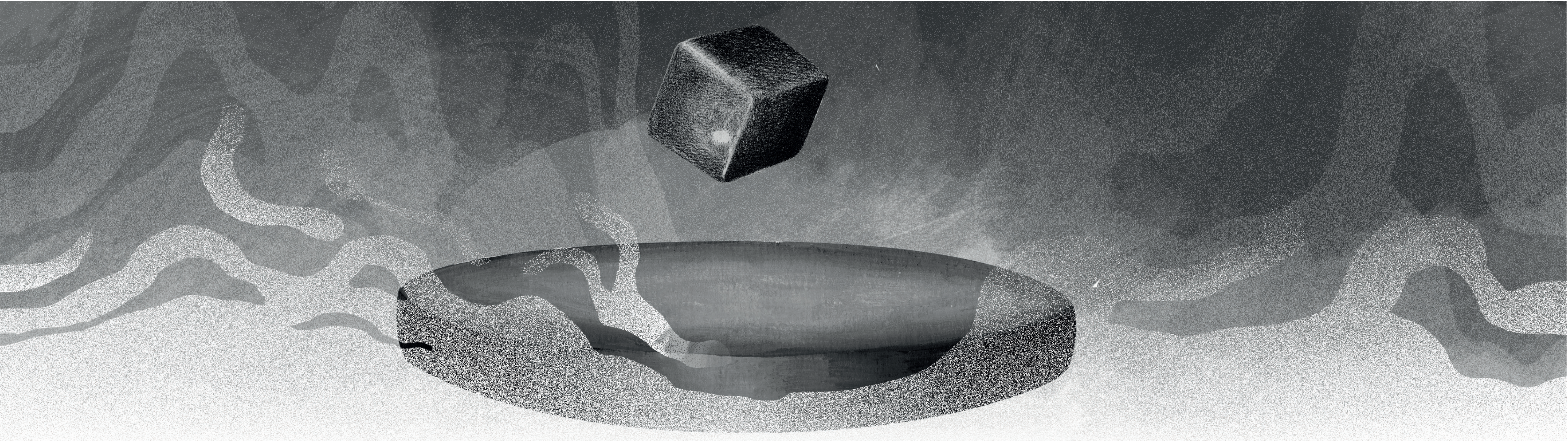
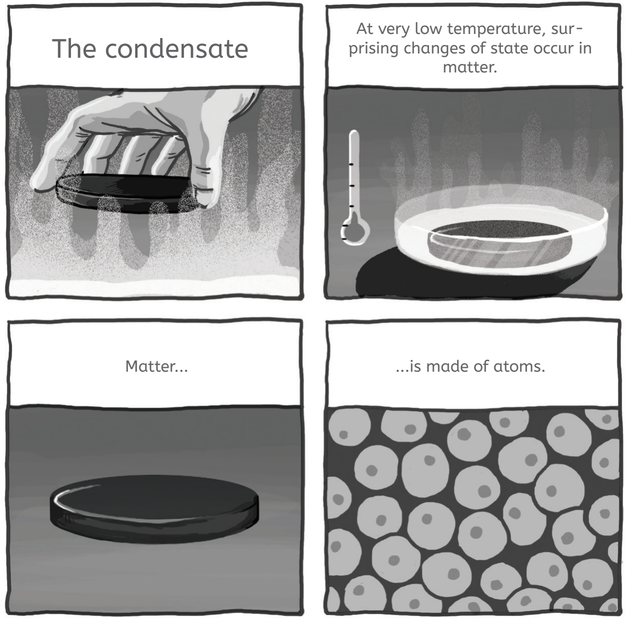
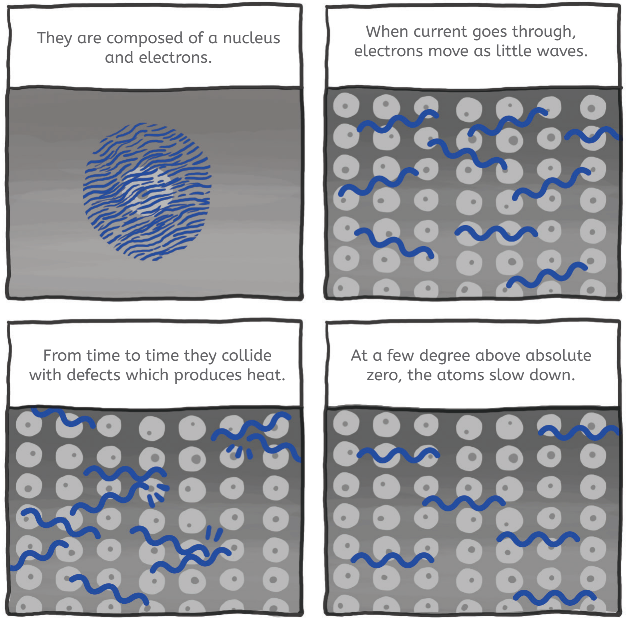
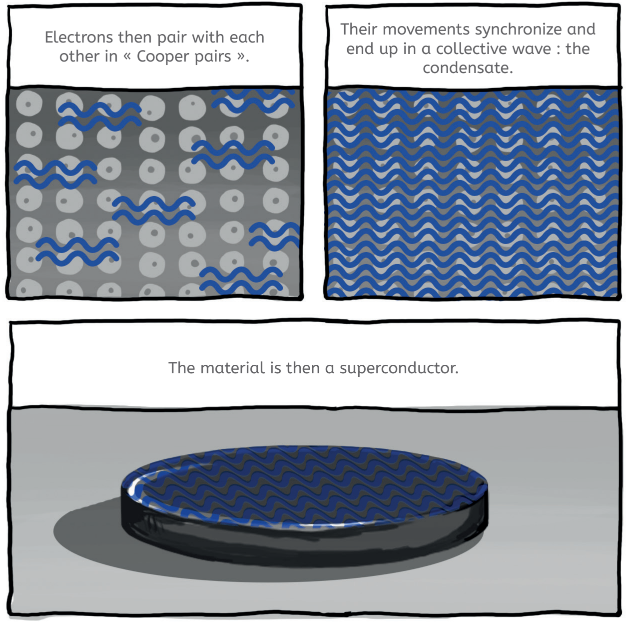
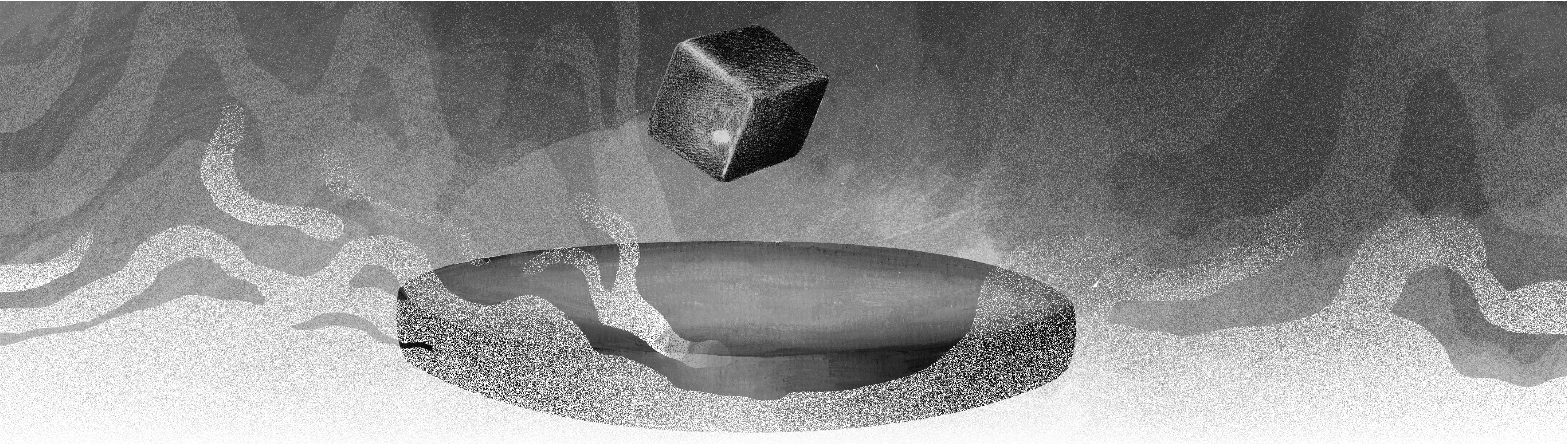


QUANTUM MEMORY

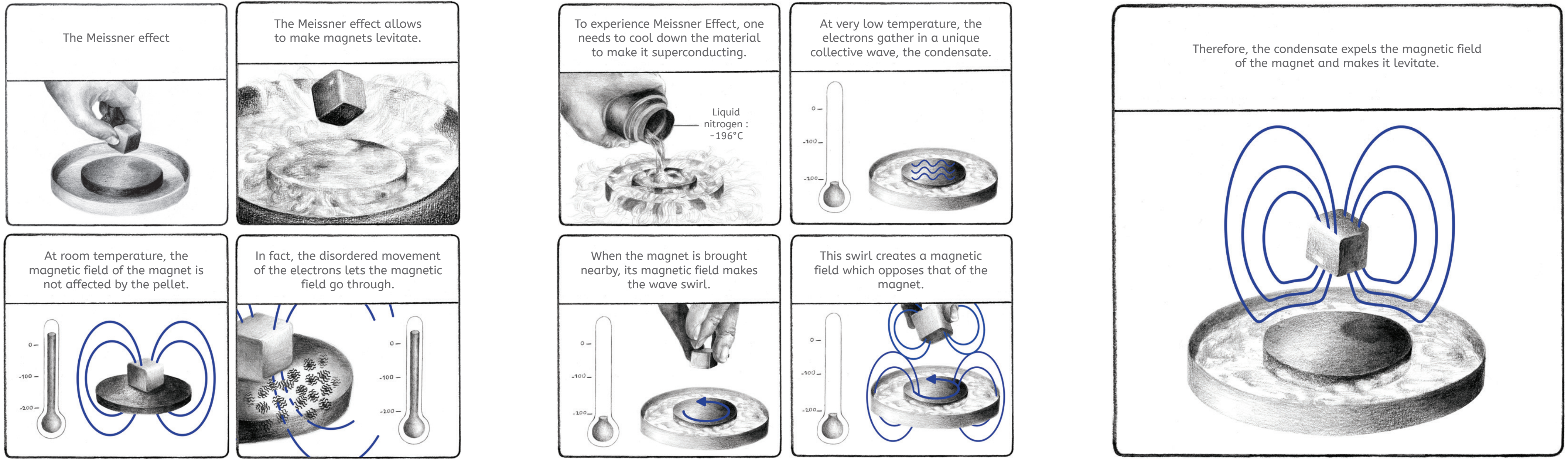

The condensate
At very low temperature, surprising changes of state occur in matter.
Matter...
...is made of atoms.


They are composed of a nucleus and electrons.
When current goes through, electrons move as little waves.
From time to time they collide with defects which produces heat.
At a few degree above absolute zero, the atoms slow down.

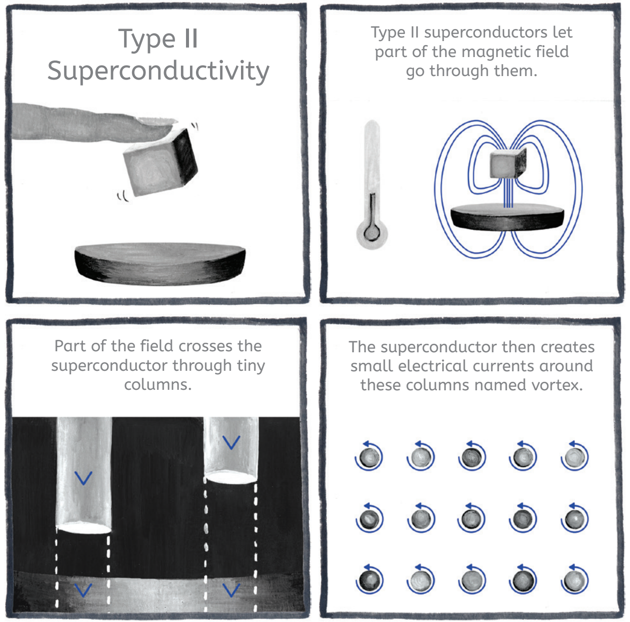

Electrons then pair with each other in « Cooper pairs ».
Their movements synchronize and end up in a collective wave : the condensate.
The material is then a superconductor.

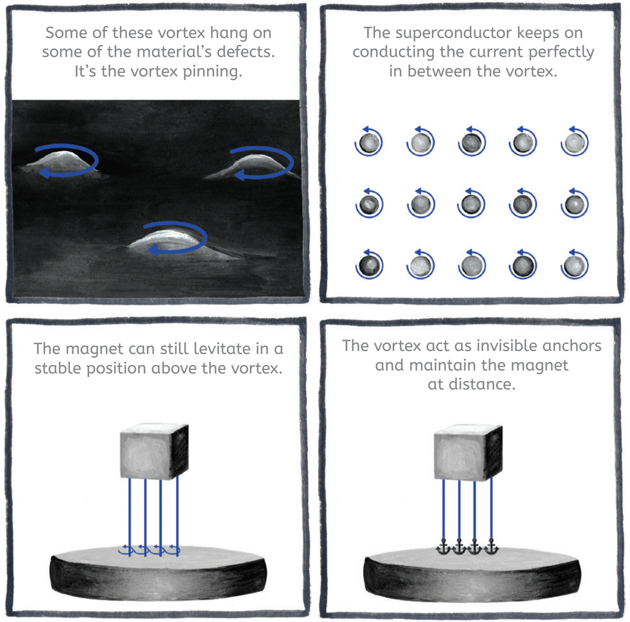


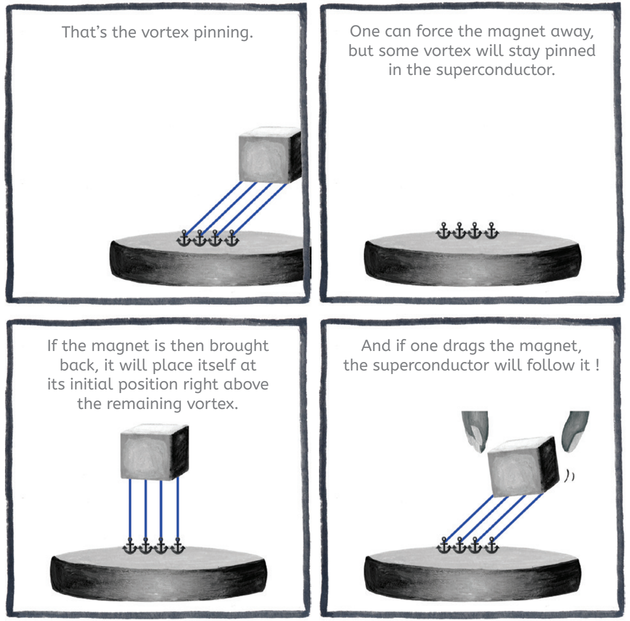
QUANTUM MEMORY


The Meissner effect
The Meissner effect allows to make magnets levitate.
At room temperature, the magnetic field of the magnet is not affected by the pellet.
0
-100
-200
In fact, the disordered movement of the electrons lets the magnetic field go through.
0
-100
-200
To experience Meissner Effect, one needs to cool down the material to make it superconducting.
Liquid nitrogen : -196°C
At very low temperature, the electrons gather in a unique collective wave, the condensate.
0
-100
-200
When the magnet is brought nearby, its magnetic field makes the wave swirl.
0
-100
-200
This swirl creates a magnetic field which opposes that of the magnet.
0
-100
-200
Therefore, the condensate expels the magnetic field of the magnet and makes it levitate.

MÉMOIRE QUANTIQUE


Type II Superconductivity
Type II superconductors let part of the magnetic field go through them.
Part of the field crosses the superconductor through tiny columns.
The superconductor then creates small electrical currents around these columns named vortex.


Some of these vortex hang on some of the material's defects. It's the vortex pinning.
The superconductor keeps on conducting the current perfectly in between the vortex.
The magnet can still levitate in a stable position above the vortex.
The vortex act as invisible anchors and maintain the magnet at distance.


That's the vortex pinning.
One can force the magnet away, but some vortex will stay pinned in the superconductor.
If the magnet is then brought back, it will place itself at its initial position right above the remaining vortex.
And if one drags the magnet, the superconductor will follow it !