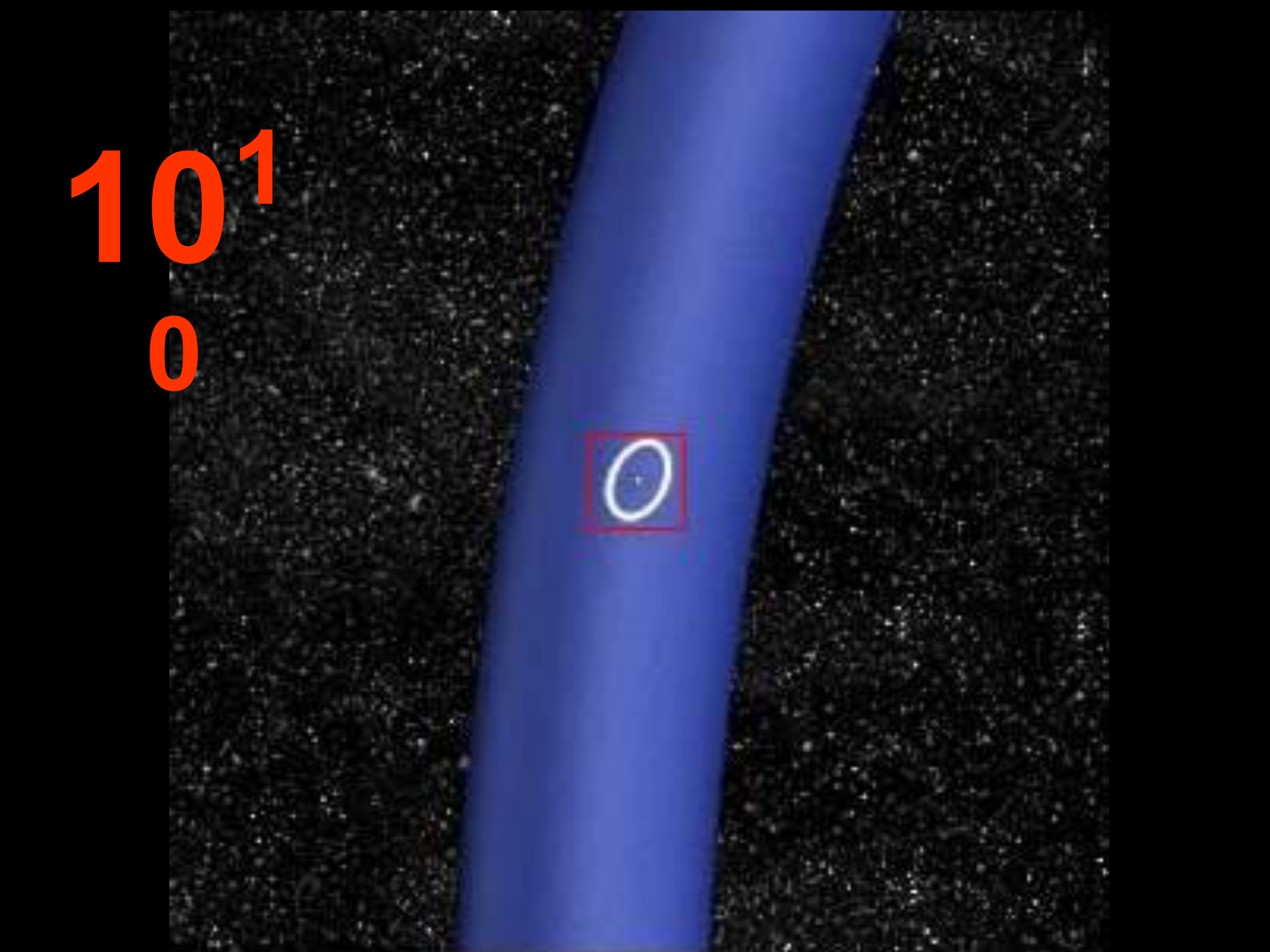

10^{1}_{5}

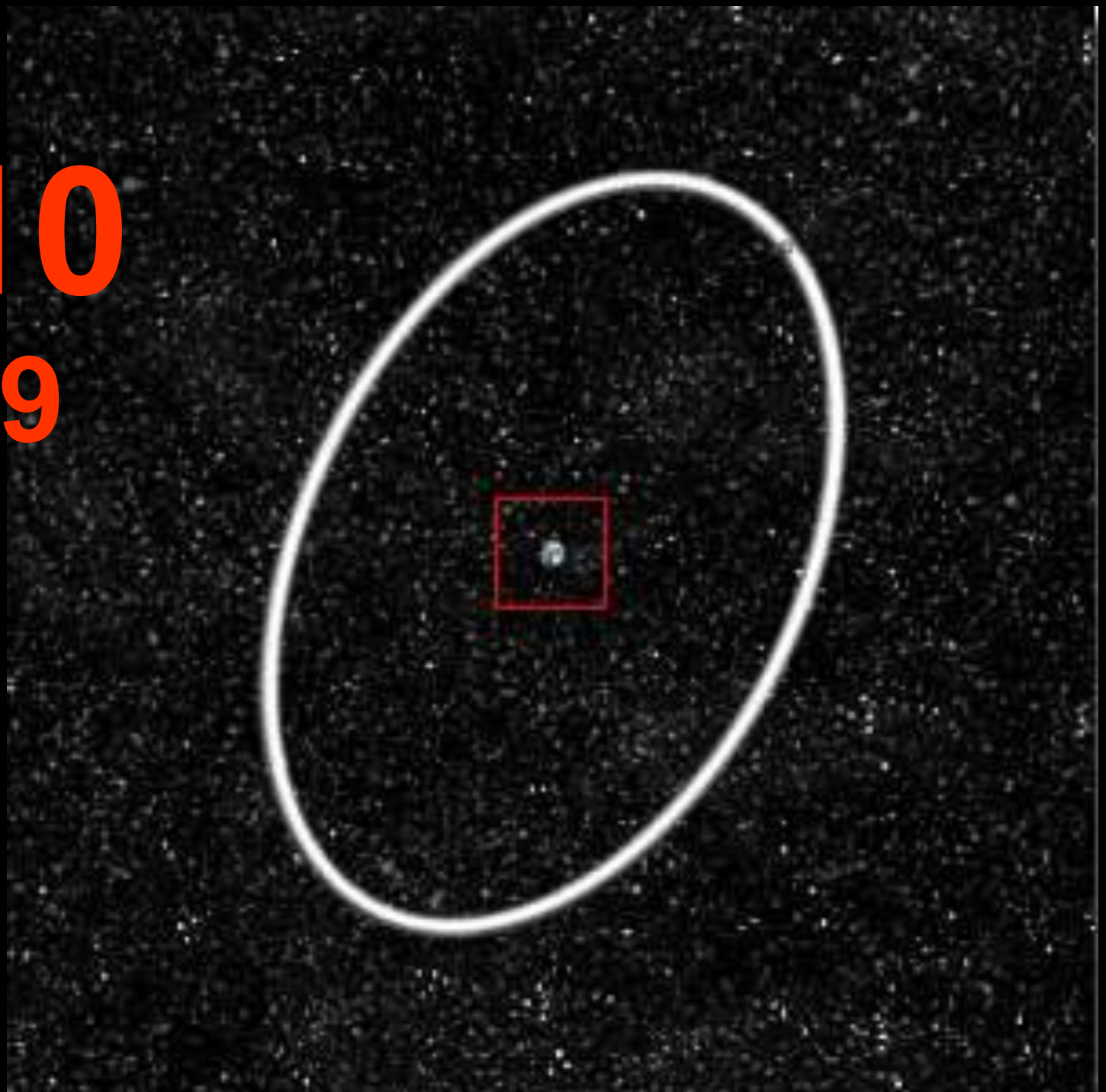

10^{14}

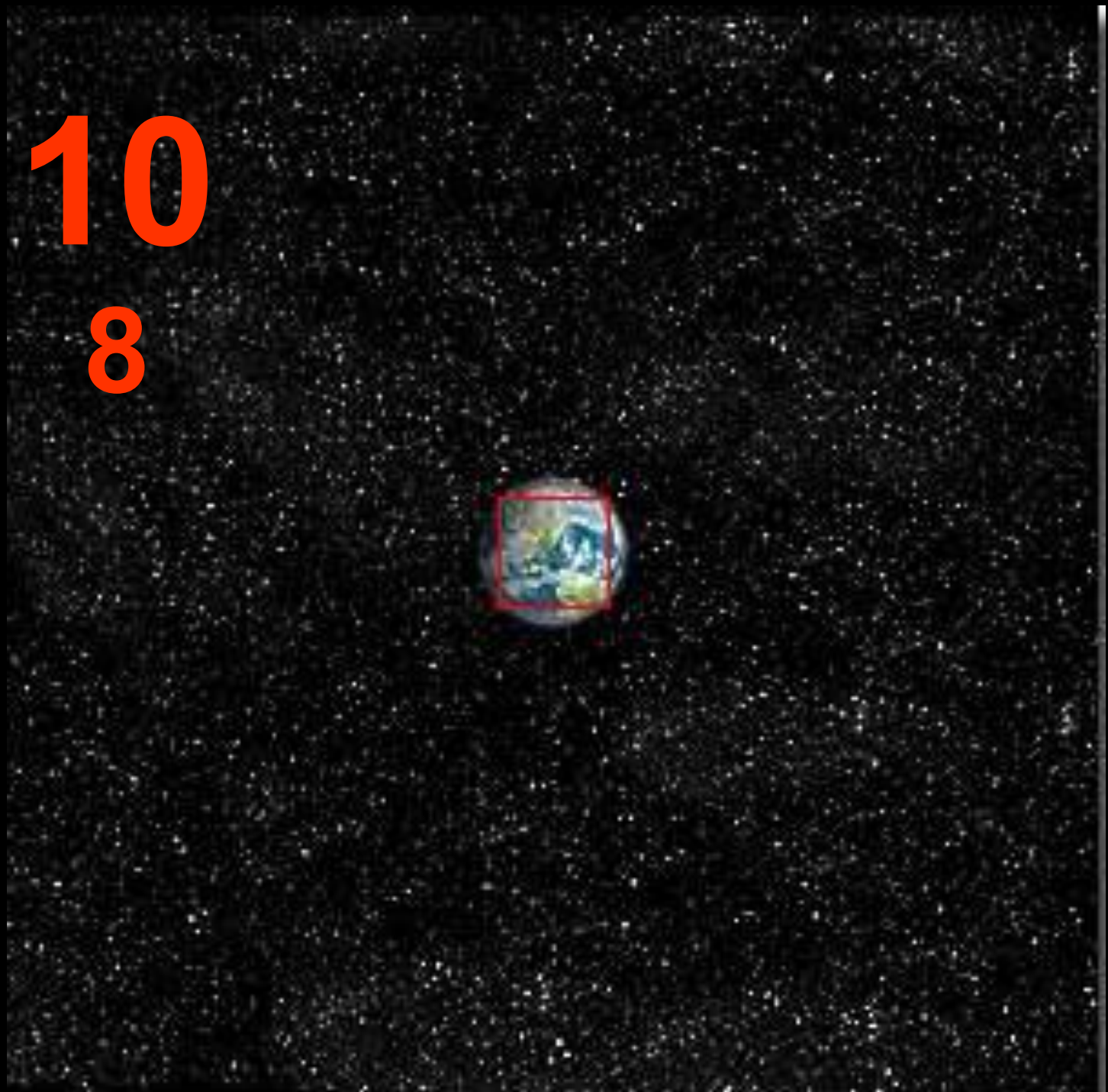

10^{1}
3


10^{1}_{2}


10^{1}
1


10^{1}
0


10
9


10
8


10
7


10
6

10

5

Questions that come to our minds ...

Who are we?
Where are we going?
From where did we come from?

10^3

Or... What do we represent in the Universe?

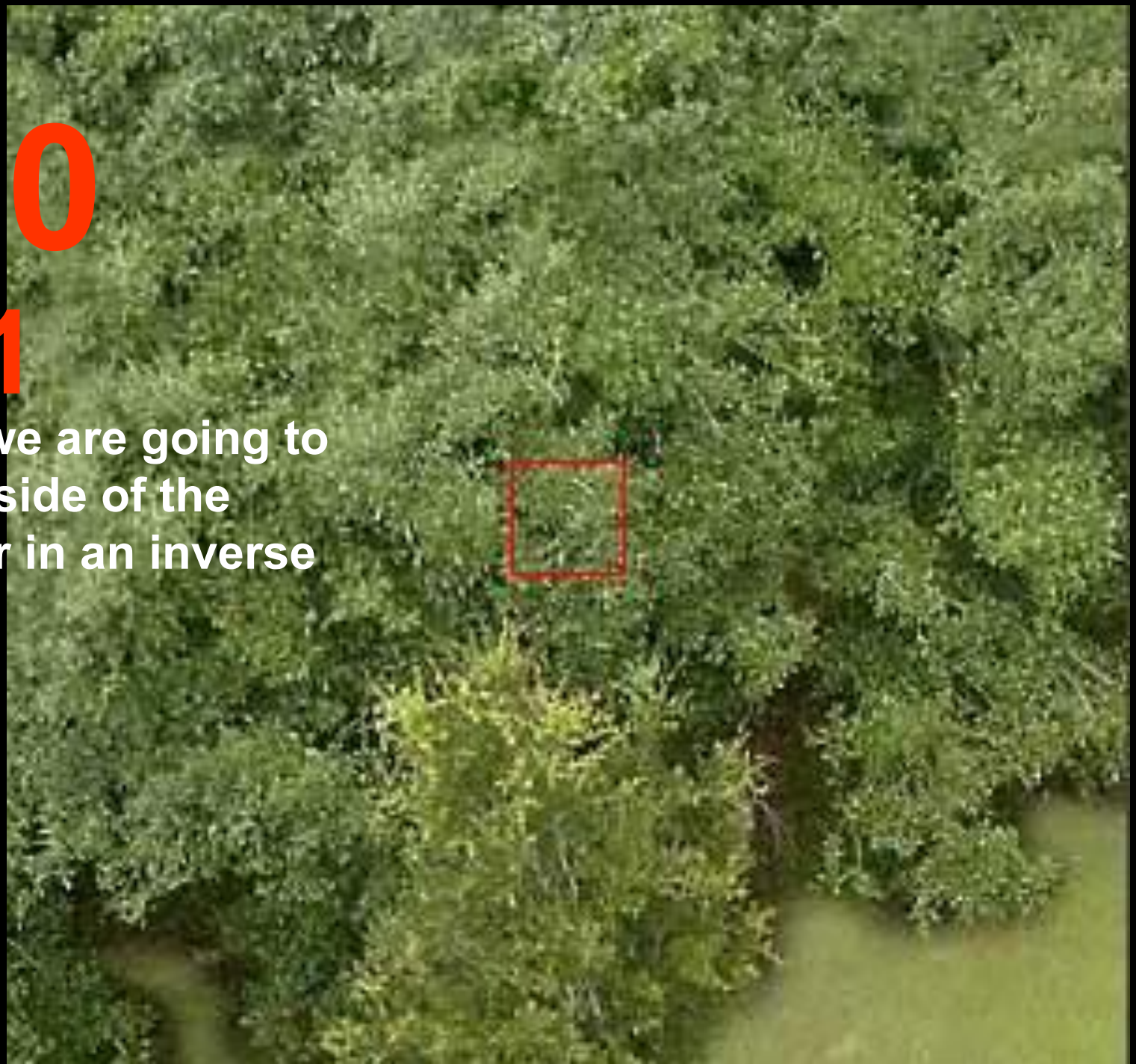
10^{23}

In this trip "upwards" we went to the power of 23 of 10

10

1

Now we are going to dig inside of the matter in an inverse trip...

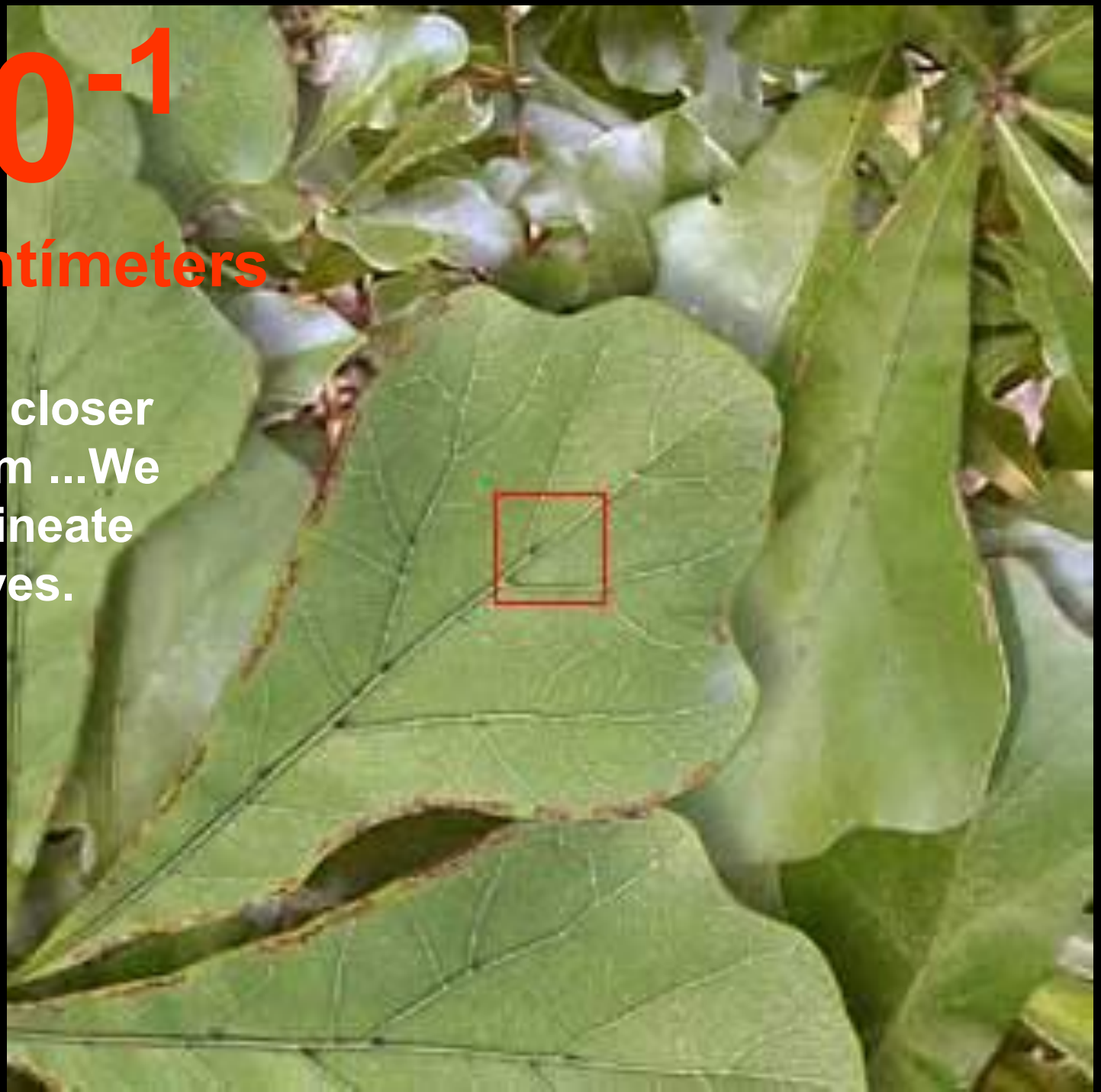



10
0
We arrived at our starting point.
We could reach it with our arms...

10^{-1}

10 Centimeters

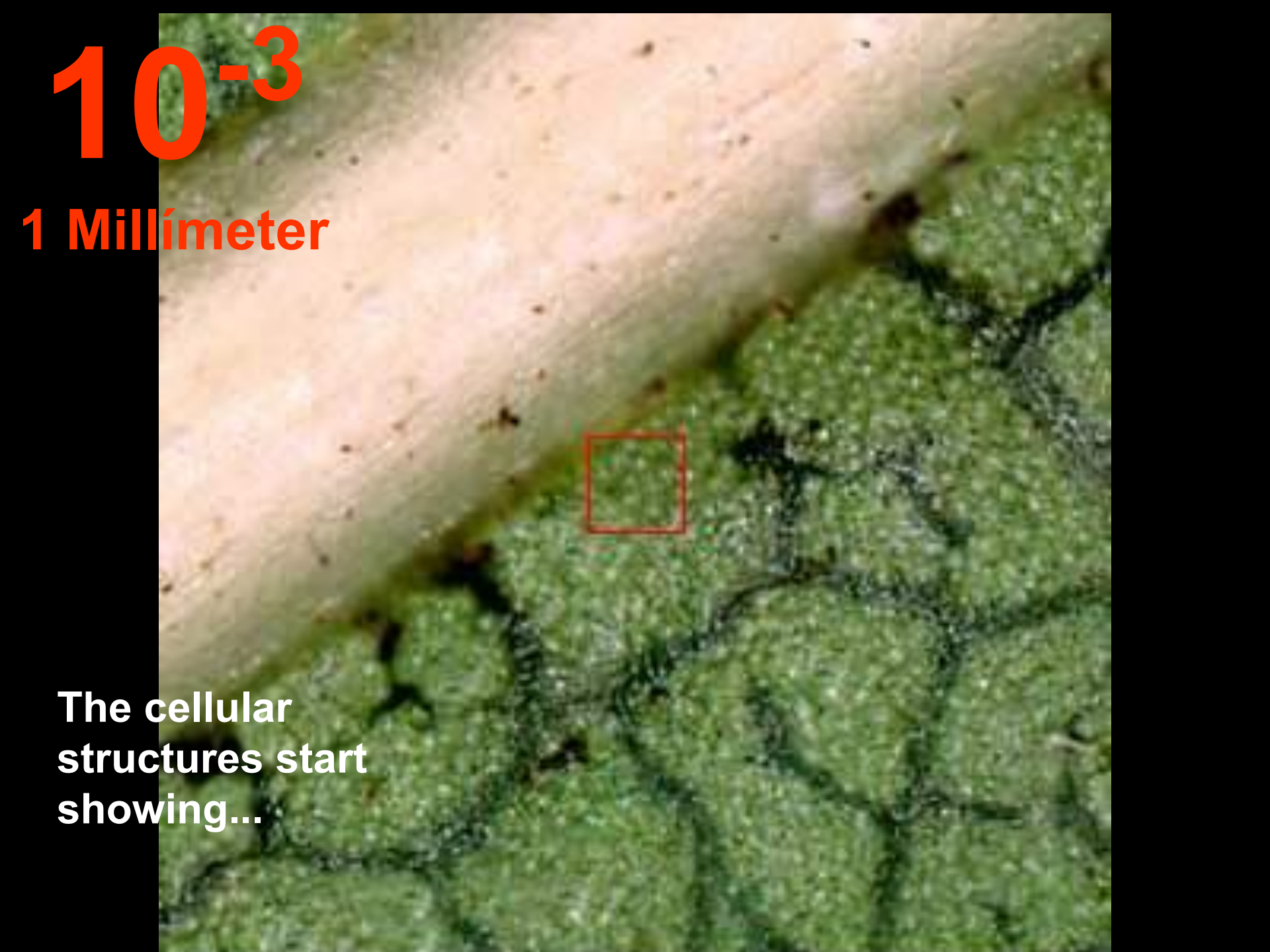
Getting closer at 10 cm ...We can delineate the leaves.



10^{-2}

1 Centímeter

At this distance it is possible to observe the structure of the leaf.

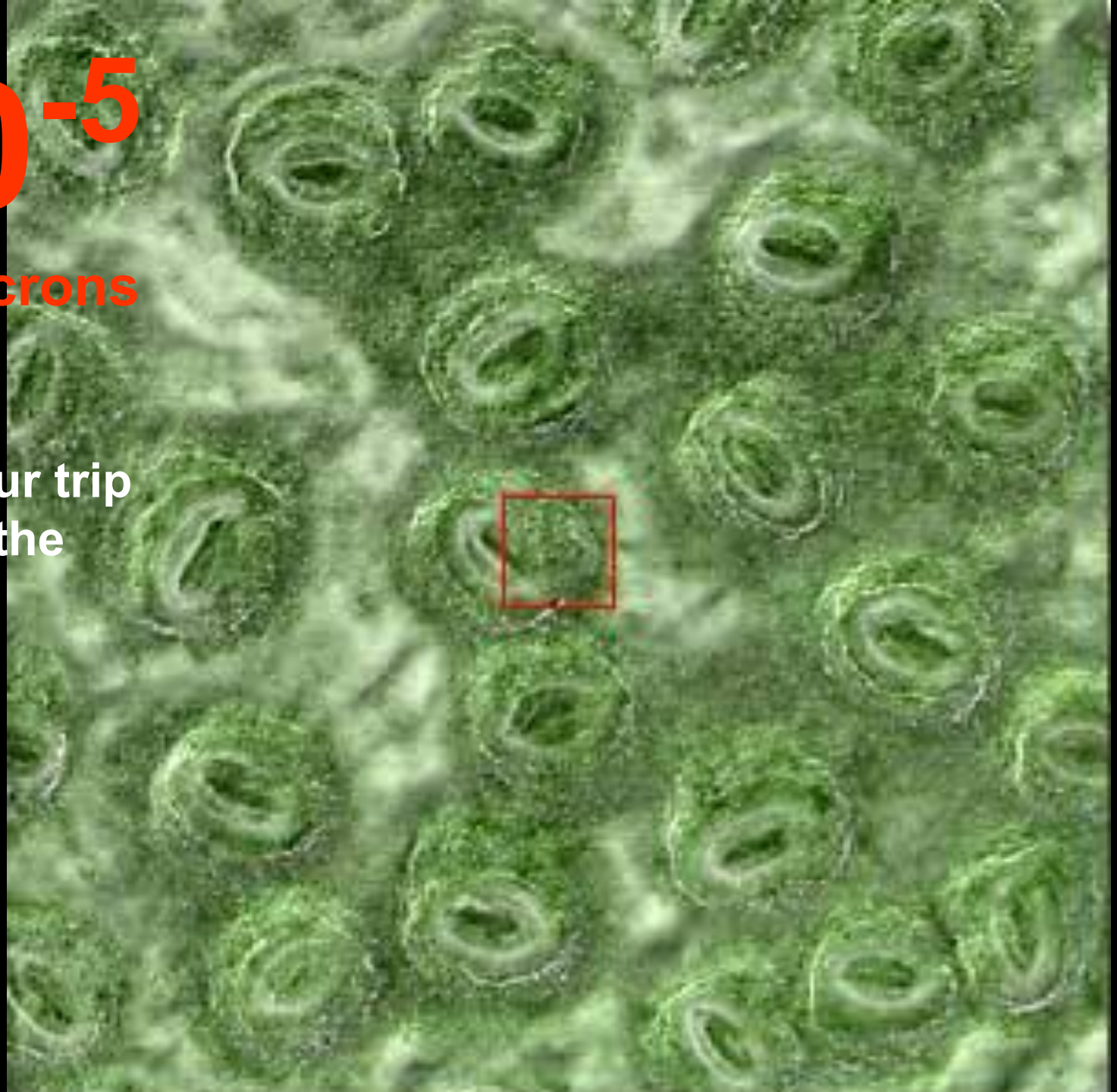

10^{-3}
1 Millímeter
The cellular structures start showing...

10^{-4}

100 microns

The cells can be defined.

You could see the union between them.



10^{-5}

10 microns

Start our trip inside the cell…

10^{-6}

1 micrón

The nucleus of the cell is visible.

10^{-7}

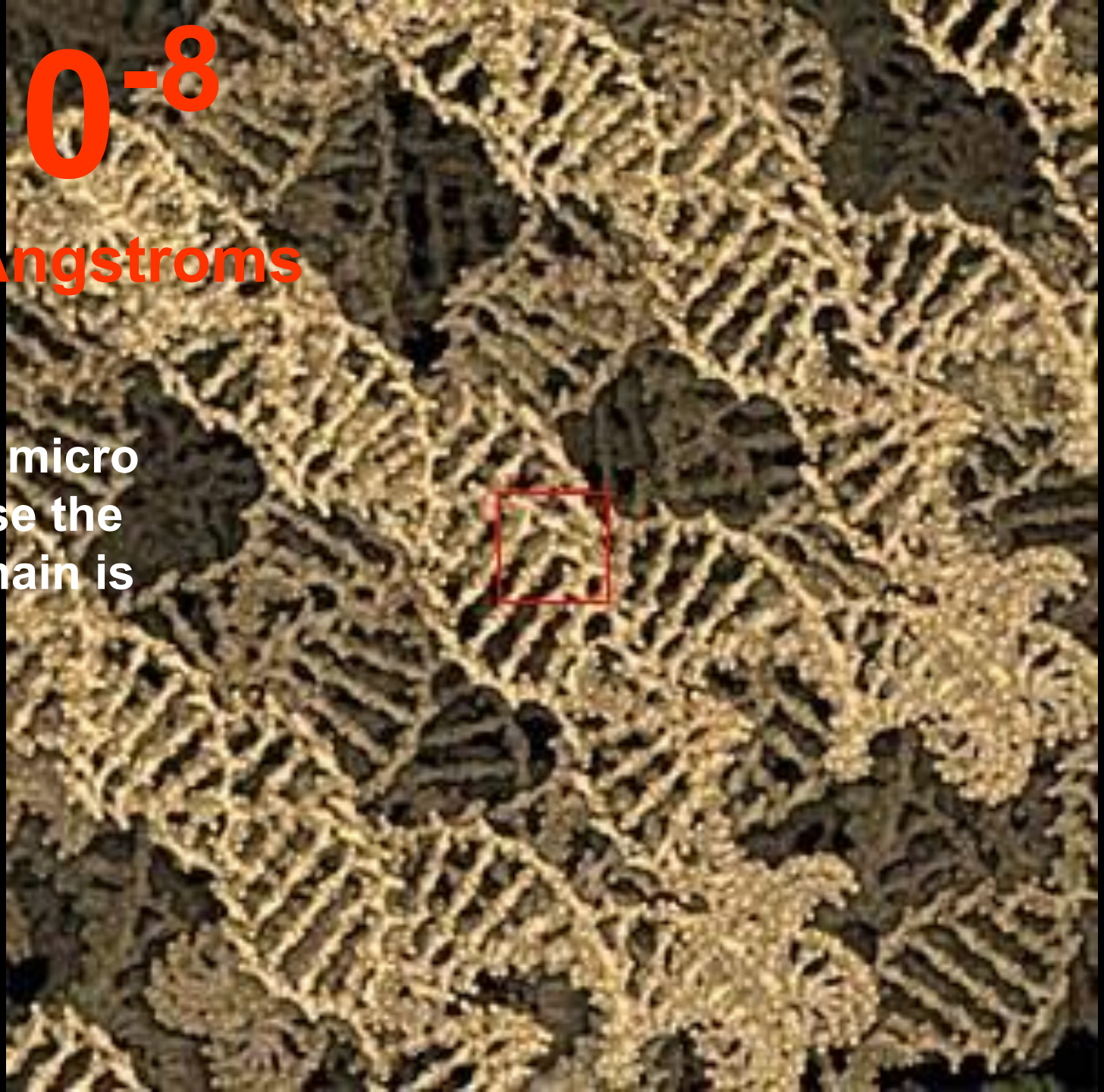
1.000 Angstroms

Again we changed the messuring unit to adapt to the minúscule size. You could see the chromosomes.

10^{-8}

100 Angstroms

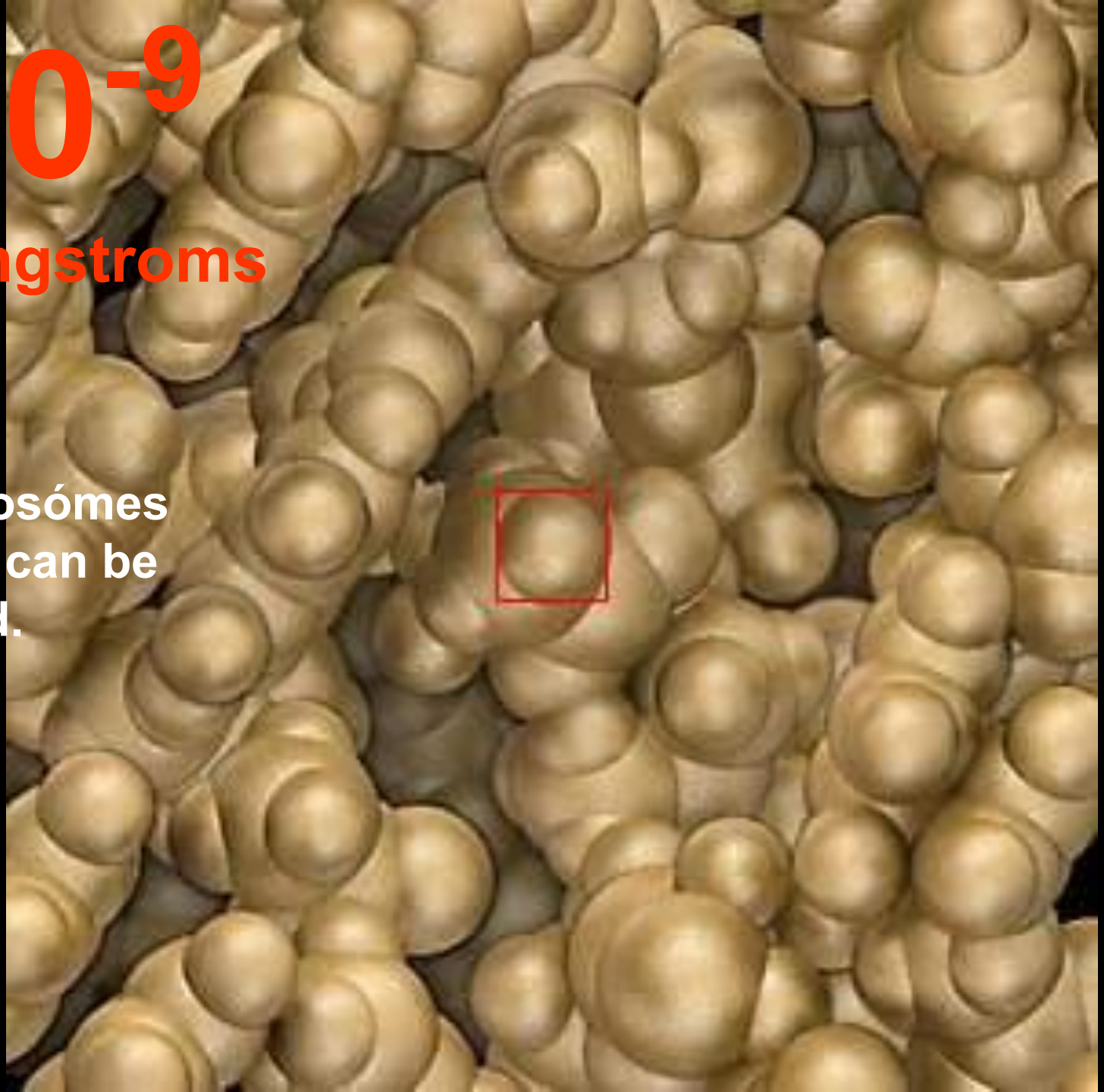
In this micro universe the DNA chain is visible.



10^{-9}

10 Angstroms

...the chromosómes blocks can be studied.

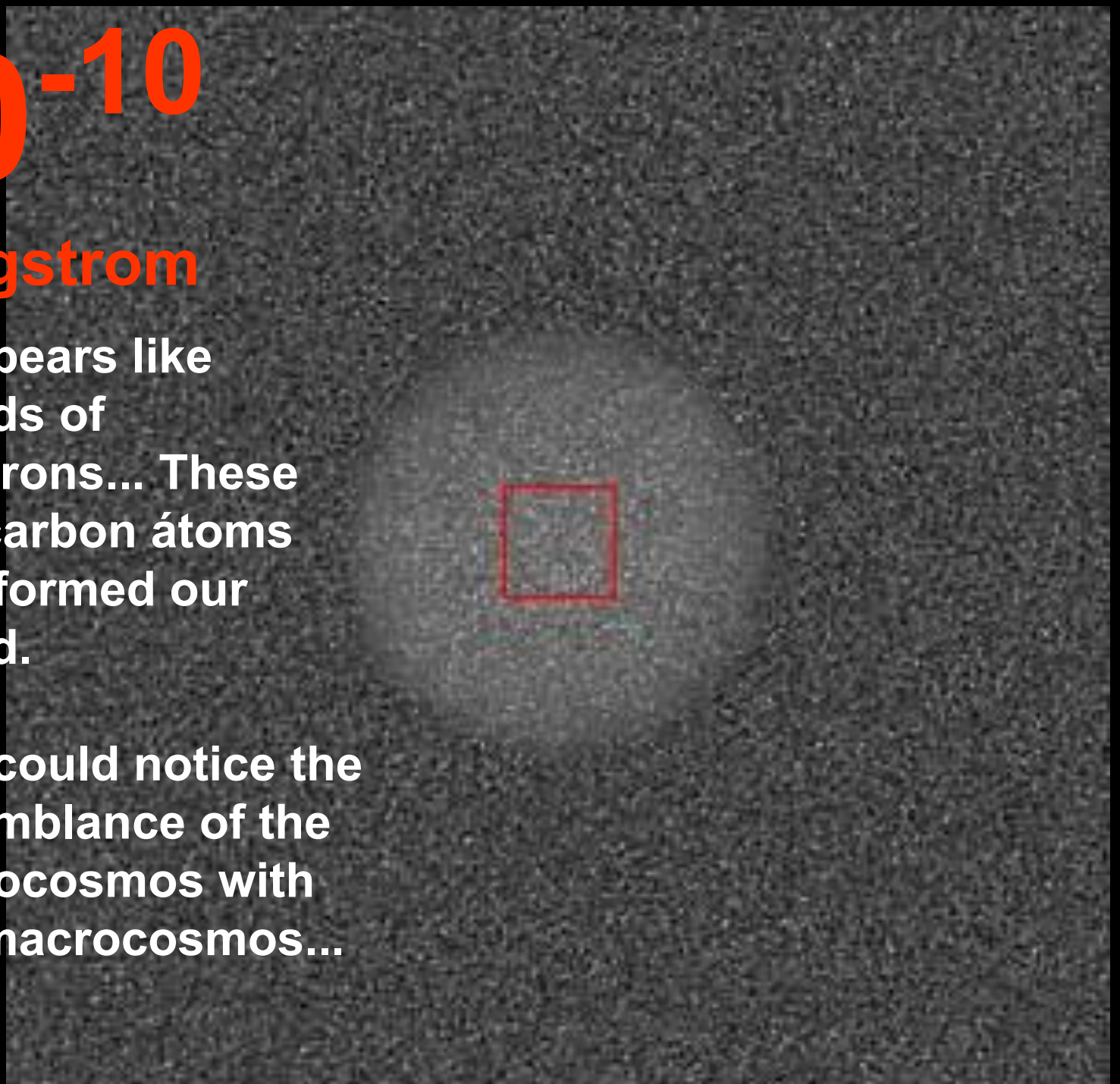


10^{-10}

1 Angstrom

It appears like clouds of electrons... These are carbon átoms that formed our world.

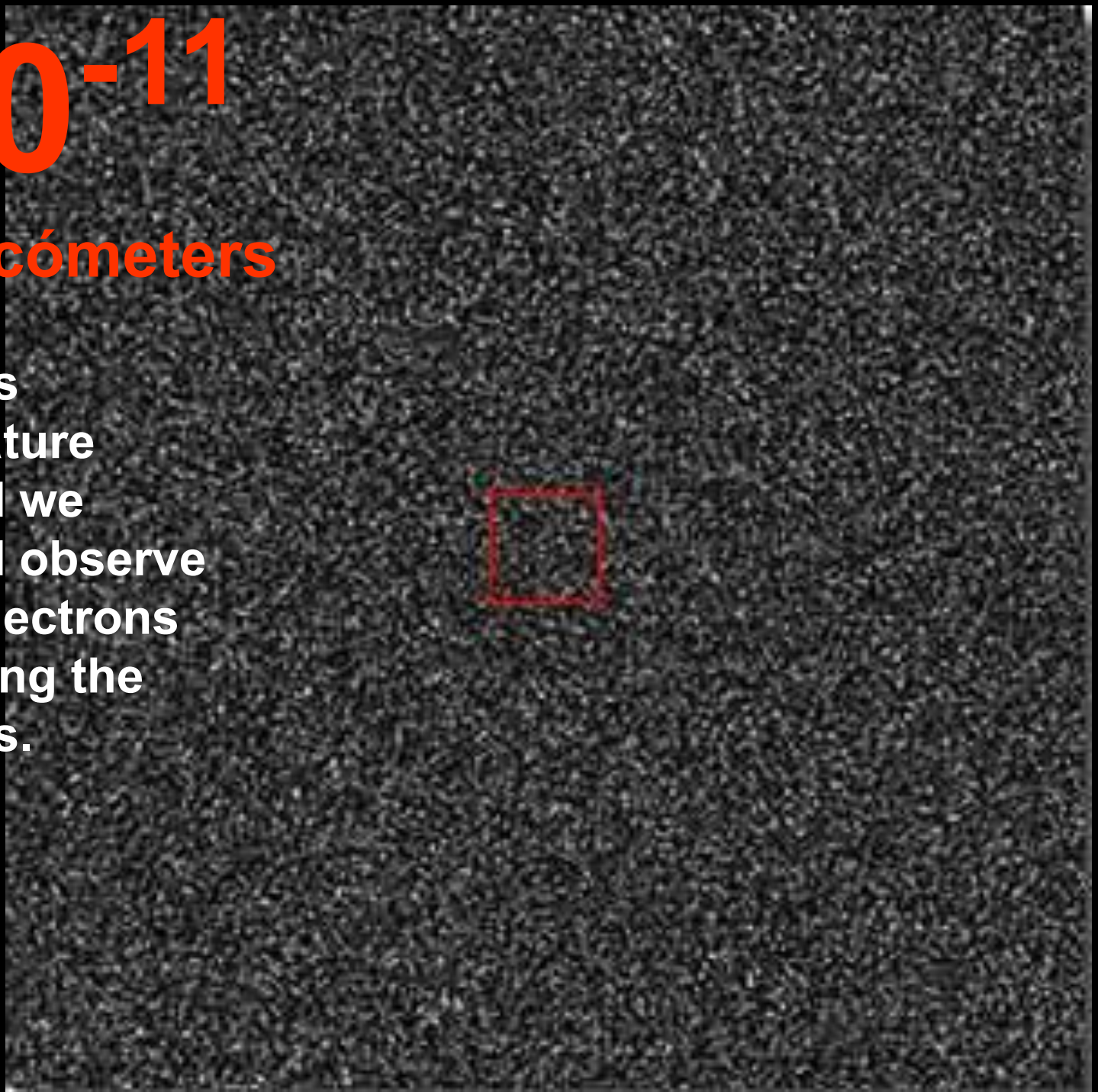
You could notice the resemblance of the microcosmos with the macrocosmos...



10^{-11}

10 picómeters

In this miniature world we could observe the electrons orbiting the atoms.



10^{-12}

1 Picómeter

An inmense empty space between the nucleous and the electron orbits...

10^{-13}

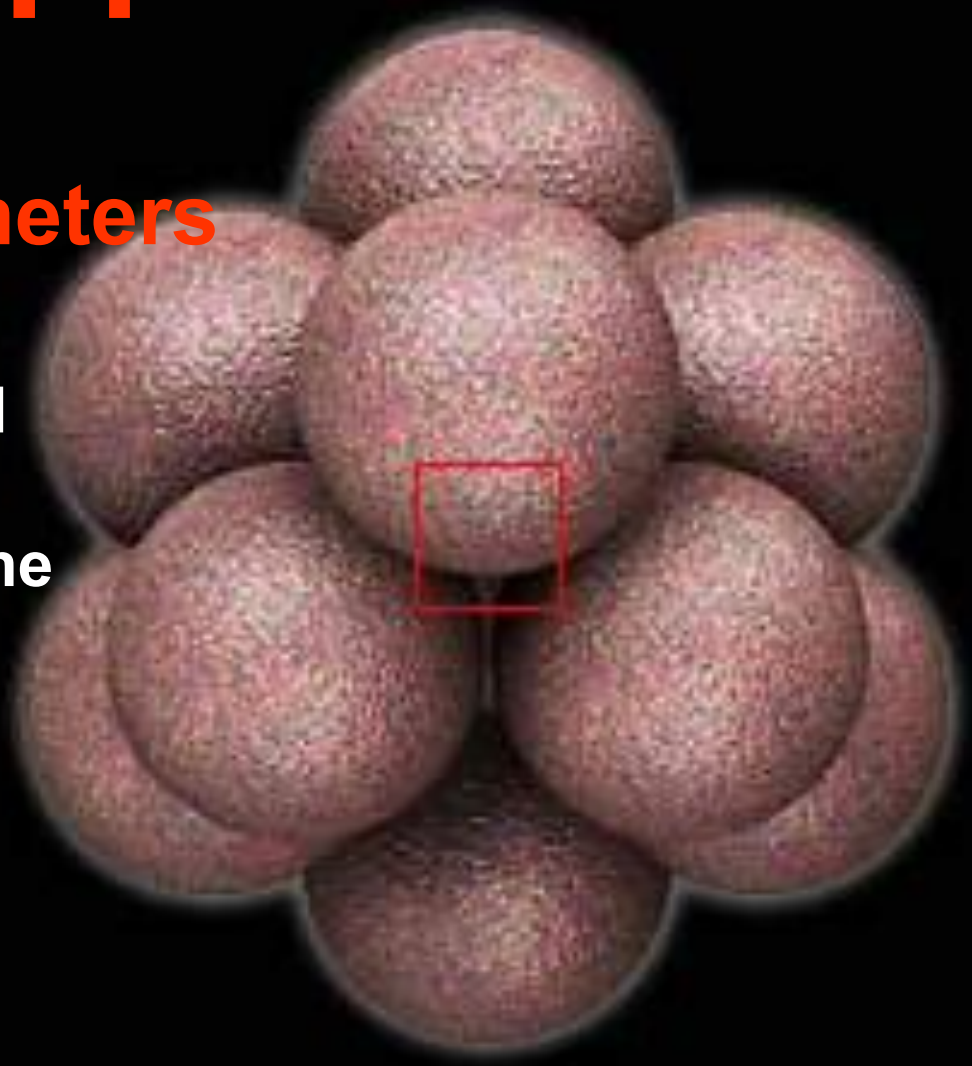
100 Fentómeters

At this incredible and minuscule size we could observe the nuceous of the atom.

10^{-14}

10 Fentómeters

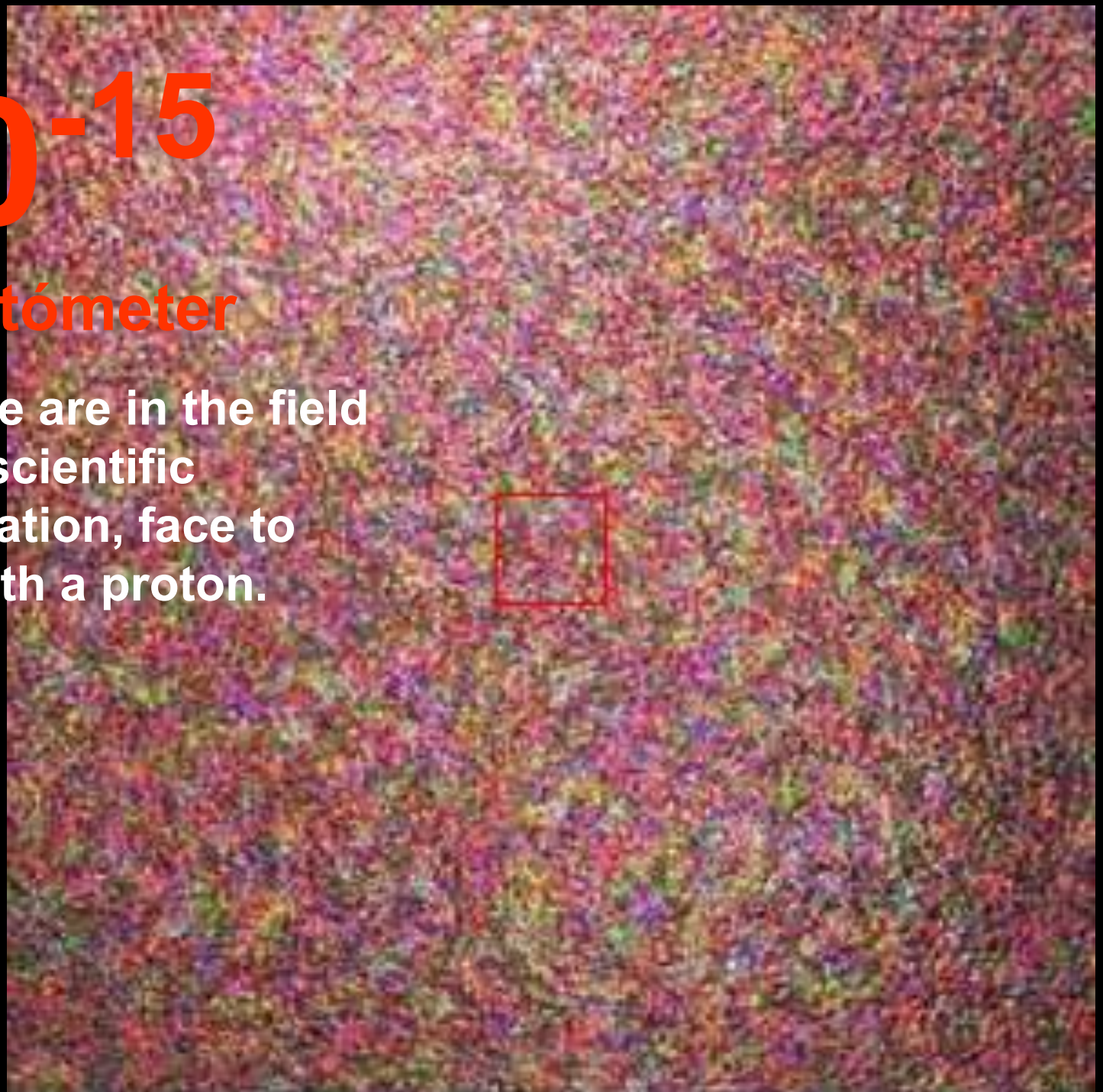
Now we could observe the nucleous of the carbon atom

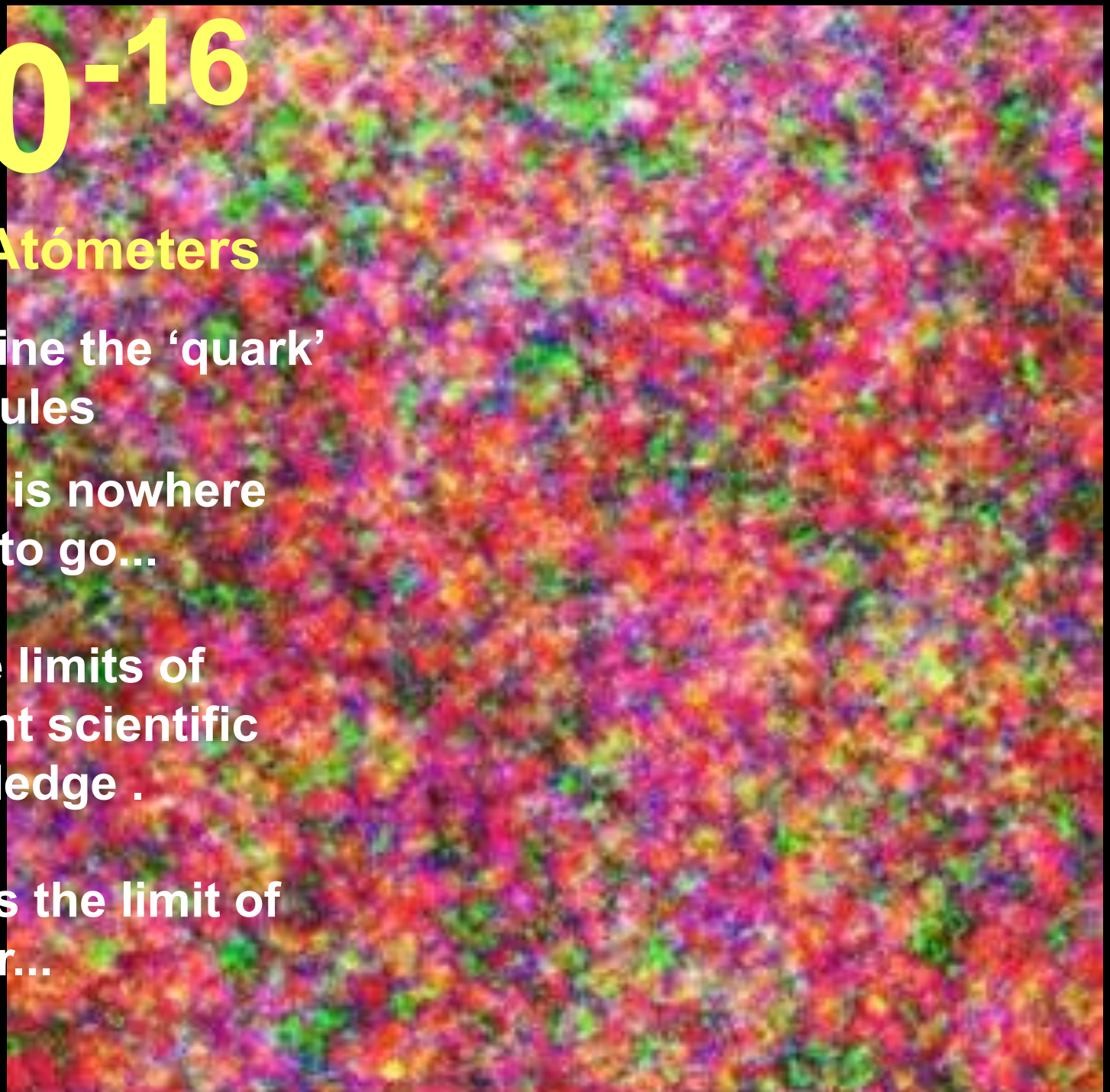


10^{-15}

1 Fentómeter

Here we are in the field of the scientific imagination, face to face with a proton.





10^{-16}

100 Atómeters

Examine the ‘quark’ partícules

There is nowhere more to go...

At the limits of current scientific knowledge .

This is the limit of matter...

And now ...Are you the center of the universe?

Are you the special creature of the Creatión?

What is behind those limits? Are there any limits?

Note that going “downwards” we could only go to the power of minus 16ªof 10 and reached the (known?) limits of matter... But upwards we went to the power of 23ª of 10 and stopped... But really we could have continued our trip with out limits to our imagination!!!!

... then?
...who says that we are alone in the universe?

END !