

Anna



Theresa



Collaboration  
Voyager

3 Particle  
Detectors



Catherine

Yuriy

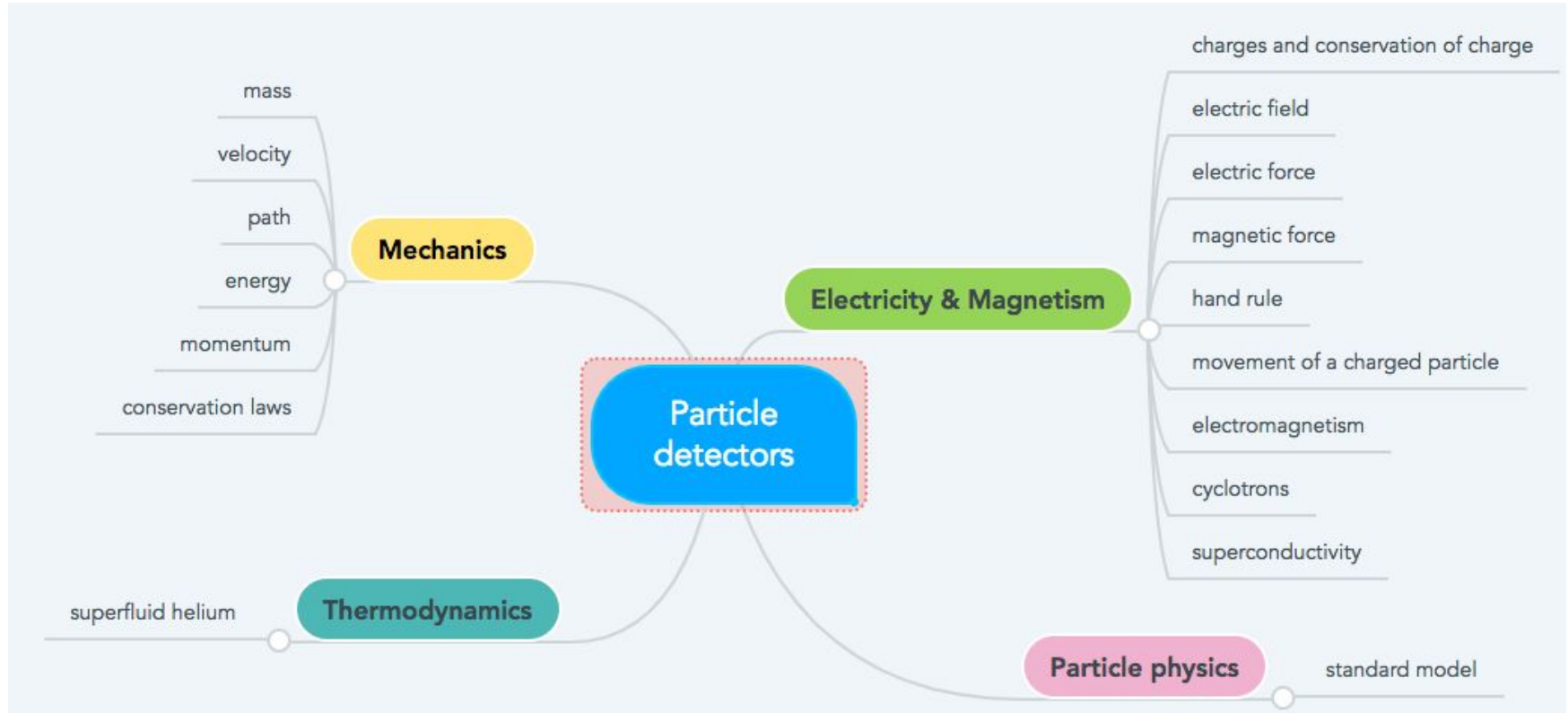


Mathias

# Who are we? Where do we come from?



# Connections to our curricula



# Key Ideas/Guiding Questions

What is the function of a particle detector?

How do scientists know if a particle is positive? Negative? Neutral?

How do scientists determine the energy of a particle using a detector?

How do scientists determine the mass of a particle using a detector?

# Potential conceptions and challenges

Student familiarity with types, names, and properties of particles

Application of RHR in various situations

Using the equation for invariant mass

Measuring mass in eV

# How to start the first class?

## Model particle detectors

- Simulate particle detectors
- One unknown particle goes through all the detectors/ Google Form: Guess the unknown “particle”

What is your gender?

What is your height?

Where do you come from?

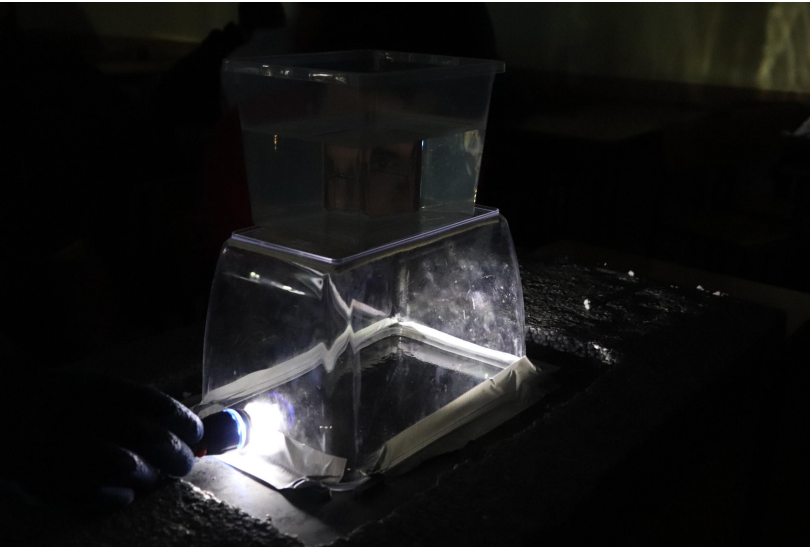
What is your favorite color?

## Ask some questions:

- How can we see what is invisible?
- How do we know the unseen particles?
- Show movie of cloud chamber
- Show picture of CMS or Atlas and ask them what is for?
- Shock students about scale of LHC and detectors and size of particles detected there.

How can we see what is invisible?

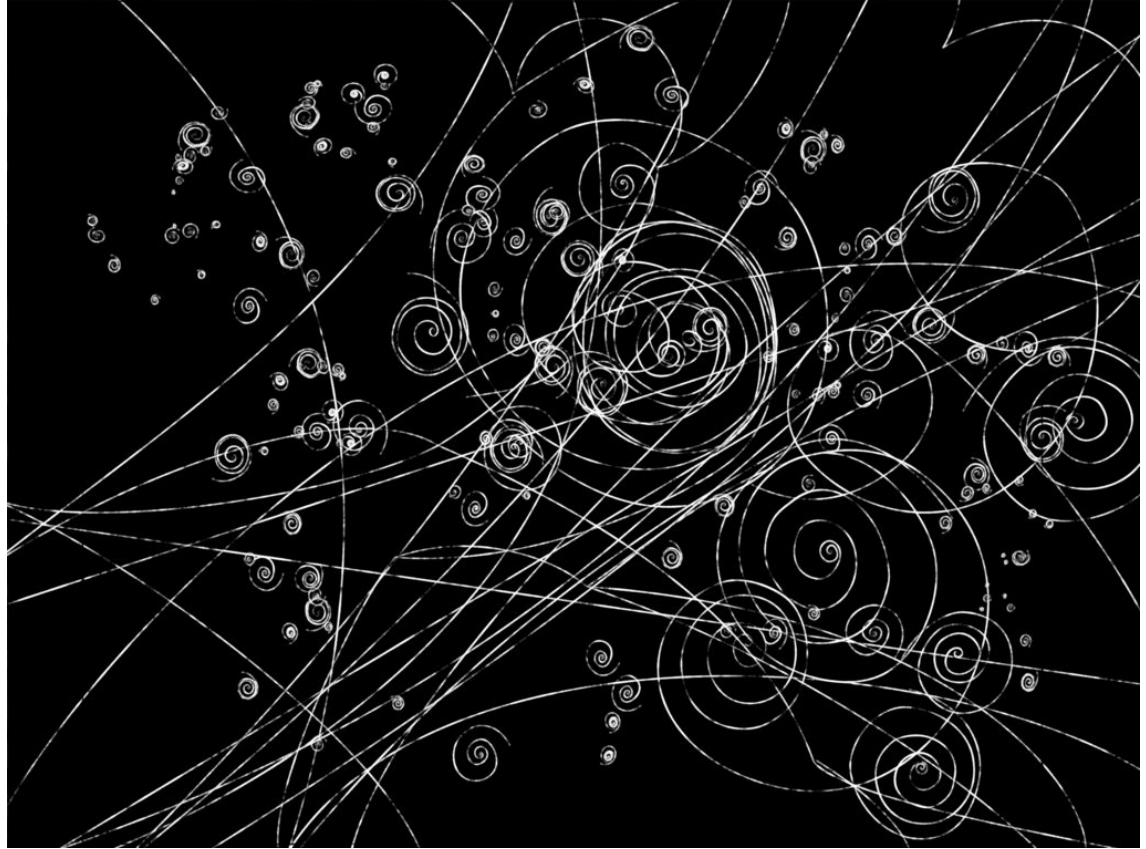
Cloud chamber!



Which particle has the biggest speed and mass? If we can add M field - can specify charge of particle.

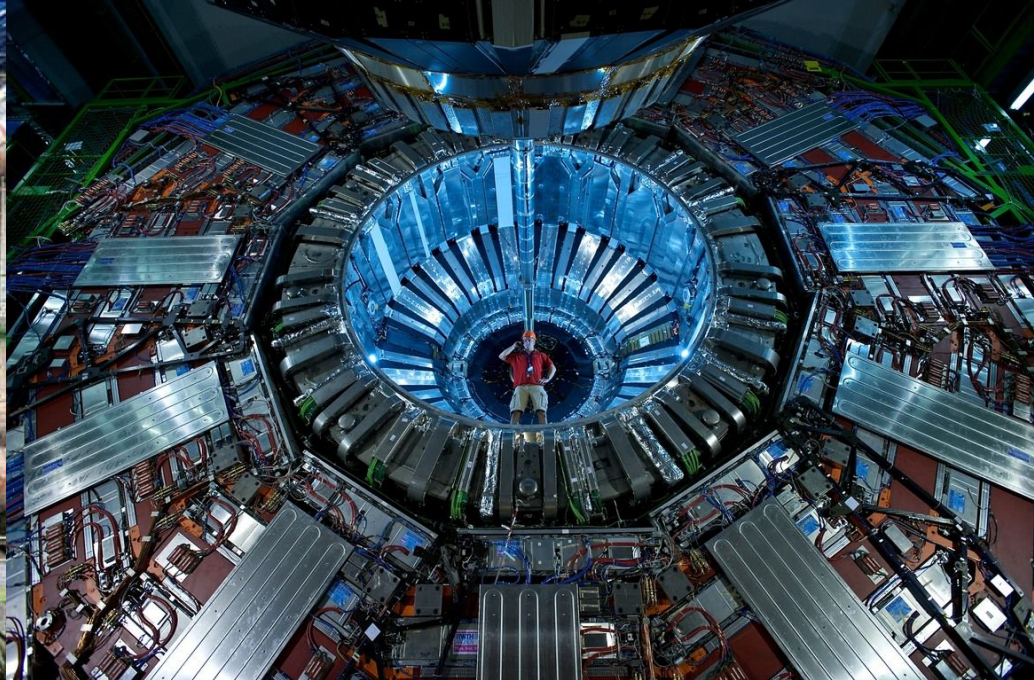
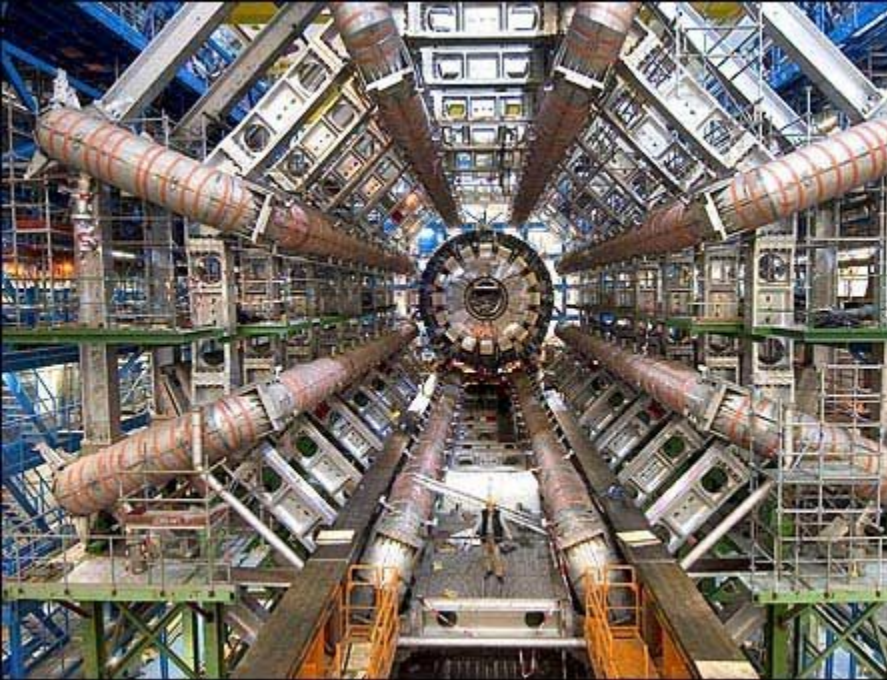
# Bubble chamber

Mention about old methods  
and try to identify particles

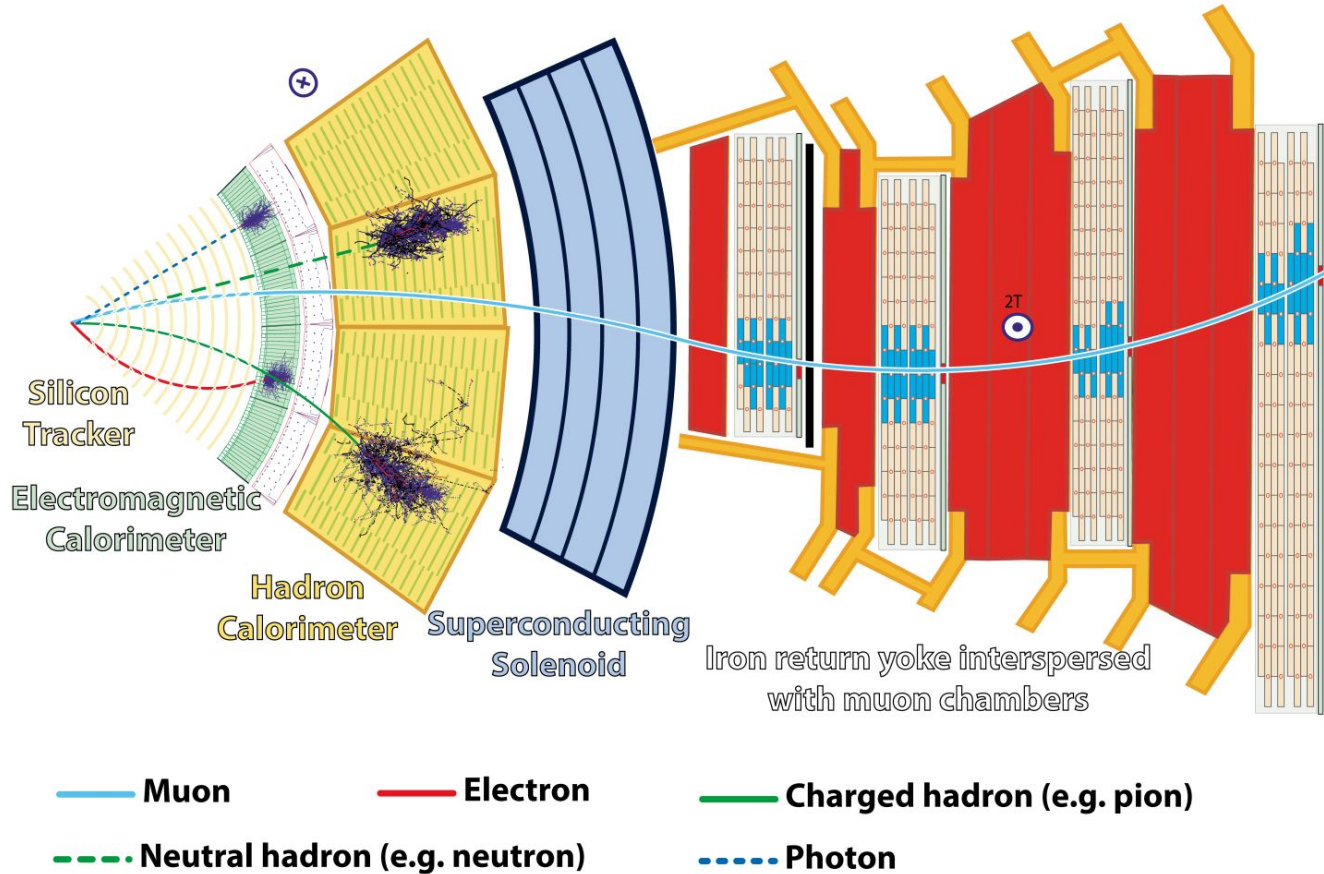




Is there something that we don't know yet?  
How can we detect it?  
Build huge machines to detect invisible particles!



.... Tell and show a story about CMS or ATLAS, use CERN resources

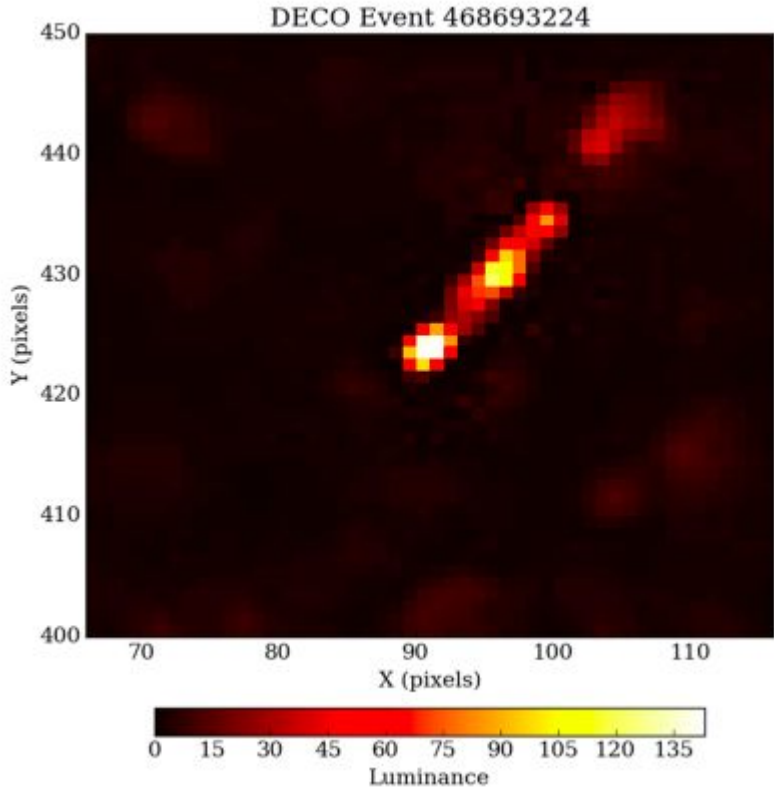


# Project

Particle detector (G-M counter) in stratosphere!



# Phone app 1 to detect particles



DECO HOME  
Distributed Electronic Cosmic-ray Observatory

PROJECT APP DATA EDUCATION RESEARCH FAQ CONTACT

HOME

News  
Stay up-to-date on all DECO news,

Download App  
The DECO app currently runs on Android

Data  
You can access all of your data as well as

<https://wipac.wisc.edu/deco/home>



Scan the QR code to  
get to the website

# Phone app 2 to detect particles

CRAYFIS

<https://crayfis.io/>

CRAYFIS:

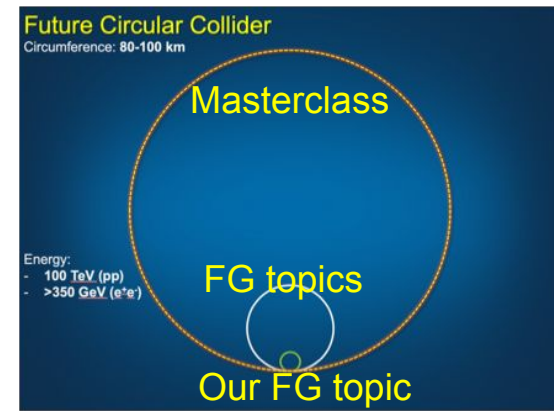
The app that turns your phone into a cosmic ray detector. No joke.



Scan the QR code to get to the website

# Masterclass “Particle Physics”

- 3 - 4 sessions in a school-year
- for special students
- at school and, if it is possible, in an institution or laboratory
- Methods and material from S<sub>μ</sub>cool lab, OpenData, Perimeter Institute, ...



# Aims

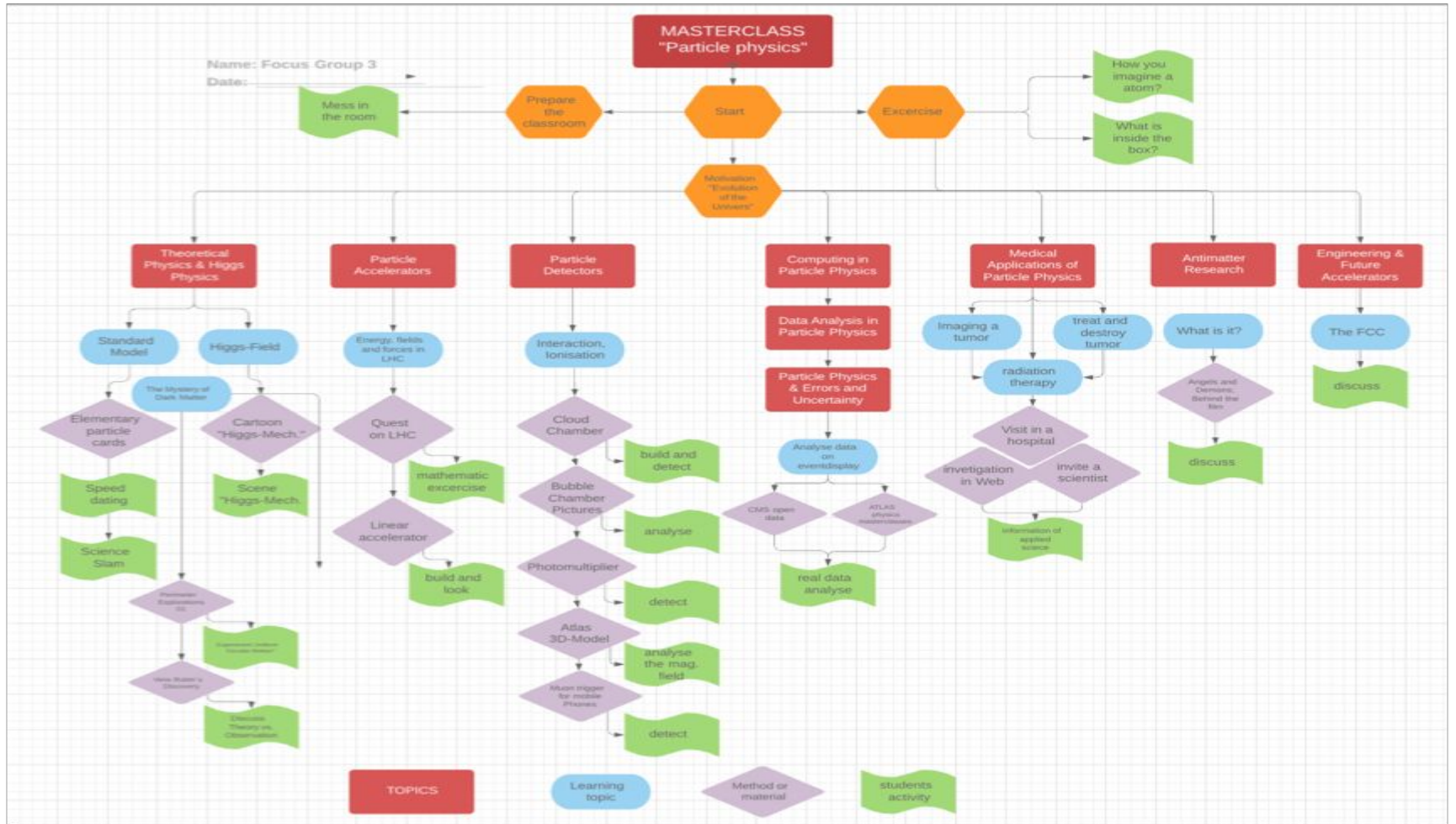


- to interest students in CERN and Particle Physics
- to explain, for what it is important
- to show how it based on school physics
- to motivate students for further investigation using WEB- and other resources

- The students come in the room
- **Look, what they do and discuss it!**









Any questions or comments?