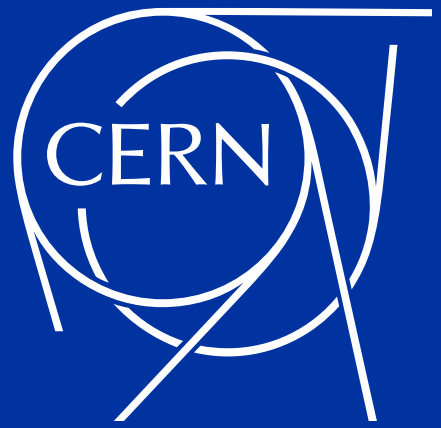


“Particle Physics for Babies”

Louie Corpe (CERN)

IPPOG Meeting, 17 Nov 2021

Introduction

- I became a father last November. Like all babies, my daughter was fascinated by brightly-coloured high-contrast images!
- Looking at such images helps babies to develop their eyesight
- There is a whole range of books in the “high contrast baby picture book” style… many of them quite boring arrays of shapes.

Introduction

- I became a father last November. Like all babies, my daughter was fascinated by brightly-coloured high-contrast images!
- Looking at such images helps babies to develop their eyesight
- There is a whole range of books in the “high contrast baby picture book” style… many of them quite boring arrays of shapes.

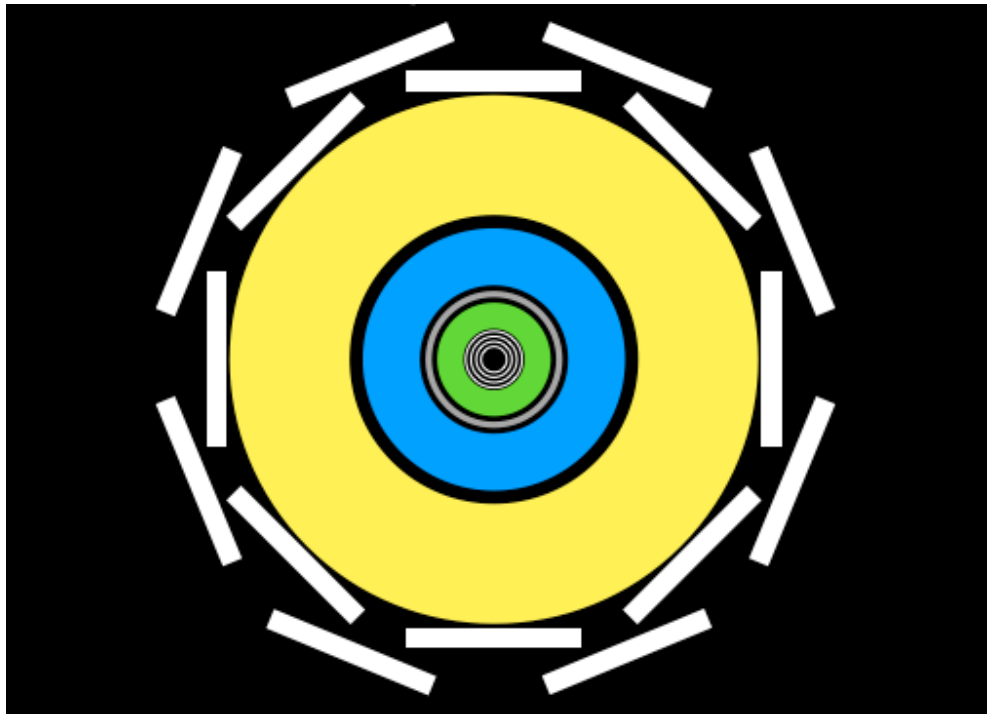
Some shapes reminded me of an ATLAS detector cross-section!

Made me think: we have many high-contrast images in HEP...

... Opportunity to create a particle-physics-themed baby book?

Particle Physics for Babies

- On last day of my parental leave, I put together some images, arranged them, and got them printed online.
- PDF is attached to these slides, and the printed version came out very nicely.



Particle Physics for Babies

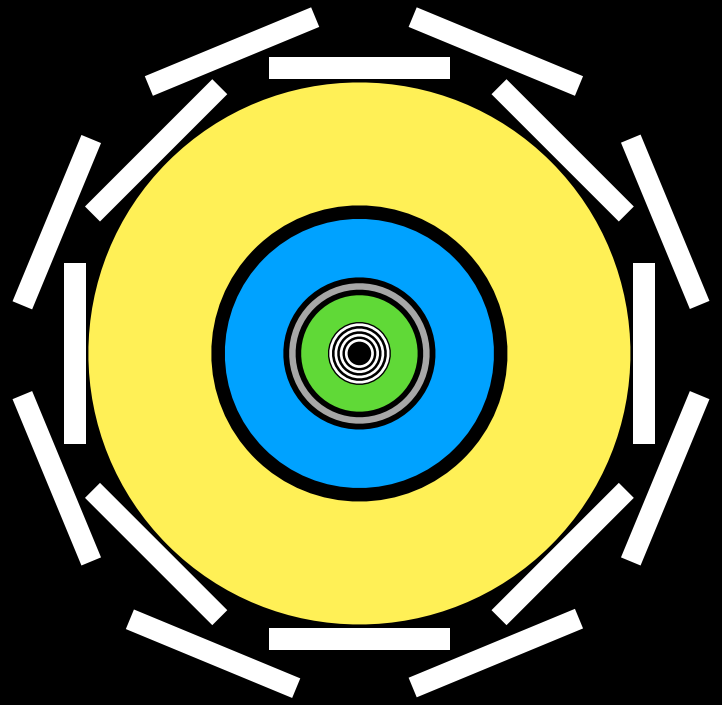
- And most importantly, my daughter loved it!



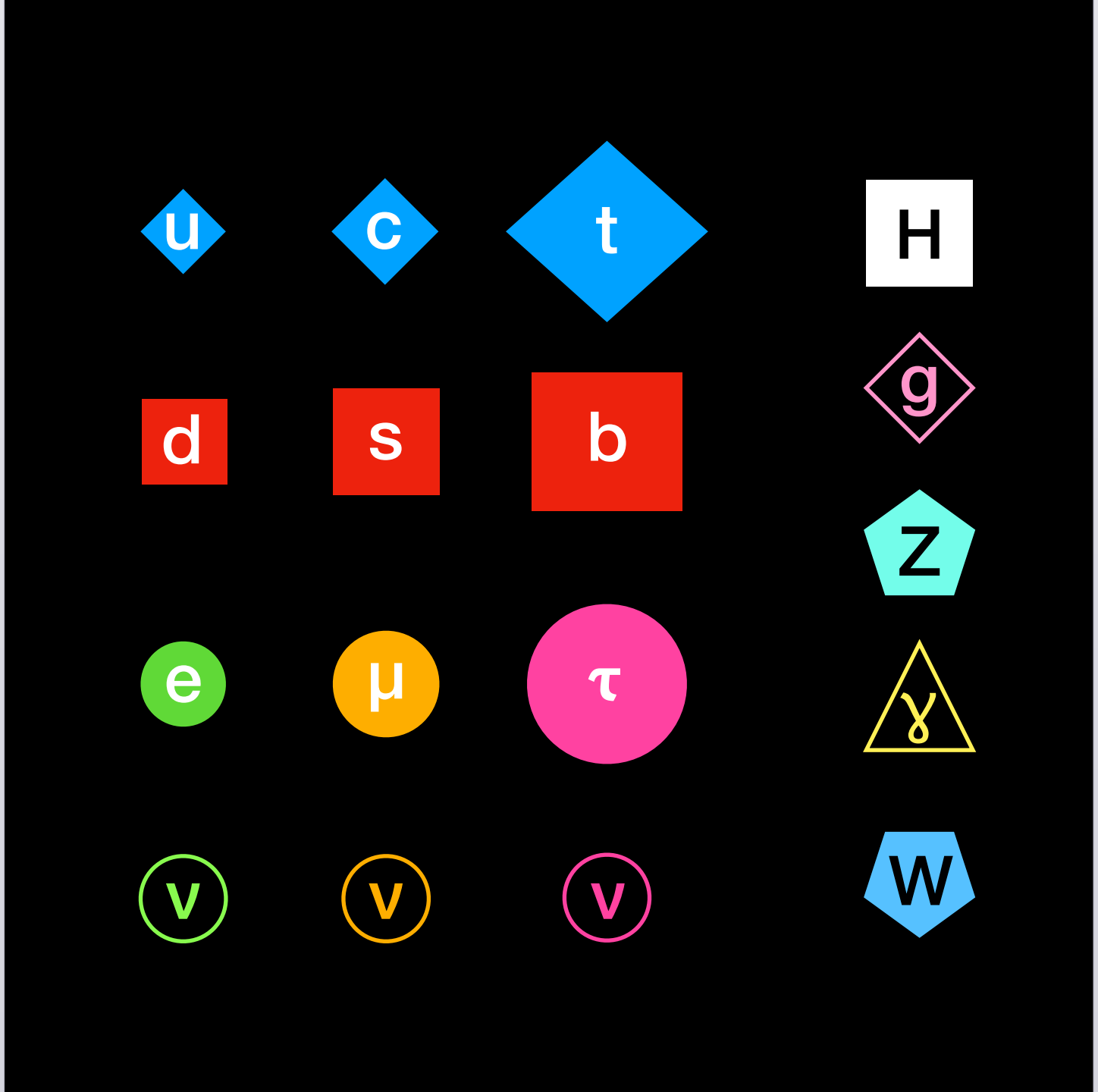
Particle Physics for Babies

- Colleagues loved the concept, and I've been using this as a gift for fellow physicists (and non-physicists) friends who have become recent parents... great reception!
- So I wondered if may be nice to circulate it more widely...
- Great feedback+support from the ATLAS outreach coordinators and IPPOG!
- Created captions which can be accessed by QR code, so that non-experts can explain to baby as the read.
- Let's take a look at the latest iteration...

Particle Physics for Babies



By Dr Louie Corpe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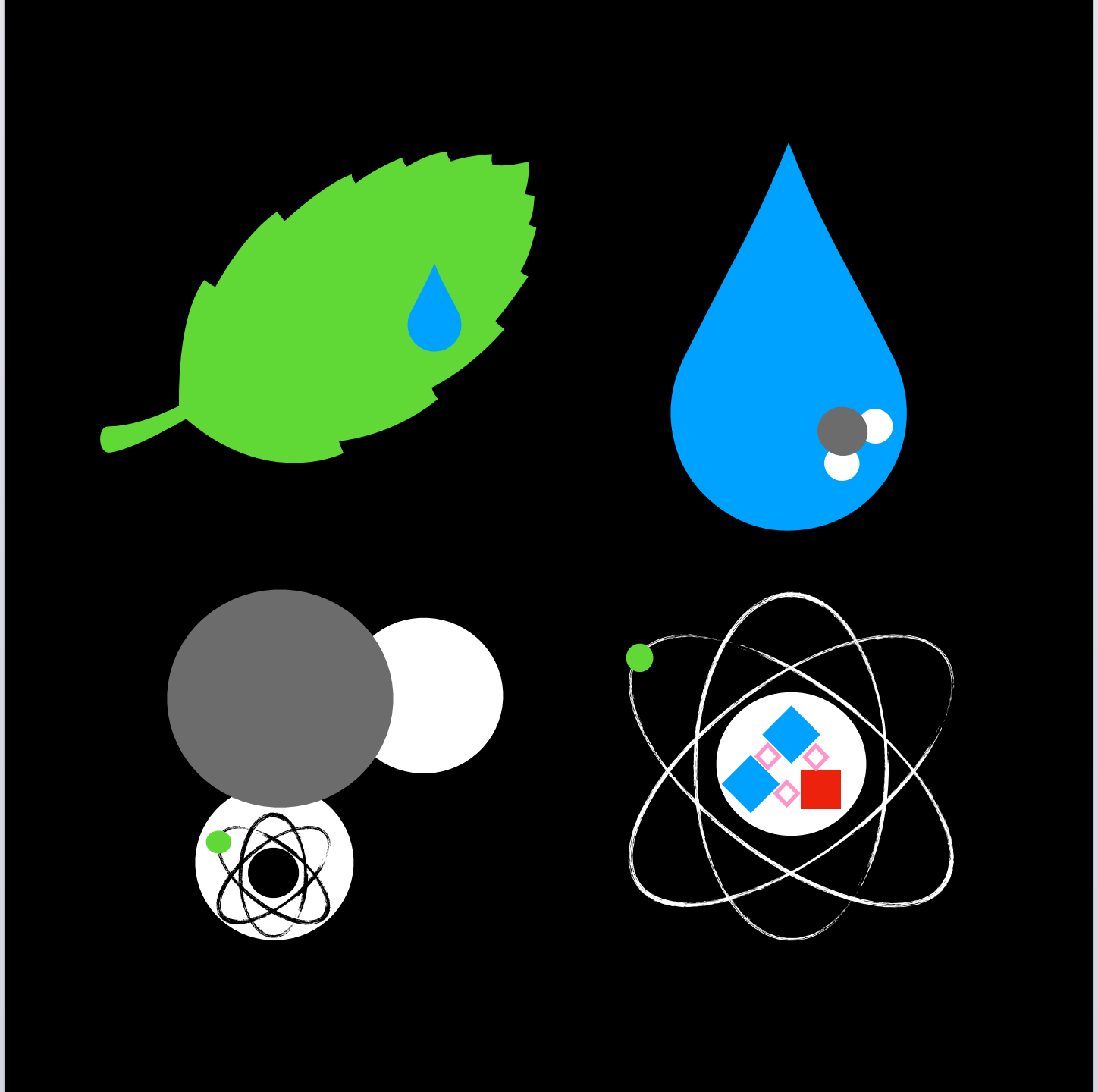

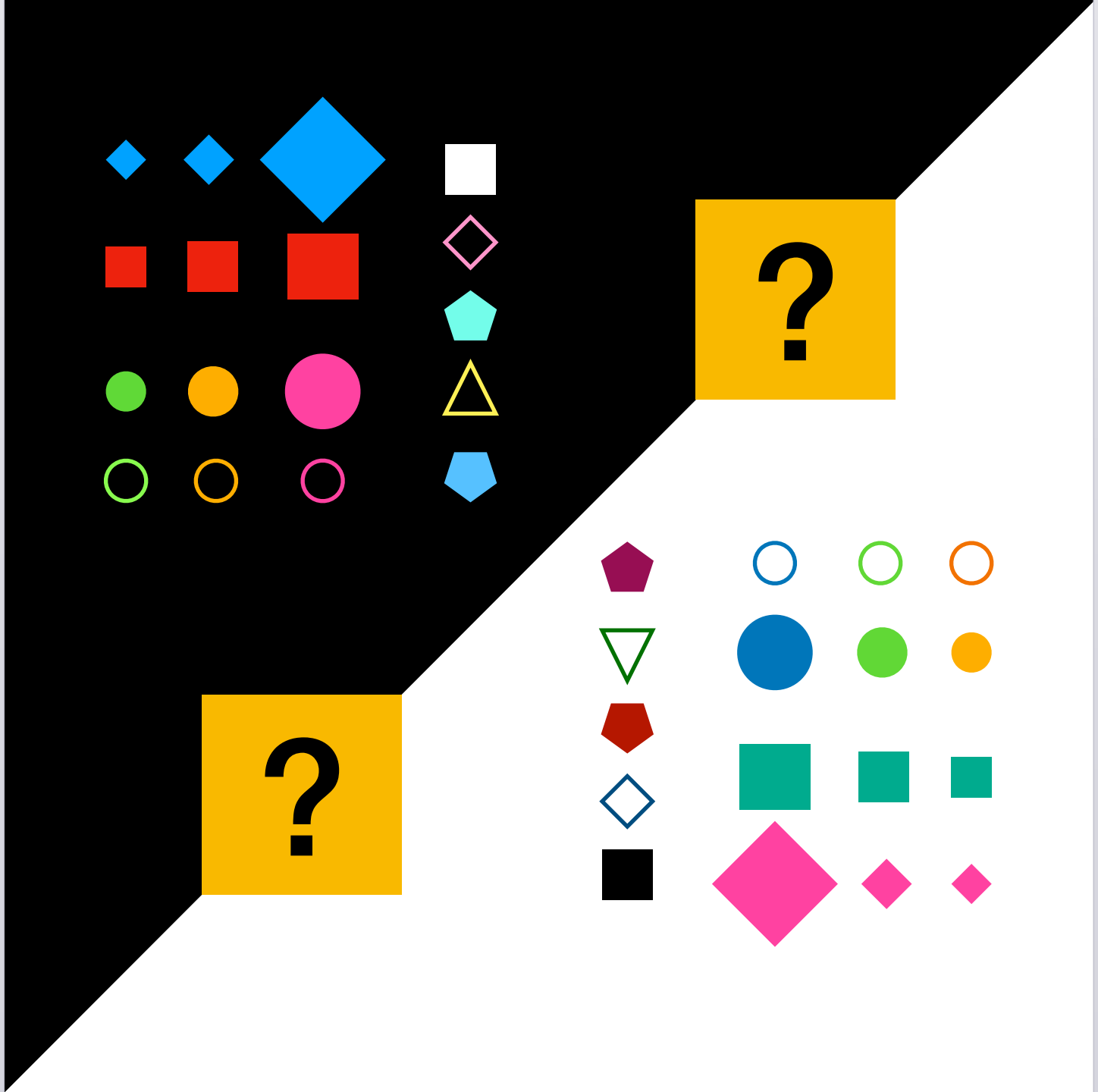

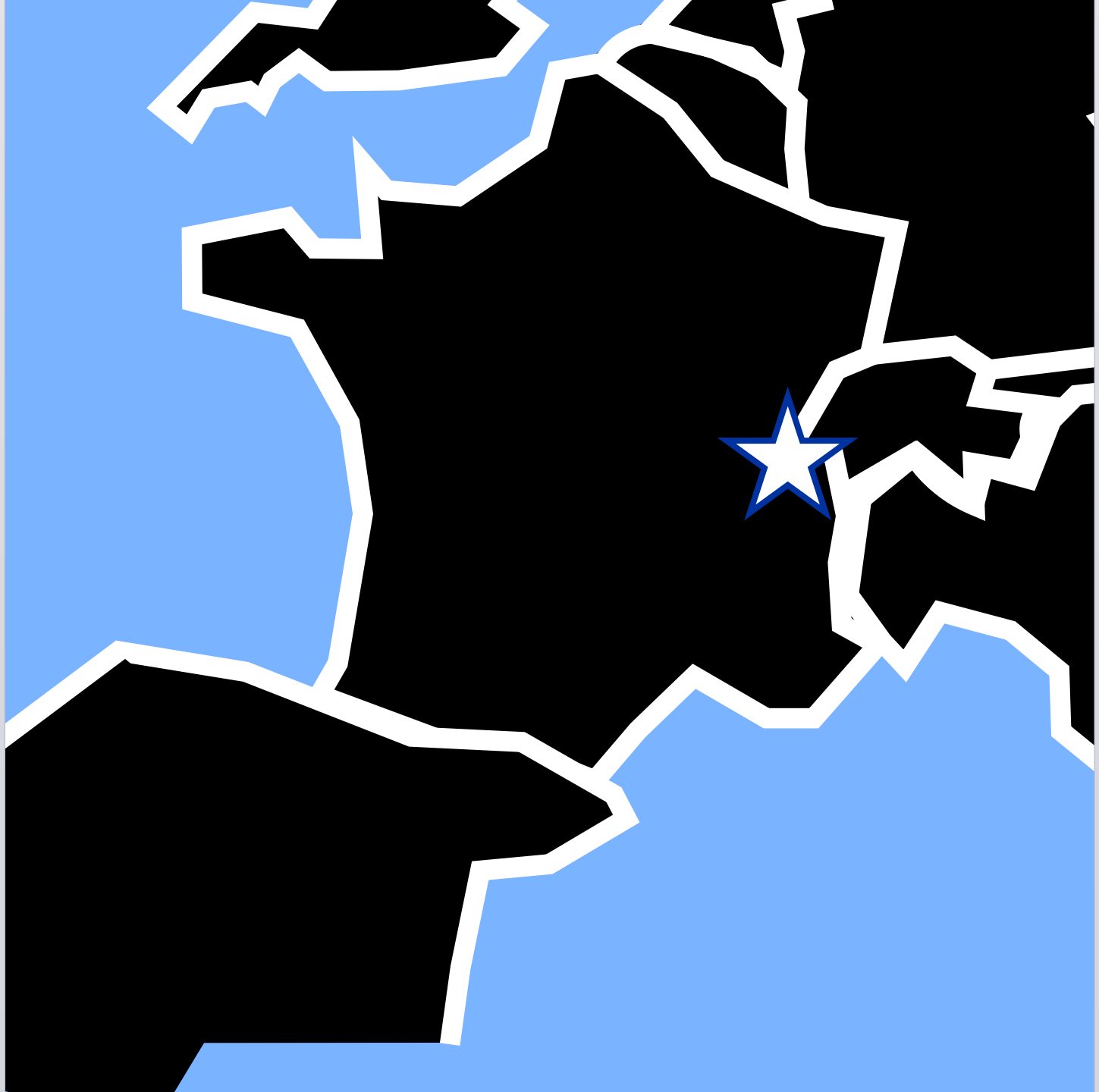

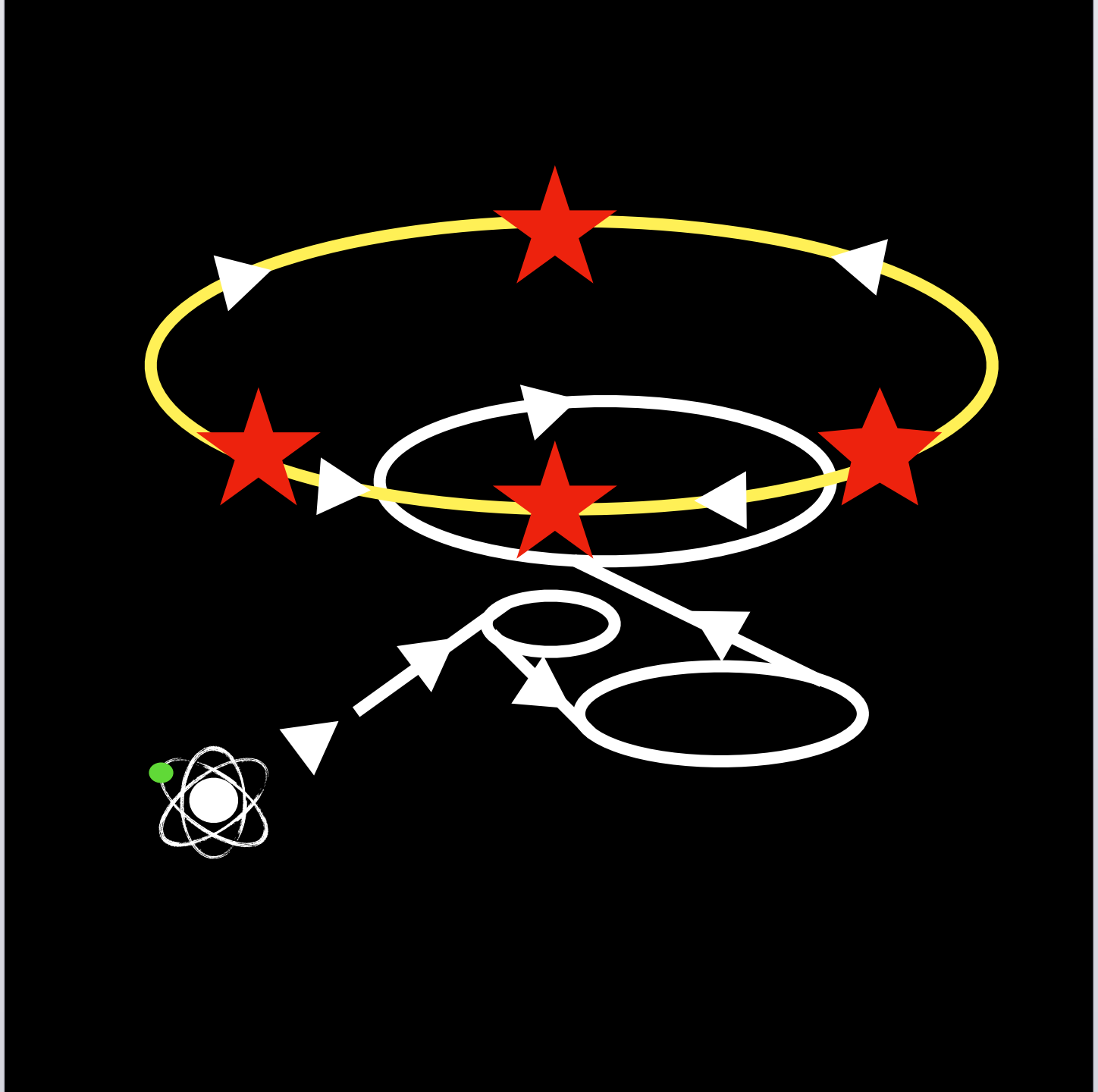

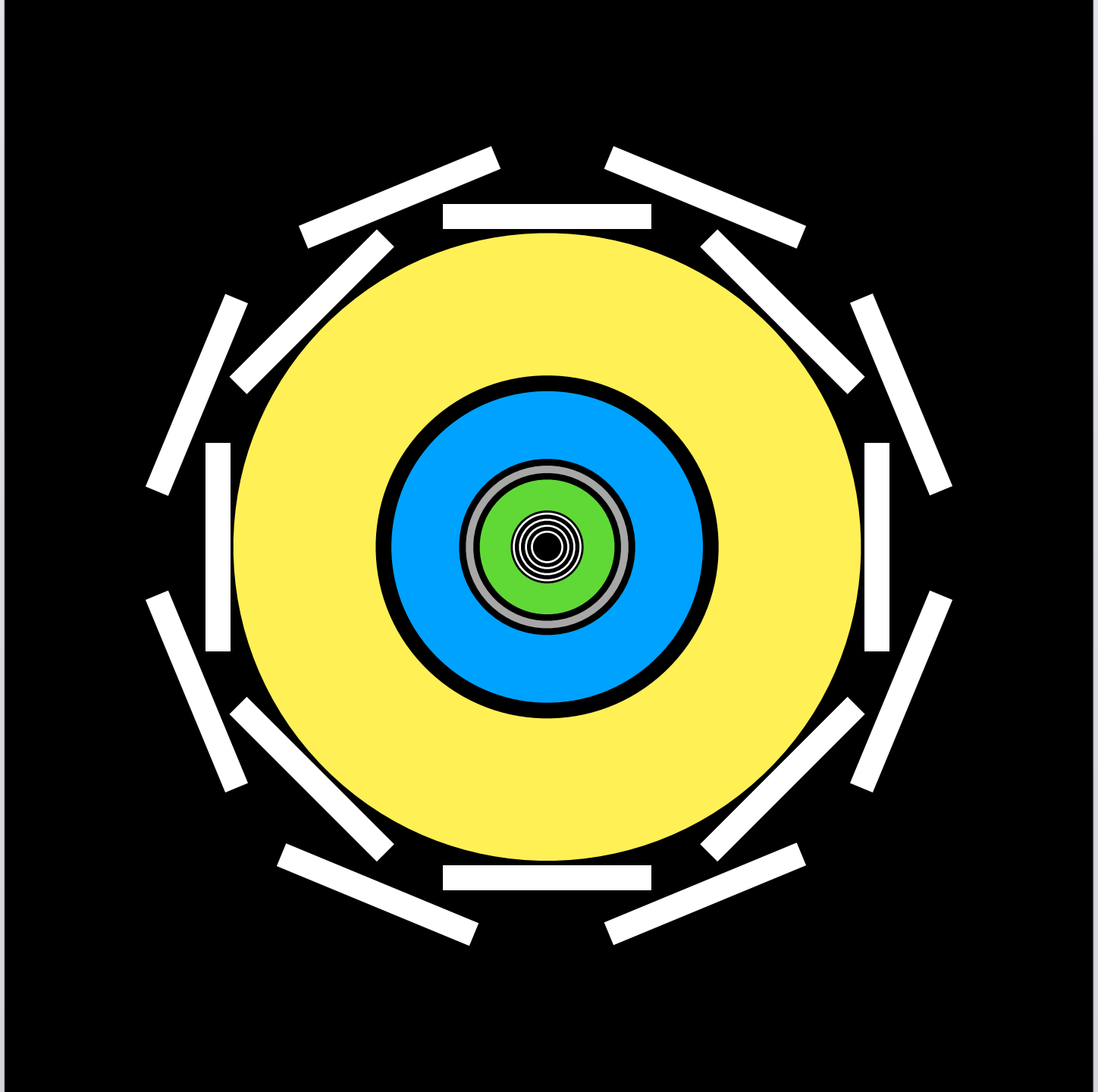

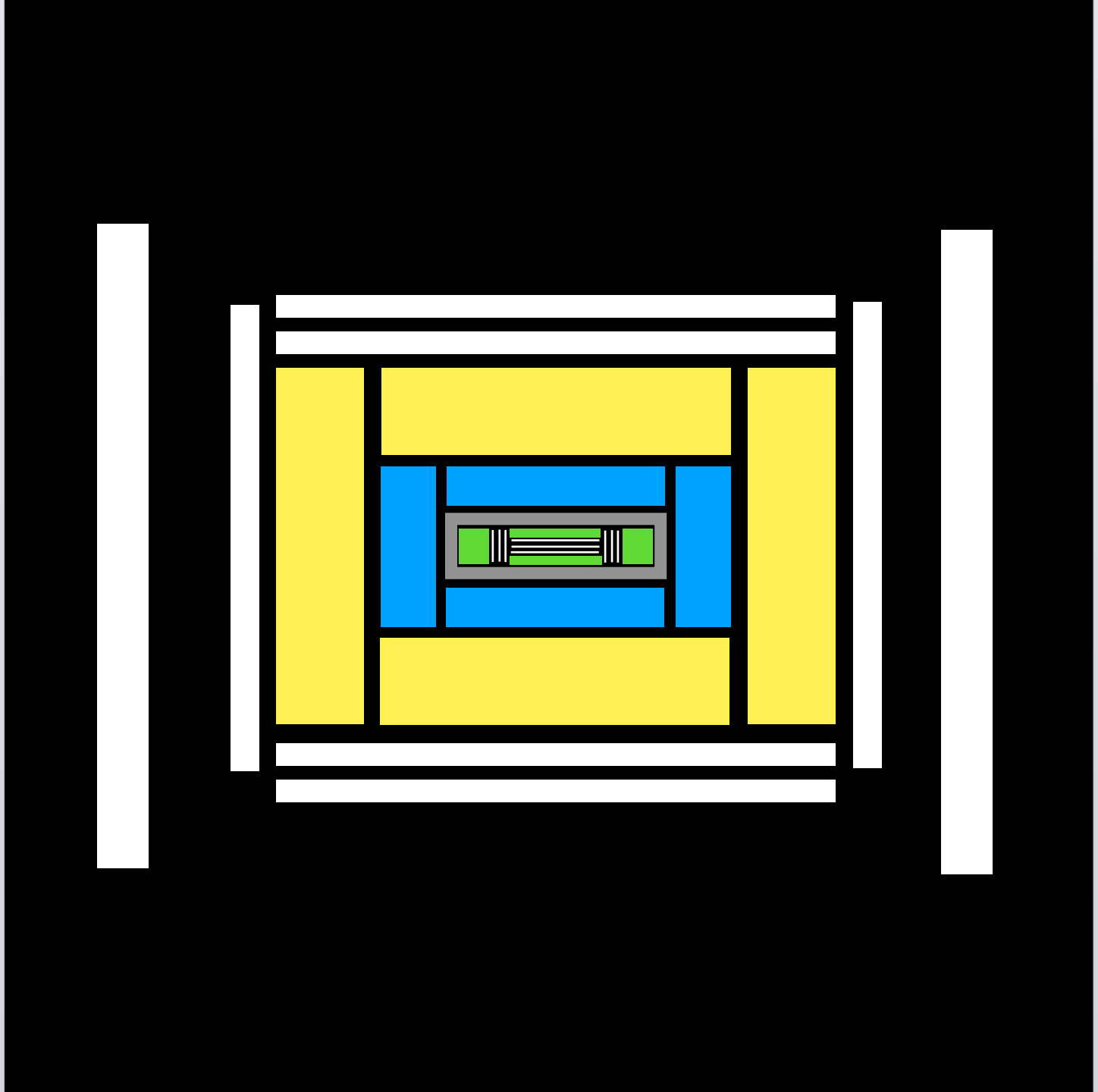

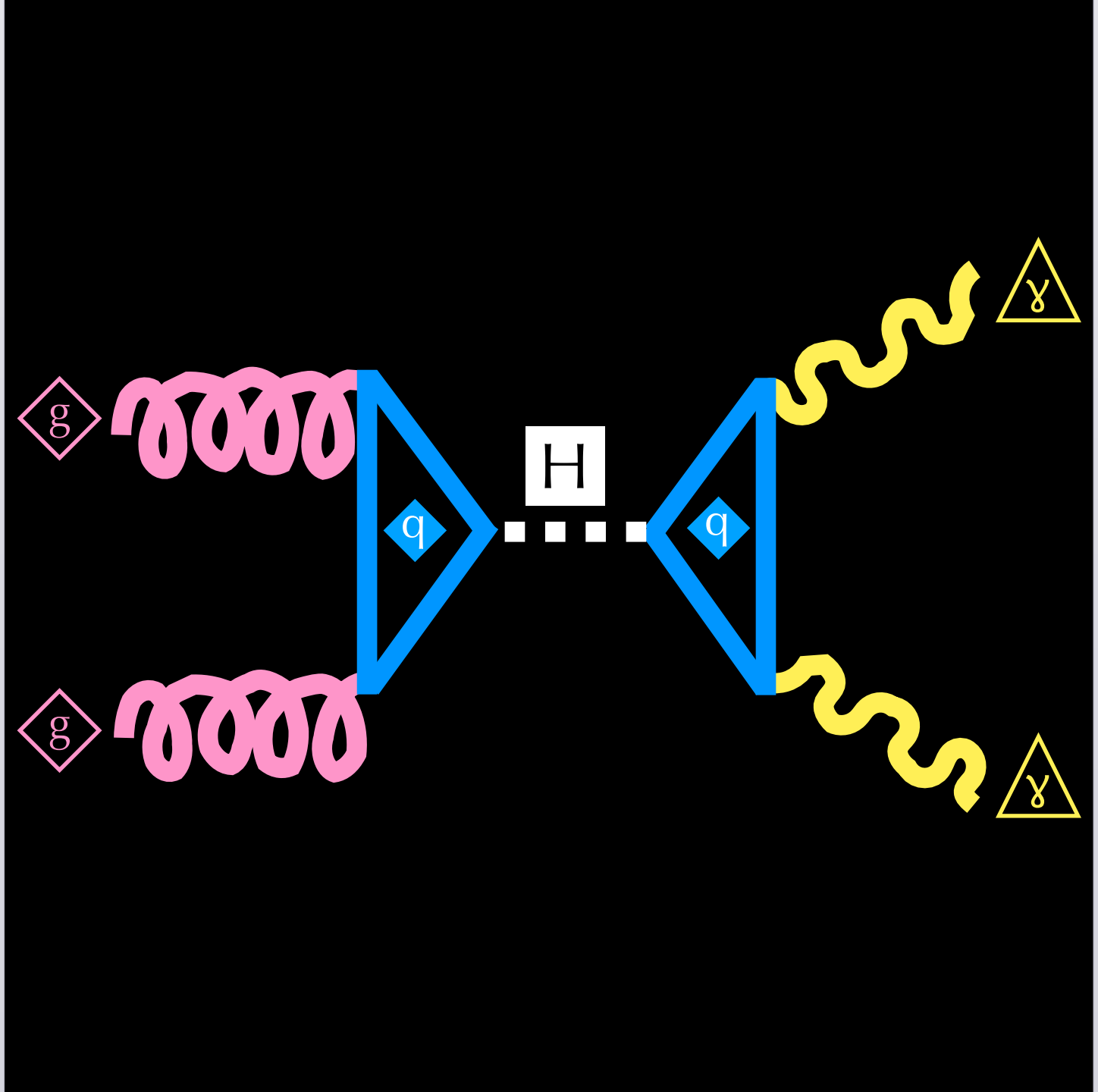
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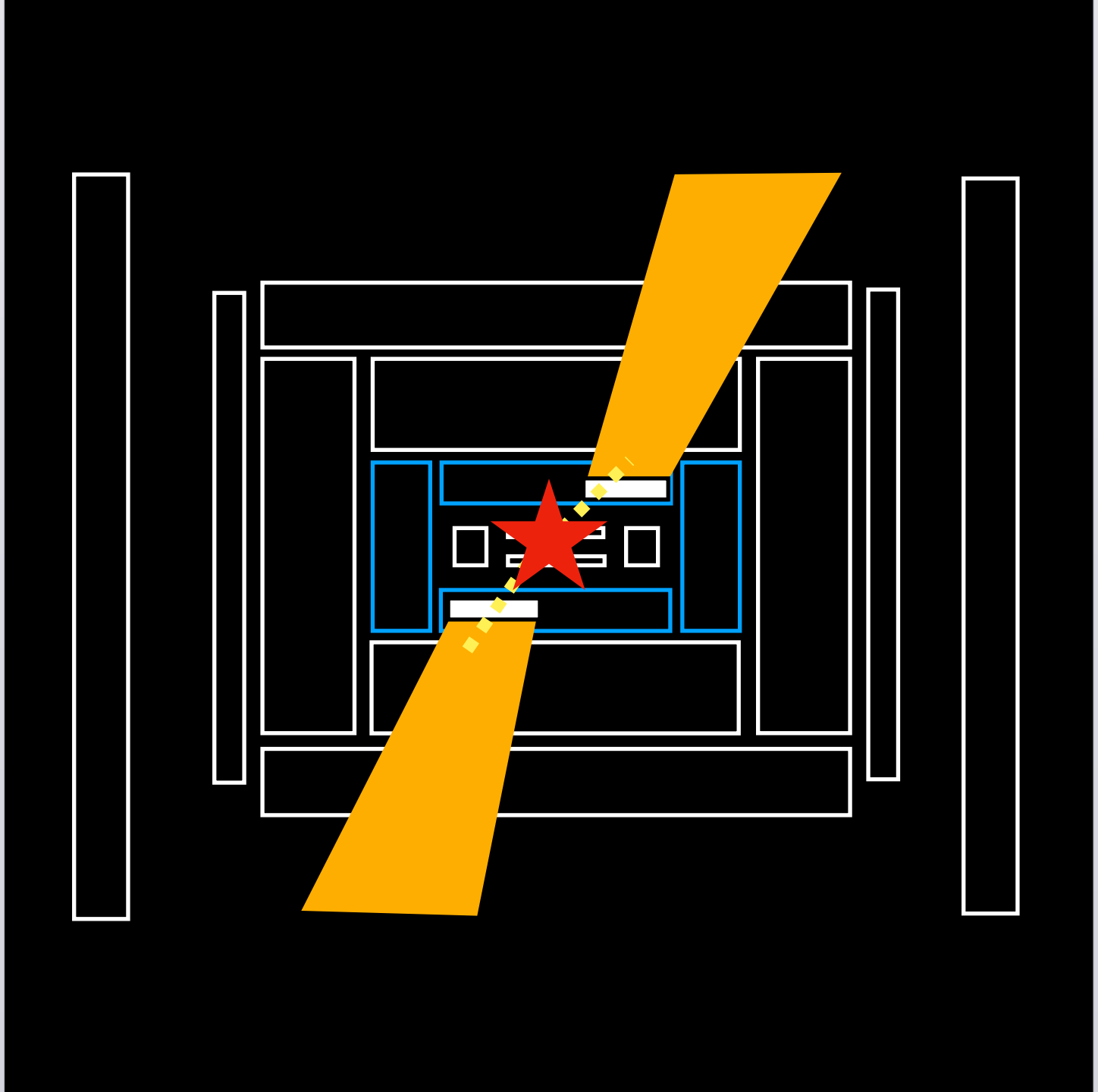

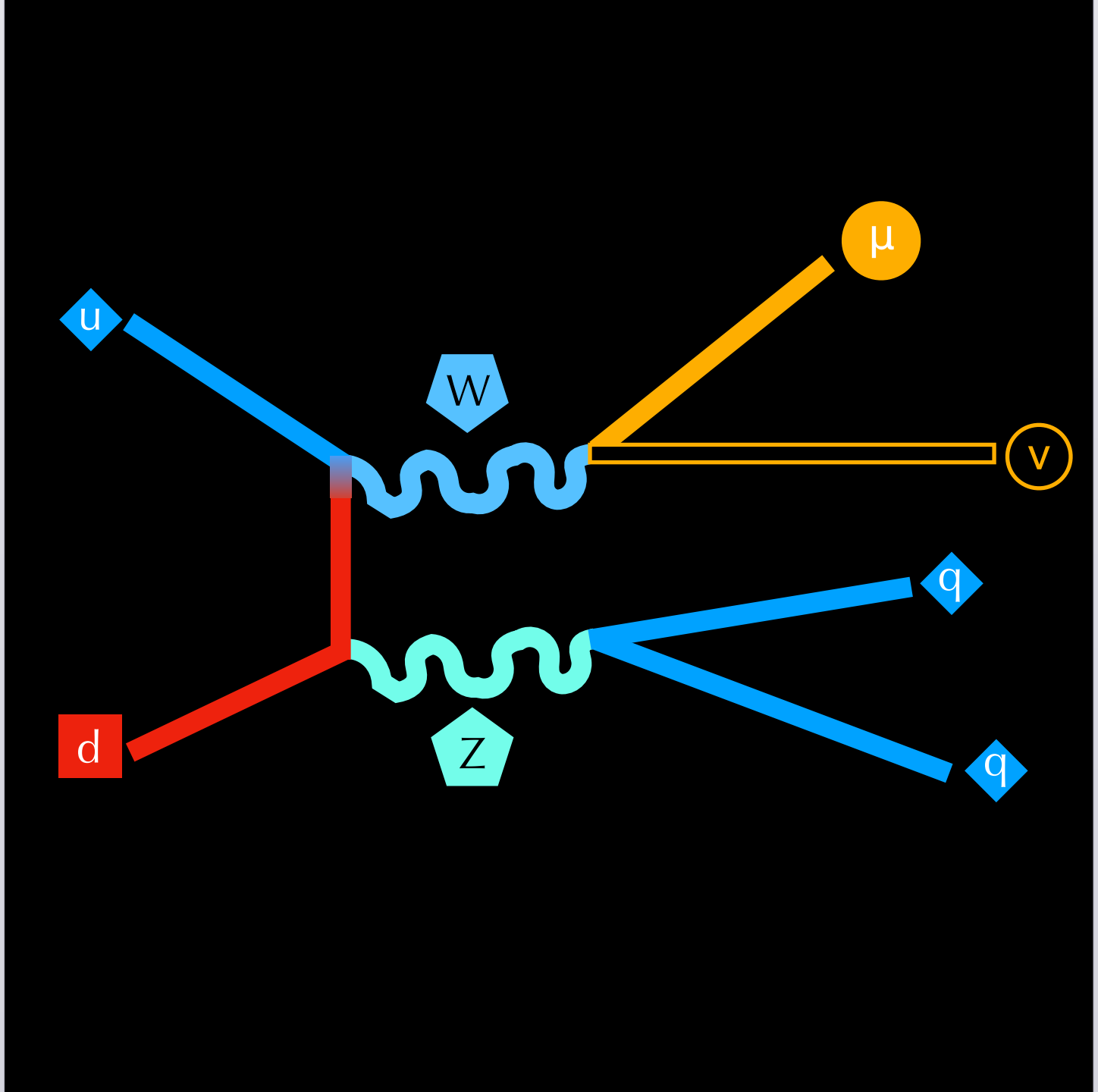
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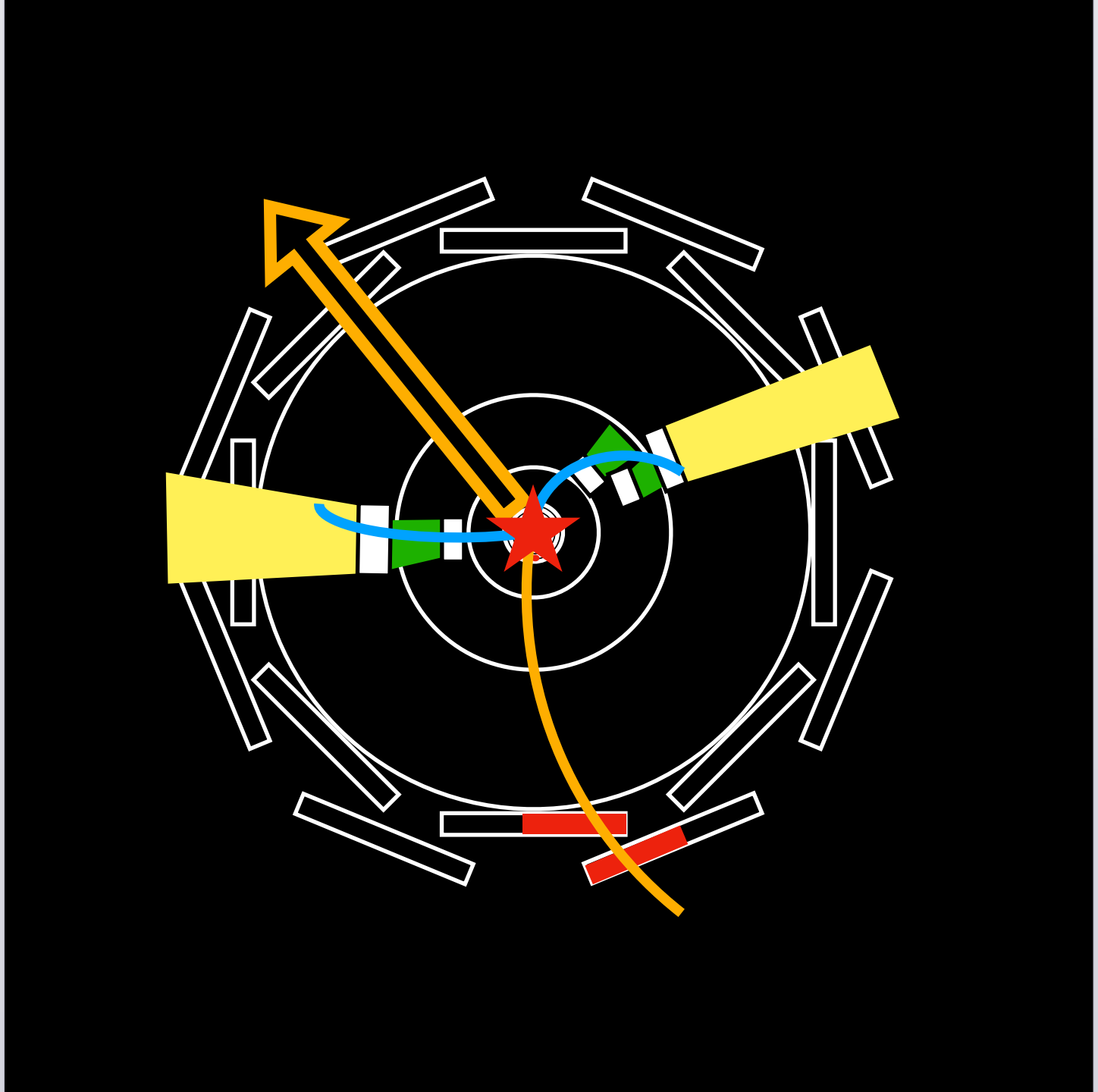

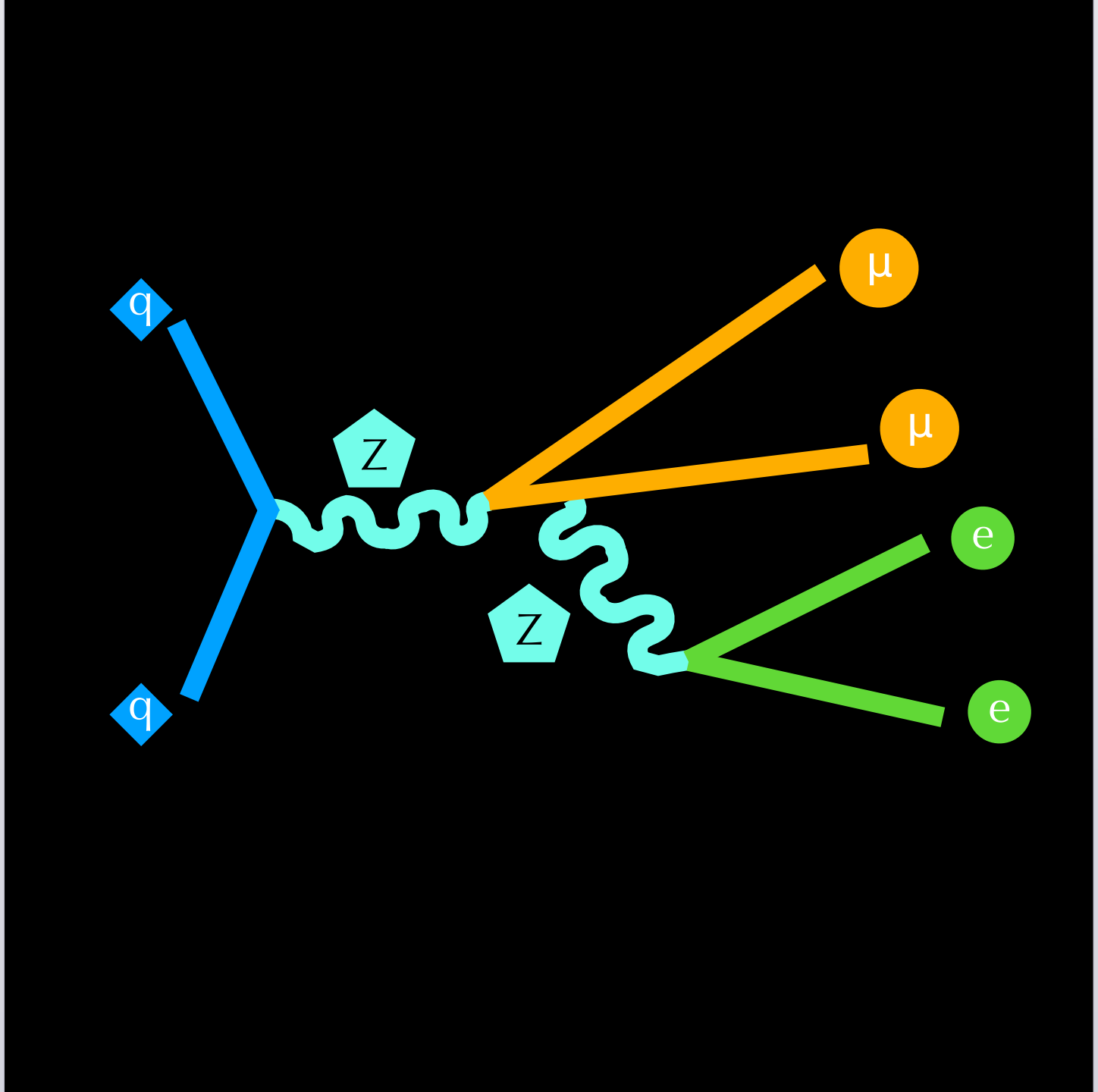
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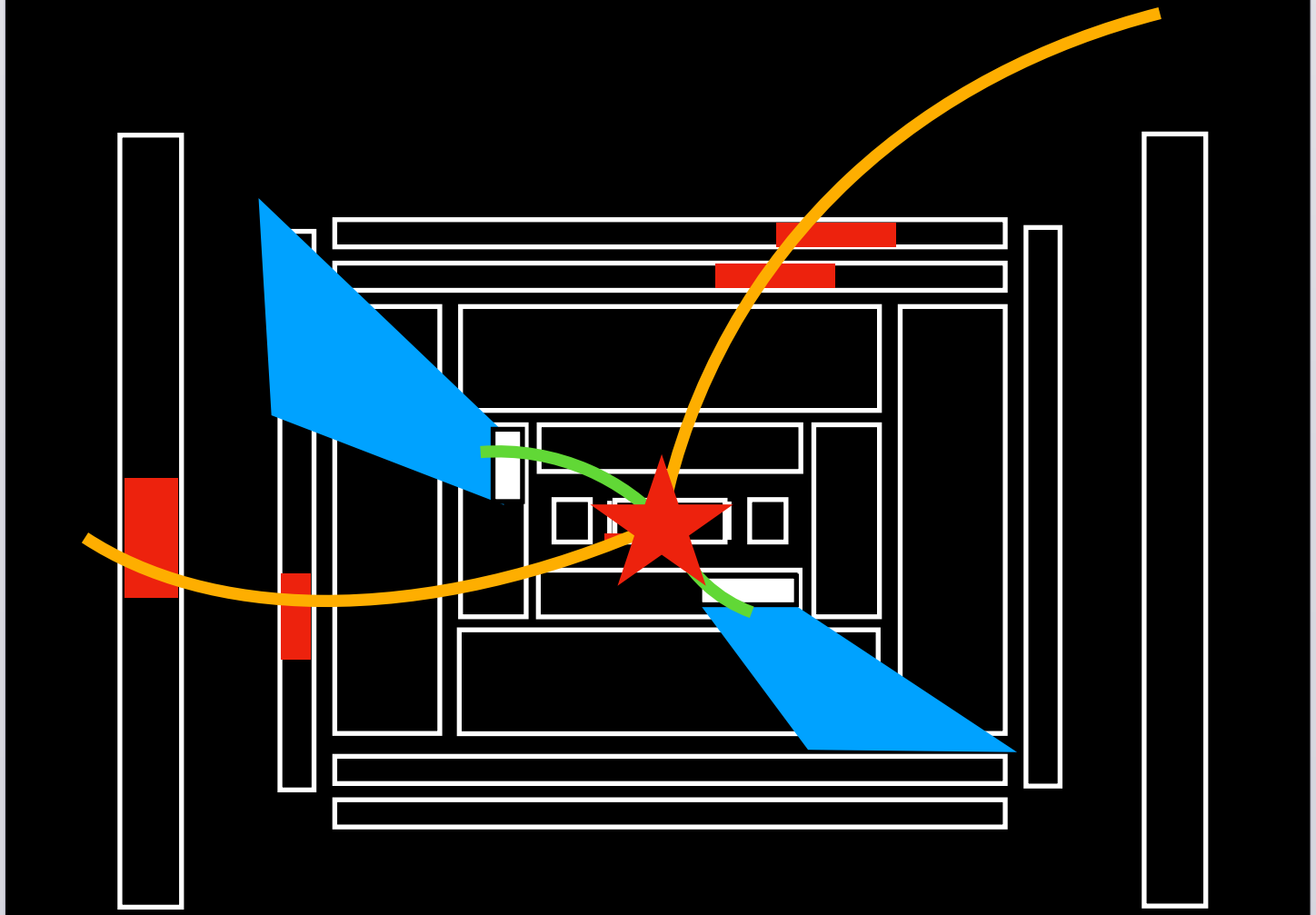

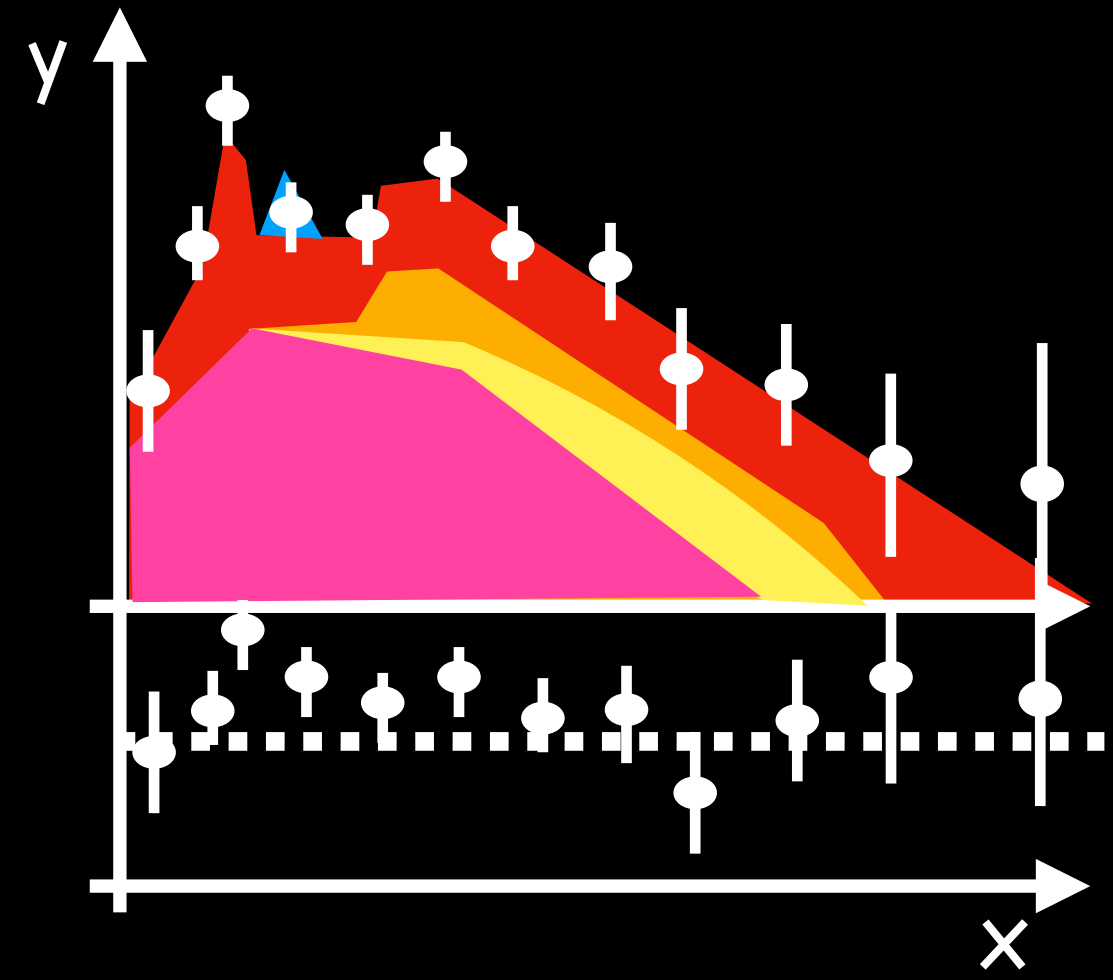
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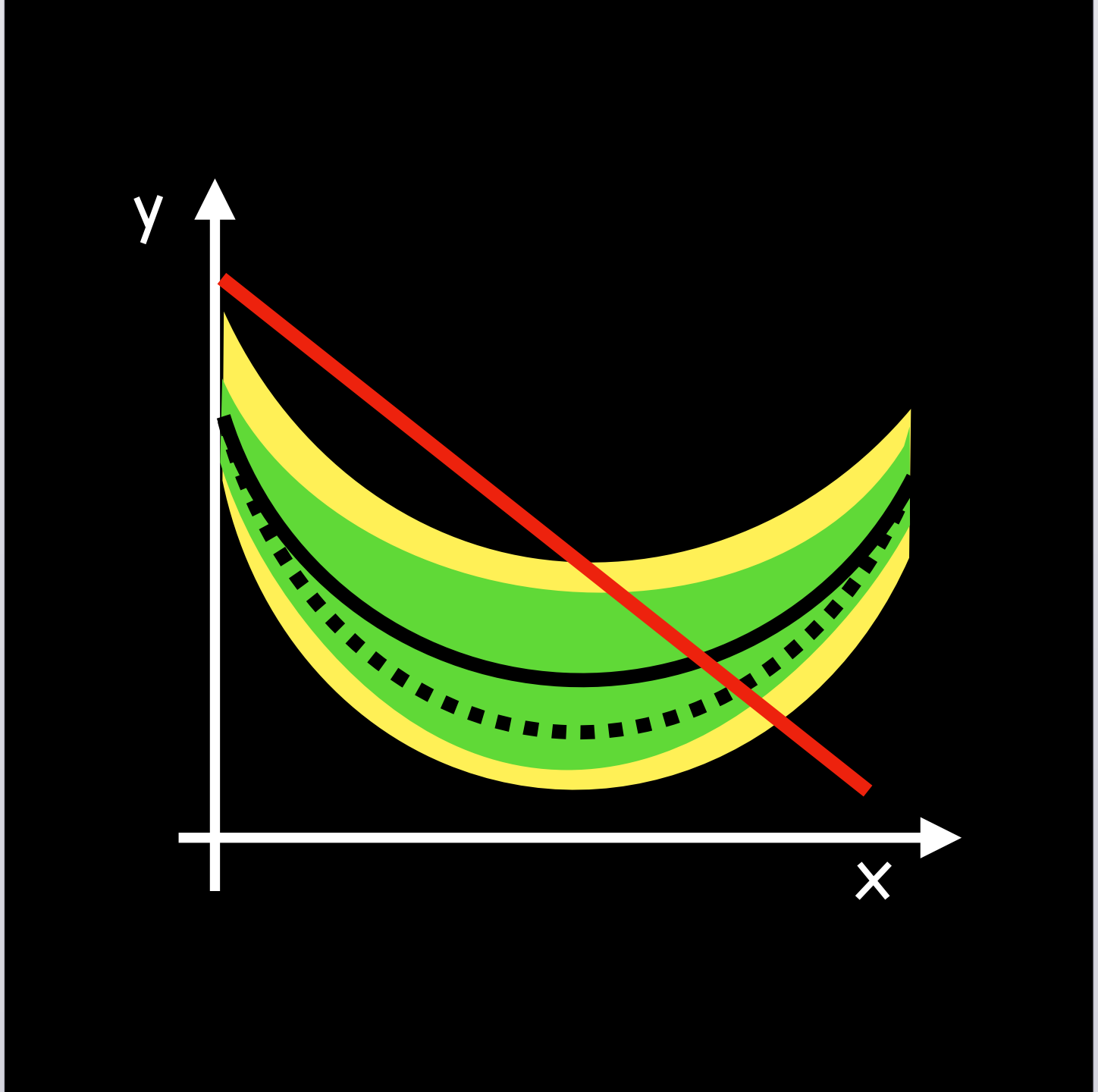
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Your Collider ?

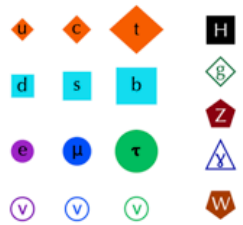
Want to find out more about the images in this book, so you can explain them to your baby?

Or visit
https://louiecorpe.com/pp4b/

Want to find out more about the

The Particle Physics Baby Book - *Explained !*

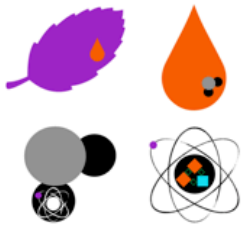
Page 1



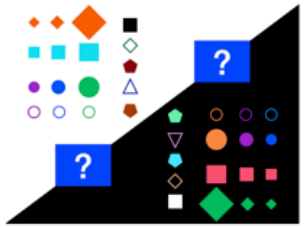
The **Standard Model** is the best guess we have so far of what the building blocks of the Universe are. It contains the **quarks**, the **charged leptons** and their **neutrinos.** The forces which connect these particles are carried by **bosons**, shown in the right-hand column.

Page 2

Let's journey into the world of particle physics: from a **leaf**, to a drop of **water**, to a **molecule of H_2O**, and to a **Hydrogen atom**, composed of **quarks** and **gluons** in the nucleus, orbited by an **electron**.



Page 3

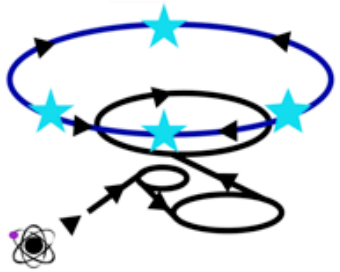


Could there be ***more*** particles than the ones we know about? **We suspect there are!** We are trying to find them. For example, in a theory called **Supersymmetry**, each Standard Model particle would have a heavier mirror twin.

Page 4

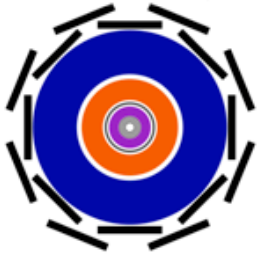
CERN is one of the places where we look for **new particles.** It's on the border between France and Switzerland. It is one of the biggest laboratories in the world!

Page 5



Welcome to the CERN accelerator complex! **Protons** (Hydrogen nuclei) are accelerated throu series of rings until they reach the Large Had Collider, moving at nearly at the speed of light. protons are then **smashed together** so we can s the particles which are produced.

At the collision points, we look for particles with huge detectors, which are like enormous 3D cameras. These pages show cross-sections of the **ATLAS detector**, across (page 6) and along (page 7). From the centre, the **tracking detectors** record trajectories of charged particles like electrons and muons; the **solenoid magnet** bends the trajectories of particles so can can estimate their momentum; **electromagnetic calorimeter** picks up electr and photons; the **hadronic calorimeter** measu activity from particles made of quarks gluons; and the **muon spectrometer** tells where muons passed.



Page 7

This is a Feynman diagram, which shows how an interaction takes place in a

What Next?

- I'm in contact with local printing company who could do an initial run of around 500 books, with the kind support of ATLAS and IPPOG (logos will be on the book)
  - We hope to have them before Christmas...

- The book will be released under a **CC BY-NC-SA 4.0** (Attribution-NonCommercial-ShareAlike 4.0 International) "Creative Commons" copyright

- The PDF of the book will be available for download+print at home

- **Thanks again for IPPOG for your support in making this project a reality**!