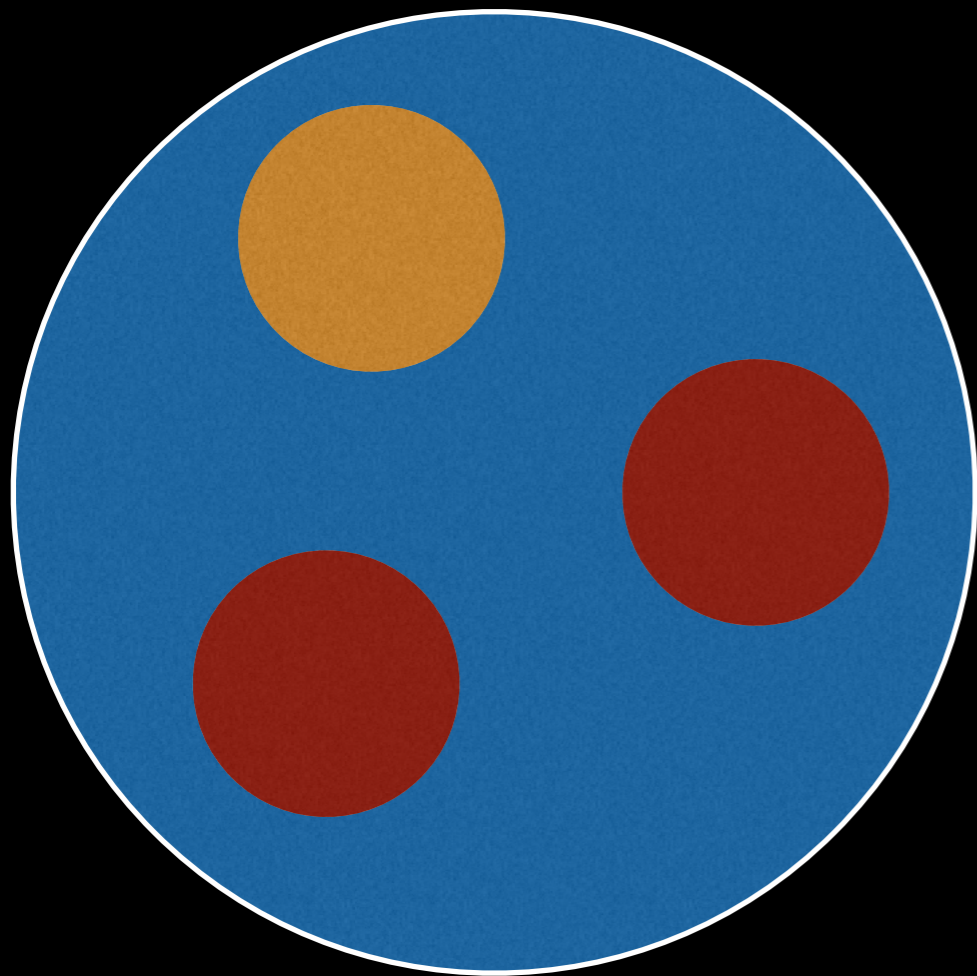


Particles

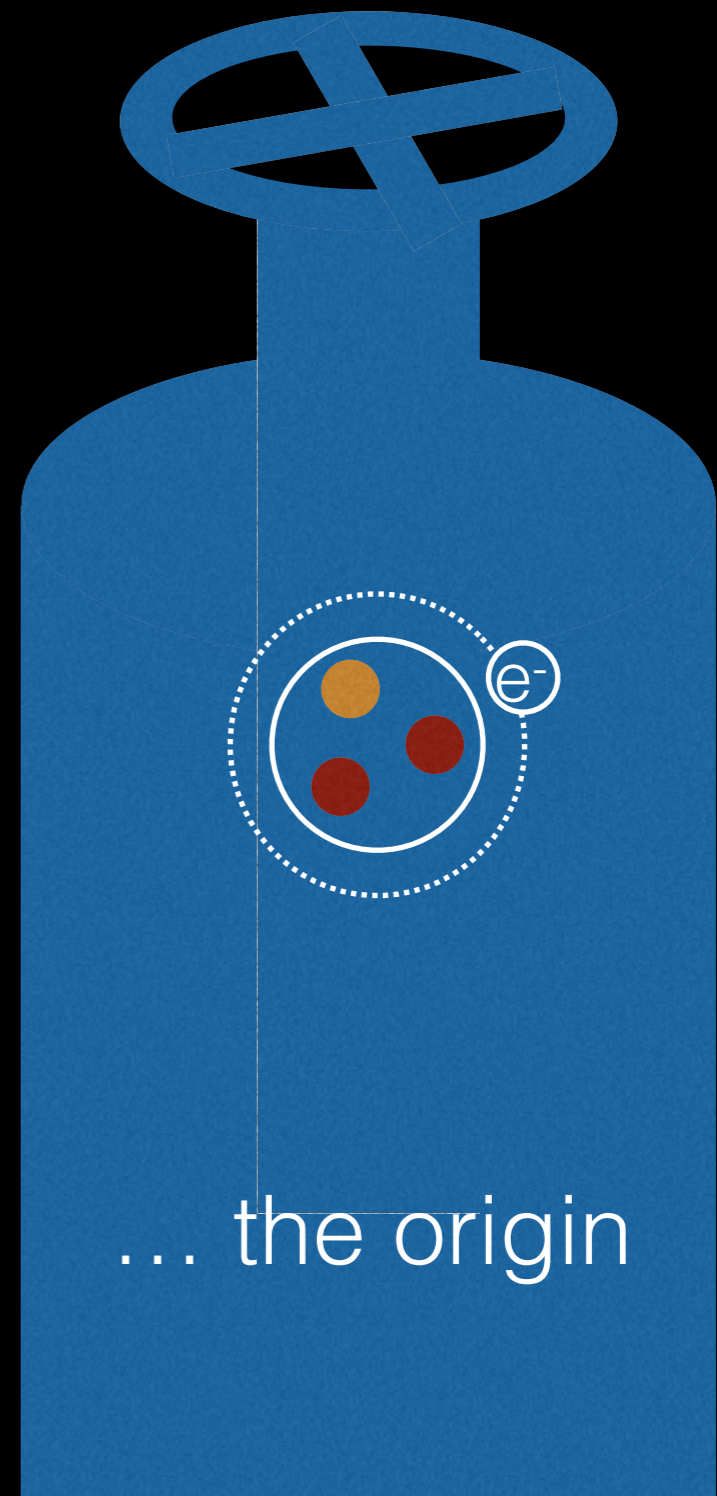
The Accelerator Game

Proton



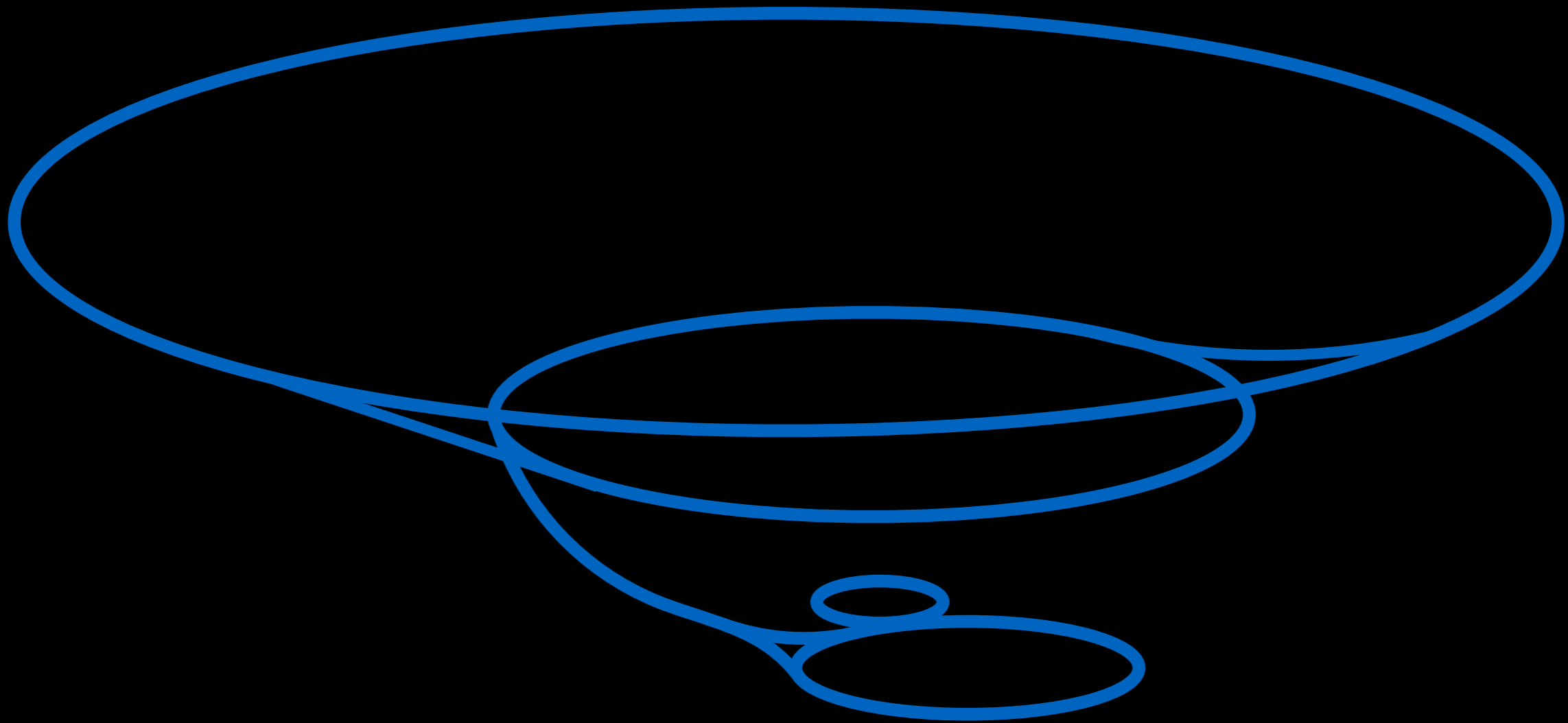
... the hero

Hydrogen bottle

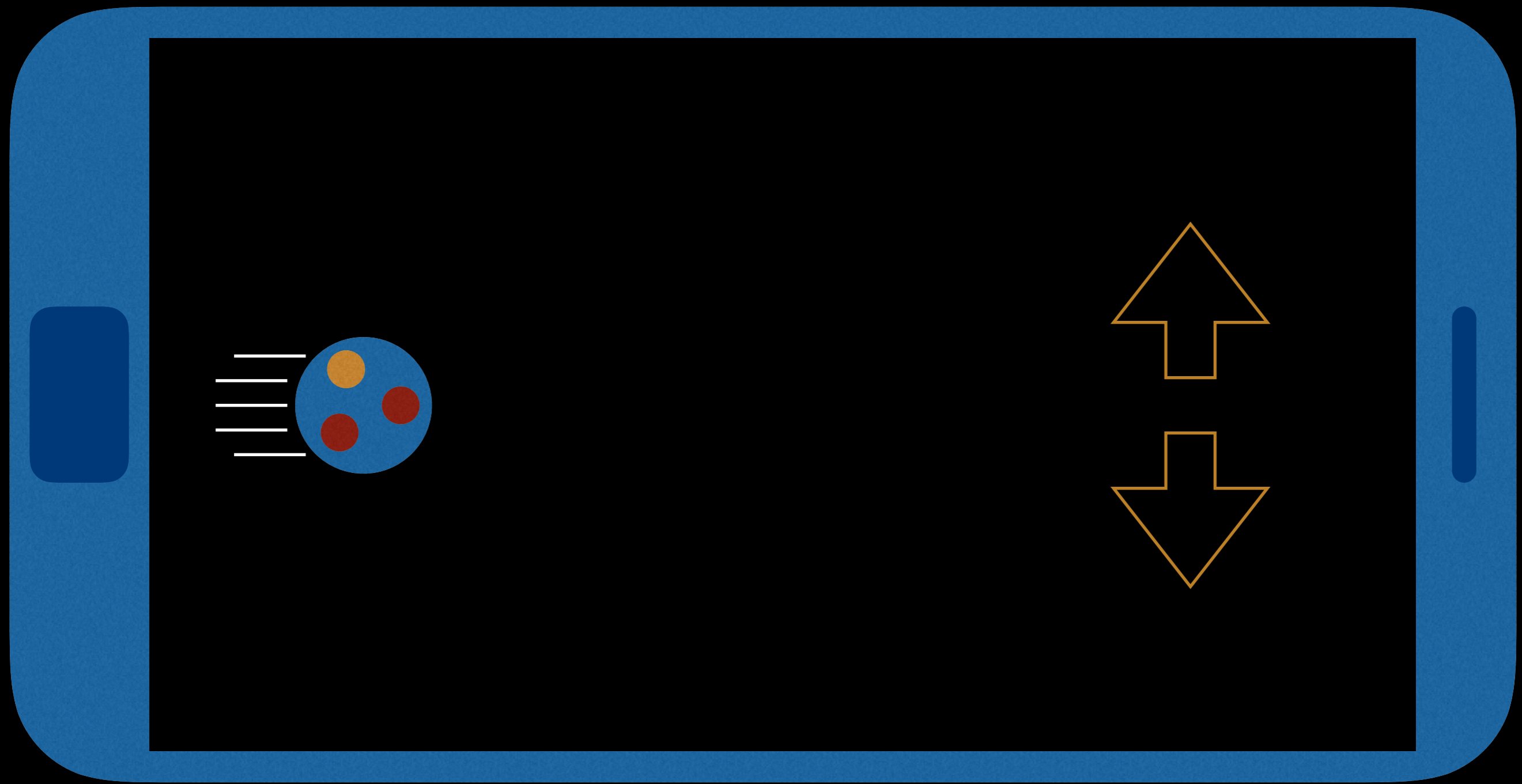


... the origin

Accelerator complex



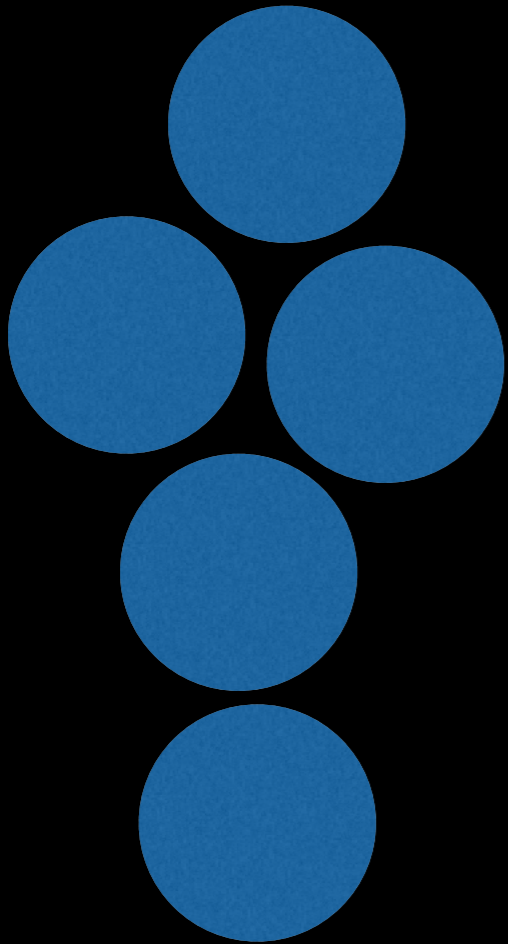
... the playground



Swipe up or down to manipulate the bunch

Avoid the obstacles

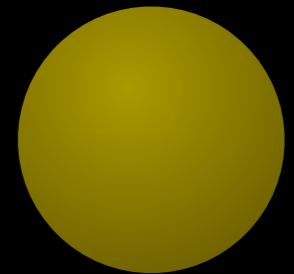
Dust particles



Faulty
magnetic fields



Muons



Get bonus energy and beam quality

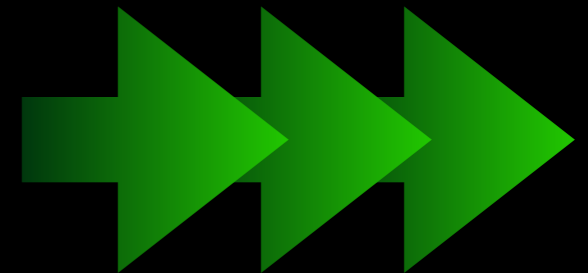
Photons



Beam Monitor



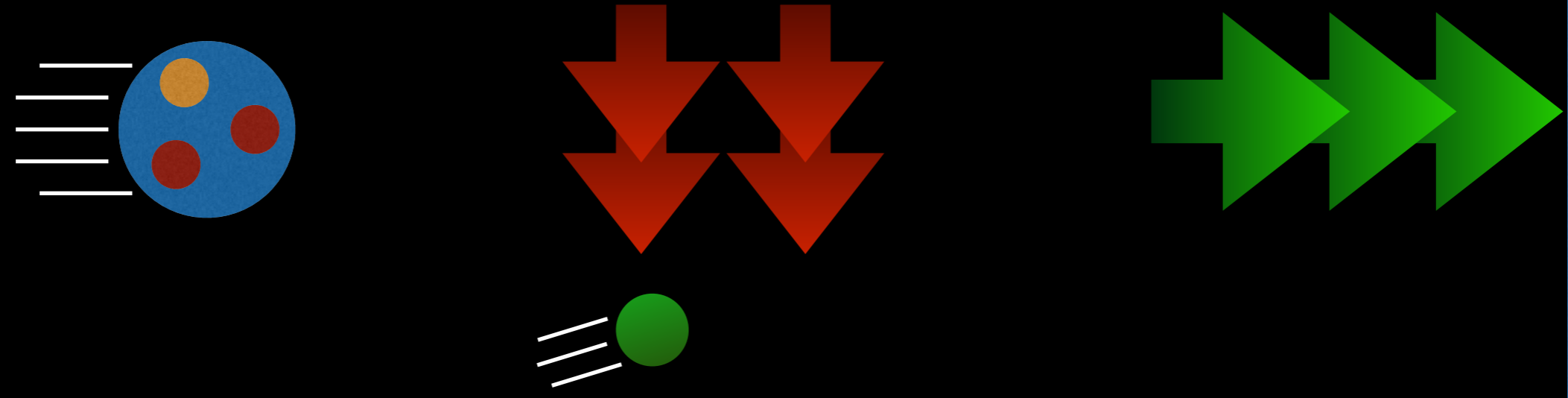
Acceleration



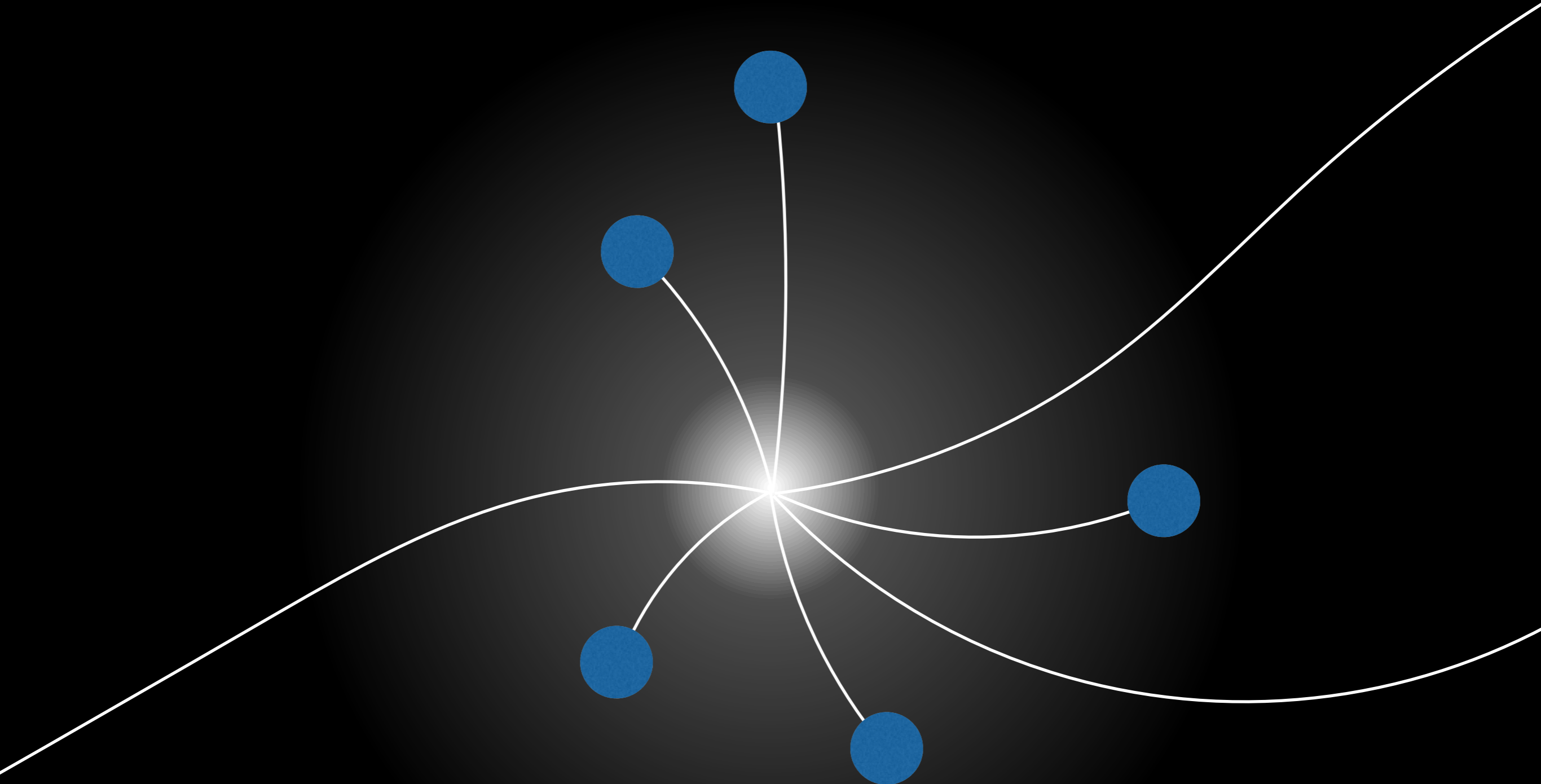
○ SPS

Quality: 90%

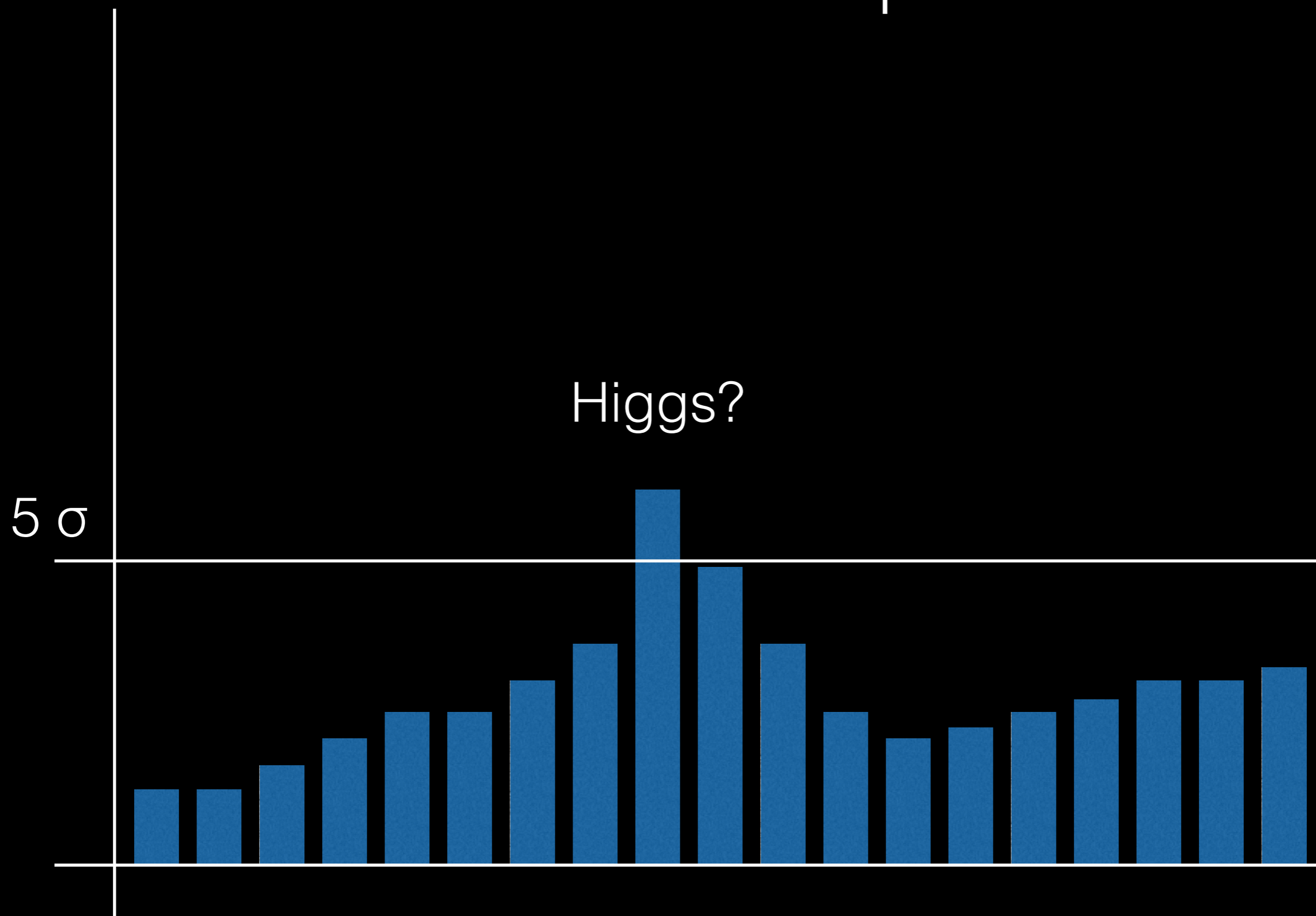
Energy: 141.24 GeV



Collide in experiments



Discover ALL the particles



... by crashing them in experimental areas

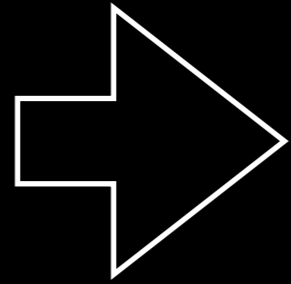
Congratulations!

125.09 GeV

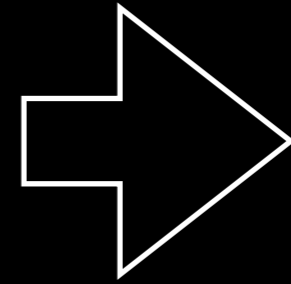
You have found the mass
of the Higgs Boson!

... and their properties

Find
particles



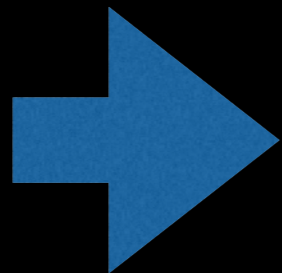
Secure
funding



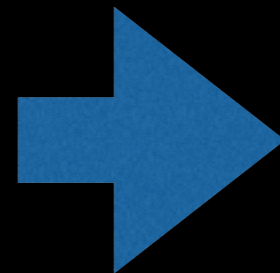
Upgrade
accelerators

From SC to HLLHC

Synchrotron



PS



SPS



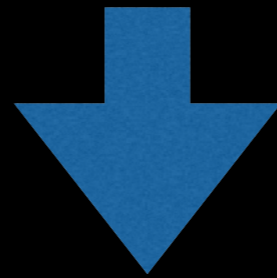
What is done?

3D prototype:

<http://simetka.cz/particles/particles.html>

+

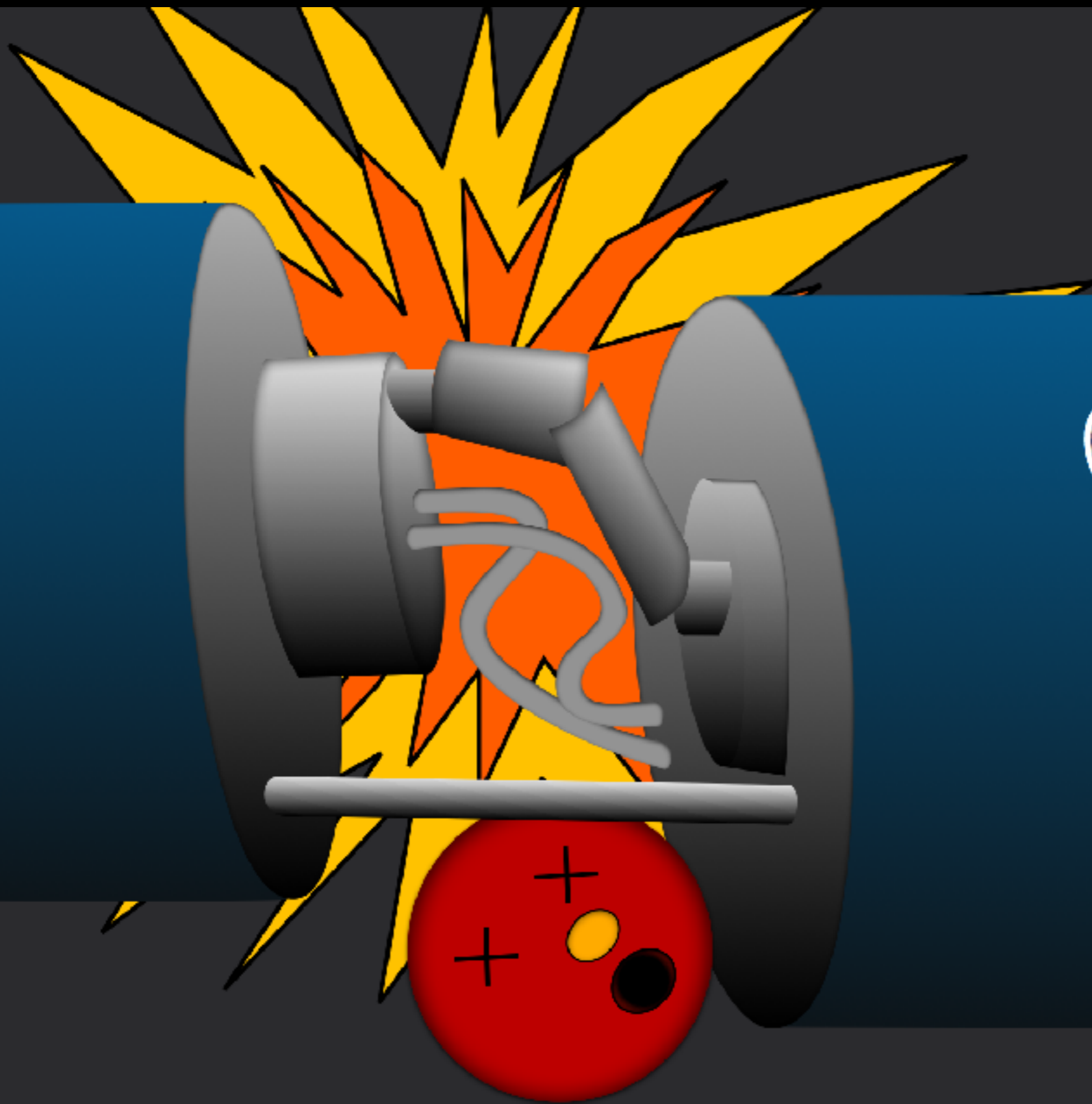
Market research



- Does not work in 3D, but could be amazing 2D game
- Need to be educational, scientifically and historically accurate
- Current educational game are either too simplified or not accurate
- Should be fun even if someone is not interested in science

Extra slides

–from original concept 2 years ago



Game
Over

ELECTRON

Charge: $-e$

Mass: 0.5 MeV

You found the first subatomic particle ever discovered (in 1897 by J.J. Thomson) !

This particle is the one that is normally responsible for electric currents: It whizzes around randomly at 2200 kilometers per second, but what we perceive as electricity is a slow movement in the order of millimeters per hour!

Before going on your journey you had one of them orbiting you. He said that you would be a good team and form "hydrogen" together.

However, the only thing that you are interested in is finding your broton!

MUON

Charge: $-e$

Mass: 105.7 MeV

Although this particle is more than 200 times heavier than its lighter brother, the electron, it takes $2.2 \mu\text{s}$ to decay. Believe it or not, that is a very long time for elementary particles, because it can travel 660 meters in that time!

When particles are accelerated, at first they become faster a lot more quickly. Once they are already very fast, however, most energy goes into making the particle heavier. It gets more difficult to speed it up and one can never actually reach the speed of light.

New stage:

The Proton Synchrotron

first operational in 1959, was CERN's flagship accelerator accelerating protons up to 28 GeV.

New stage:

The Super Proton Synchrotron

The accelerator provided proton-antiproton beams for the UA1 and UA2 experiments which discovered the W and Z bosons (Nobel Prize 1984).
Currently the SPS supplies protons and lead ions for the Large Hadron Collider.

New stage:

The Large Hadron Collider

at CERN is the biggest and most powerful particle collider in the world

The LHC collides protons at 13 TeV and aims to answer some of the unsolved questions of physics, such as where mass comes from and what is dark matter.