TO DEFINE:
How to represent the mass? cap = Light particles, helmet = hadrons, head = no mass (see neutrino)
How to represent the charge? Colours? **Plus and minus signs, and no signs at all for neutral?**
How to represent energy/ momentum? magic wand (electrons, fotons, neutrinos) water noodle (muons, hadrons)
How to represent photons? no cap, no helmet, just bare head, magic wand
How to represent neutrinos? Transparent Plastic film or bag, magic wand
How to represent muons? cap (positive or negative signs) + water noodle.

Main goal:
Simulating, using their bodies, how a particle detector works with each type of particle.
The structure of the detector should be painted over the ground, partially (cone section) or totally (circular)
It is recommended to start with single particle detections without changing the detector students before trying a real event with several particles.

Material:
Chalk: to paint the detector
Blindfolds: optional, but the particle doesn't know which kind of particle it is, so it can be a good representation of what's happening. However, students may close their eyes.
Two different types of caps and hats (mass), in two colours/signs (charges): For example, we can use white and black caps and white and black helmets, or white caps and helmets with plus and minus signs. The students can also do them but need to be able to represent mass (light and heavy particles) and the charge (positive or negative). Neutral charges could be a mix of black and white, or just without any sign at all. Not wearing a hat or a cap means the particle does not have mass (photon) nor a charge. Neutrino is represented with a plastic foil or a transparent plastic bag.

Others: to represent momentum/energy?

Group:
The group should be divided into 3 (4?) parts: the particles, the magnetic field, the detector (and the data system?).

How should each group act?

- The particles: muons, protons, neutrons, photons, electrons (and their antiparticles? other?), Those students move following a straight line until a force acts over them, with their arms up so they can also interact with the sensor.
  Could they wear blindfolds?
- The magnetic field: 2 students, representing the gauge bosons responsible for bending tracks of the student. When students with charge (how is it expressed?) enter the detector, the gauge EM bosons should tell them how they need to blend their path or maybe act over them to bend it.
- The detector: different students are distributed through the parts of the sensor and act differently depending on the type of particle:
  - If it's stopped, then they should stop the student

- If it’s tracked, then they clap their hands
- If it’s not detected (like photons), they ignore them.

How it works:
Some students are the particles and are produced (start moving) from the collision point. According to the type of particle, they need to wear clothes or complements representing their properties (charge, mass (optional), energy/momentum (optional))

Each student of the detector and the magnetic field needs to know how and over which particles interact.

The magnetic field
- The magnetic field student on the right will attract (by talking to or by pulling him) the student if (and only if) they have a positive charge (colour?)
- The magnetic field student on the right will attract (by talking to or by pulling him) the student if (and only if) they have a negative charge (colour?)

The tracker students: several students take positions around the collision point inside the marked zone as the detection system.
the tracker.
- They interact but do not stop. They just clap hands with all charged particles.
- Ignore none charged particles.

The EM calorimeter :
- must stop any charged light particle and photons (HOW PHOTONS ARE REPRESENTED? NO HAT? WHAT ABOUT NEUTRINOS?)
- They interact but do not stop. They just clap hands with charged heavy particles.
- Ignore not charged particles with mass.

The H Calorimeter students
- stop any massive particle, charged or not.
- Ignore light particles

The Muon Calorimeter
- They interact but do not stop. They just clap hands with charged light particles.
- Ignore not charged particles.

IF there is a data system, when the particle stops, they can get their data: bending => momentum, energy, charge, mass and try to guess the type.
IF NOT, it can be done as a group deliberation.