

Particle Physics

HST2024 Study Group 7



Curriculum & Classroom Connections

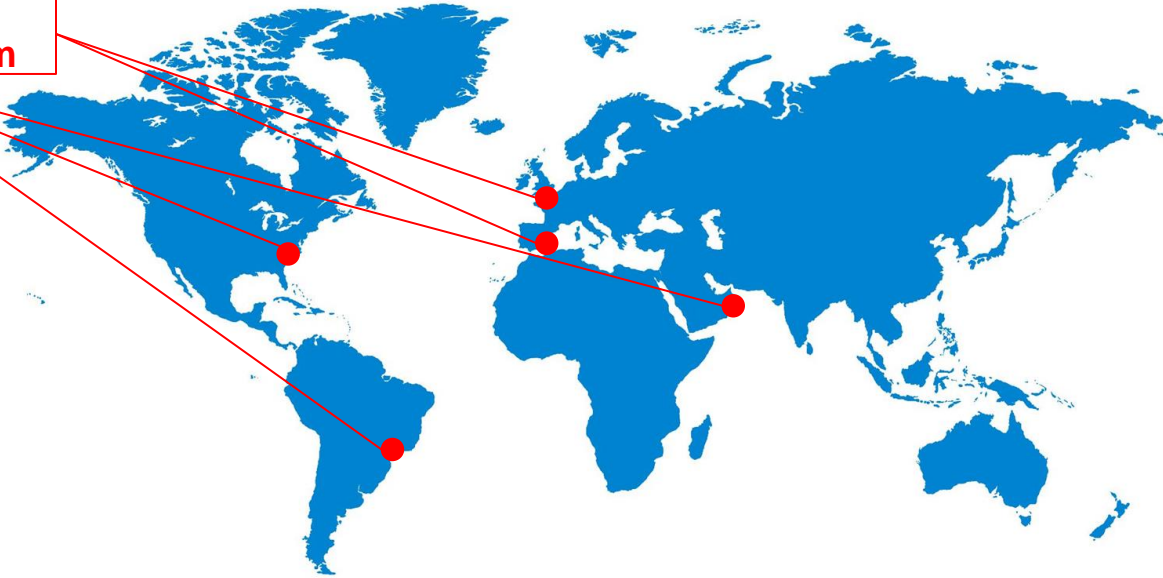


Curriculum & Classroom Connections



Curriculum & Classroom Connections

Electromagnetism



Curriculum & Classroom Connections

Electromagnetism

Mechanics

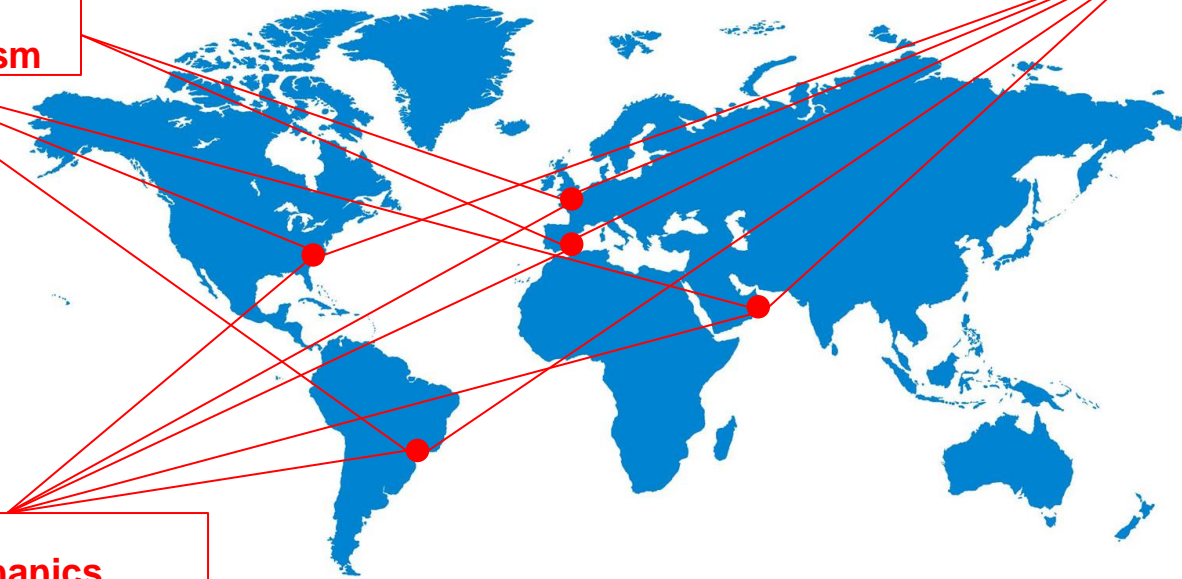


Curriculum & Classroom Connections

Electromagnetism

Modern Physics*

Mechanics



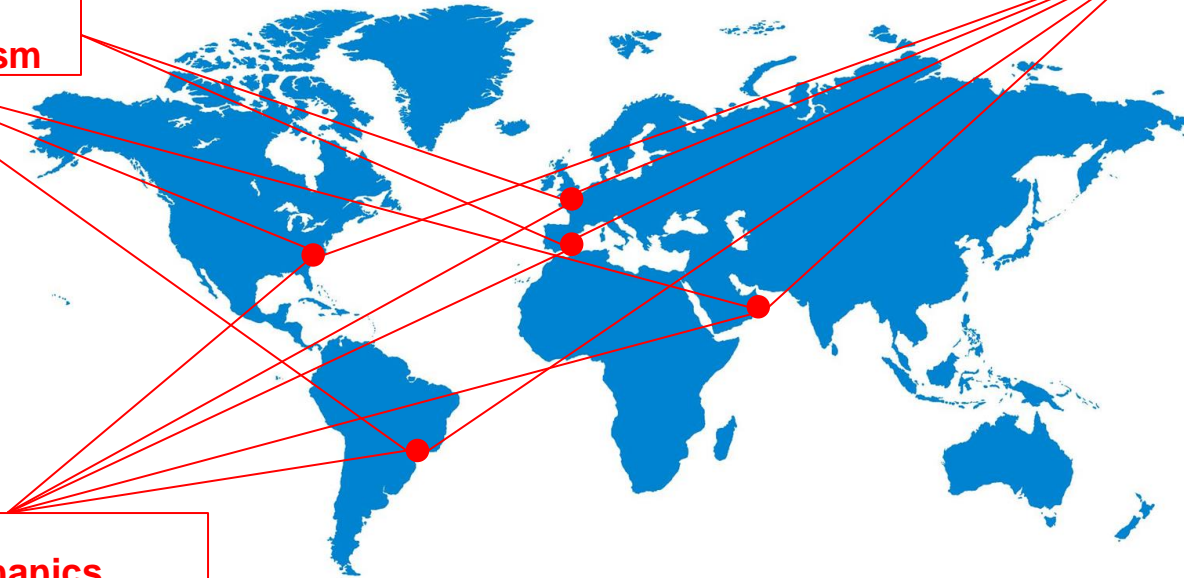
Curriculum & Classroom Connections

But where is Particle Physics?

Electromagnetism

Modern Physics*

Mechanics



Curriculum & Classroom Connections

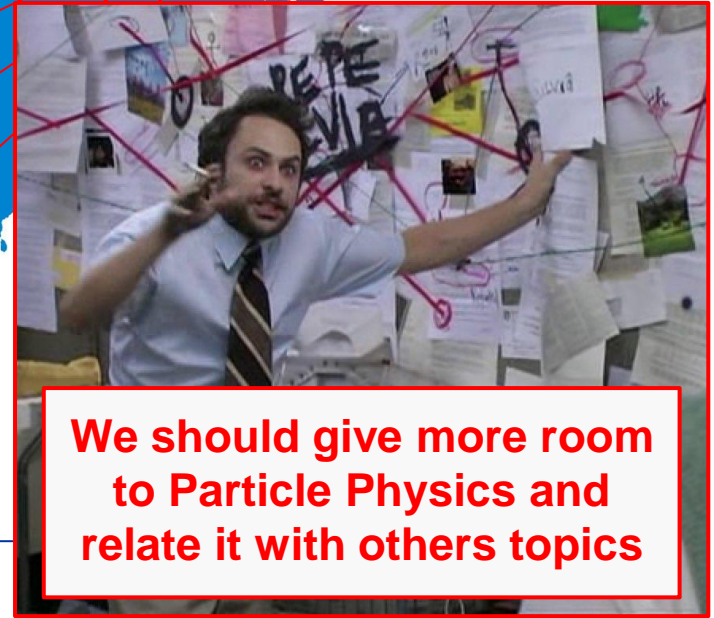
But where is Particle Physics?

Electromagnetism

Modern Physics*

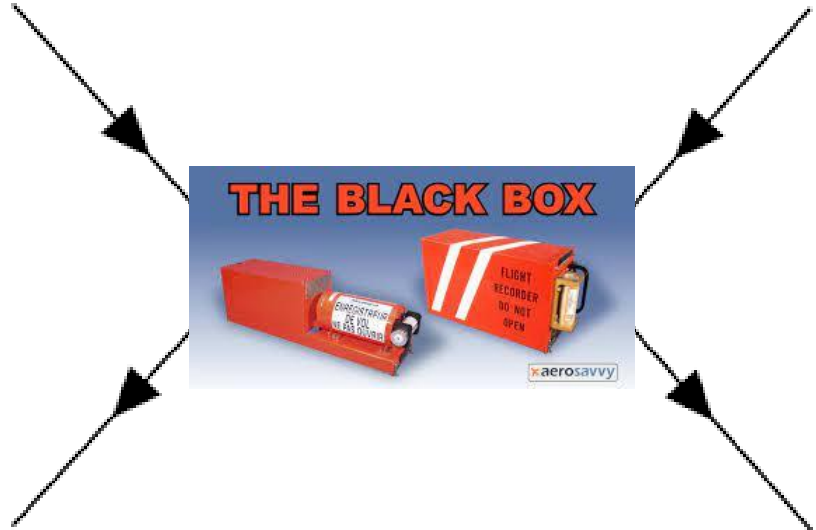
Mechanics

We should give more room to Particle Physics and relate it with others topics

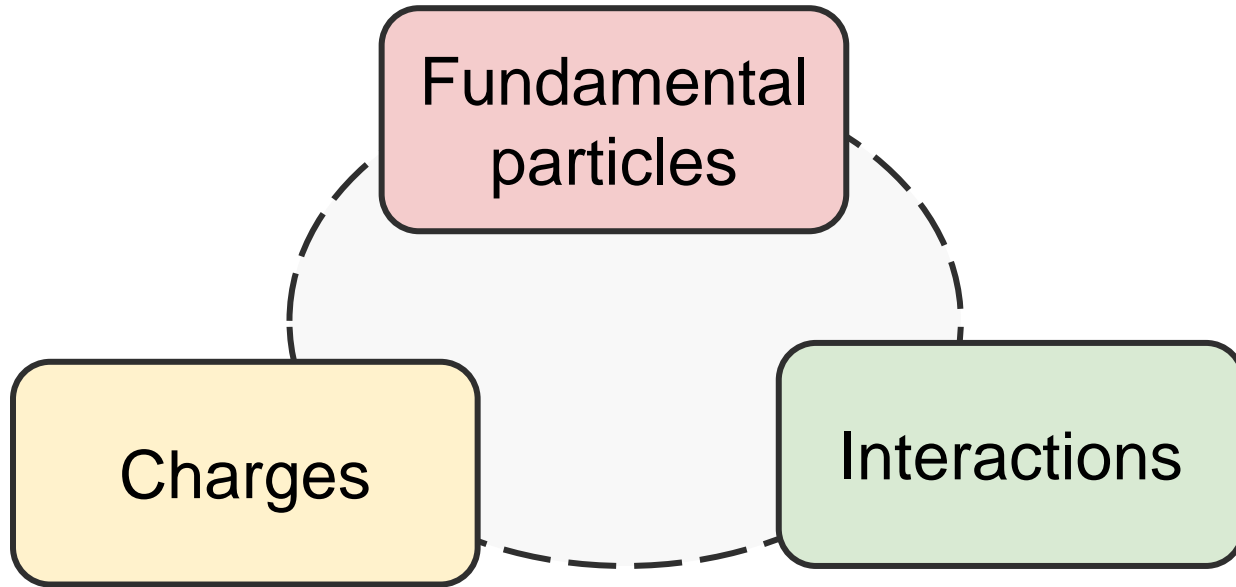


Key Ideas

We are building a model that reproduces reality, but the model is not the reality



Key Ideas

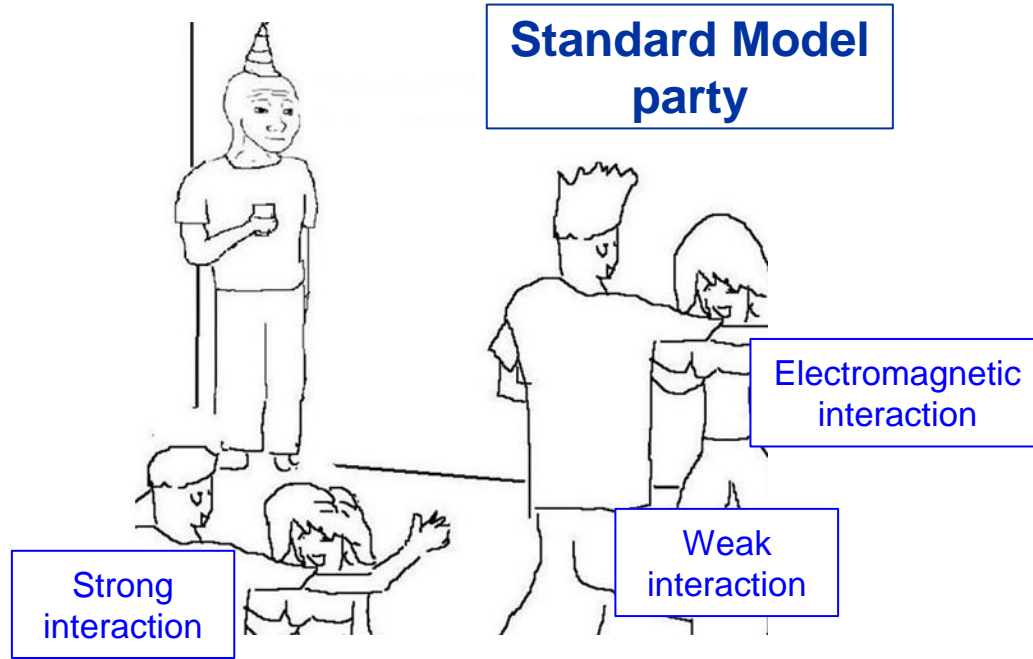


Key Ideas

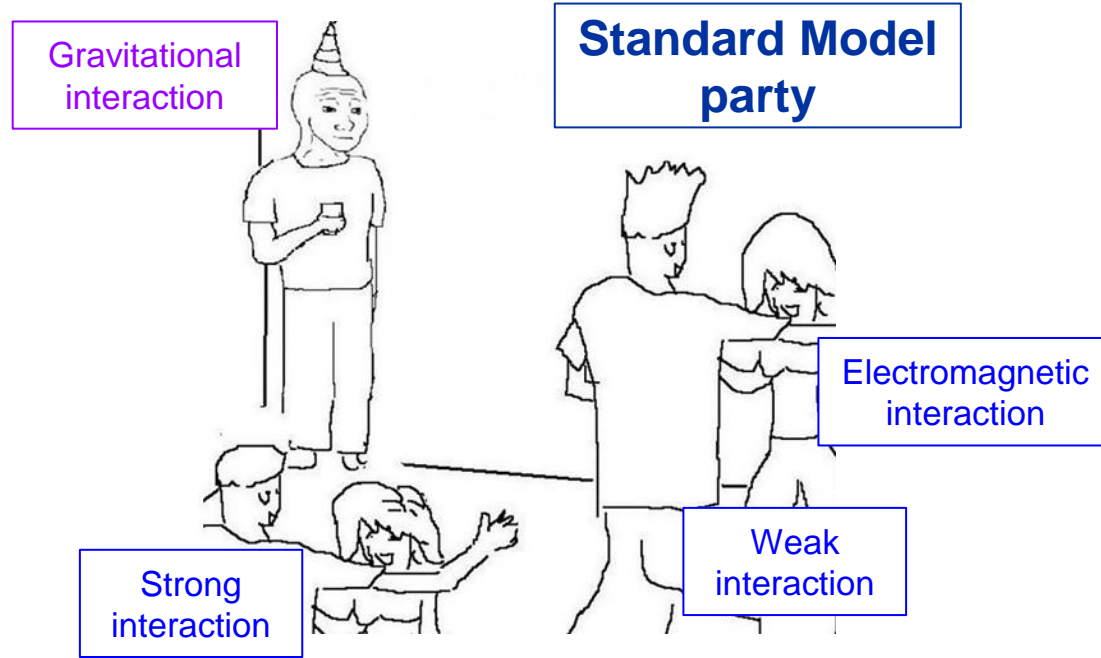


**Standard Model
party**

Key Ideas

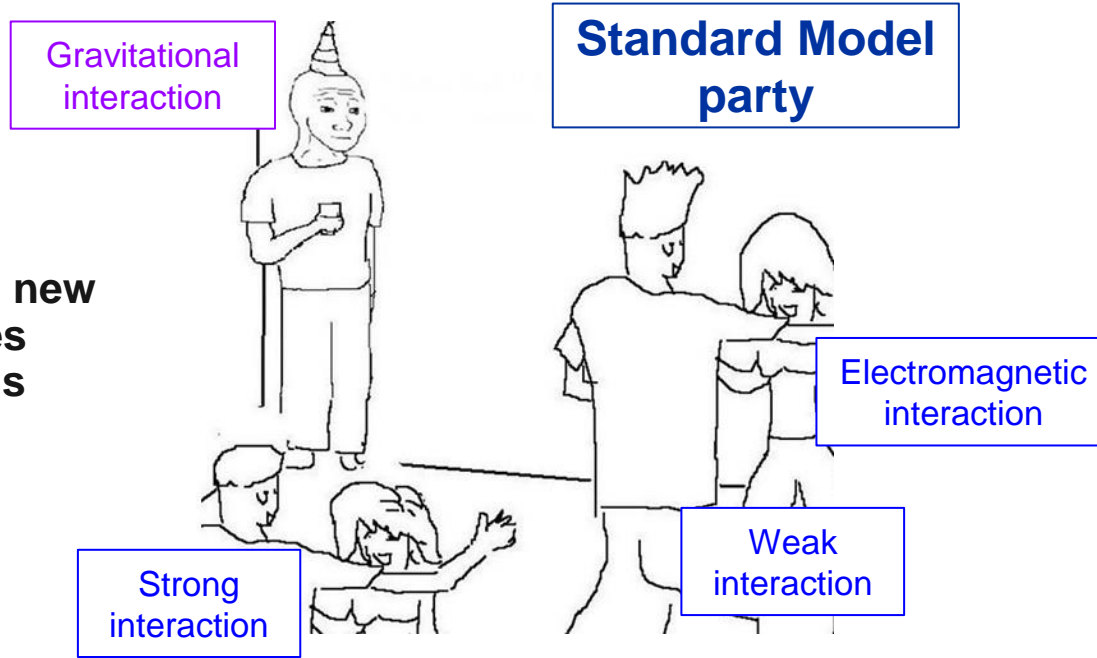


Key Ideas

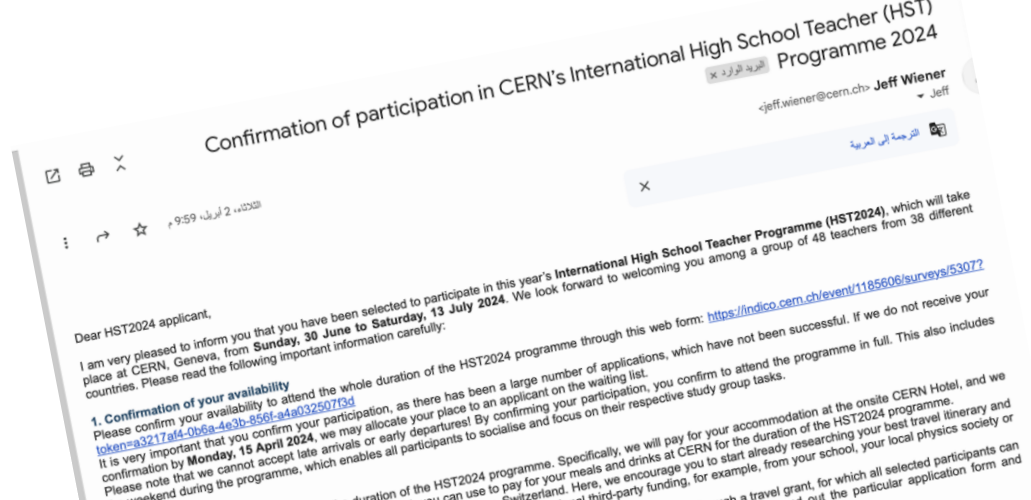


Key Ideas

We have to build a new model that includes all the observations

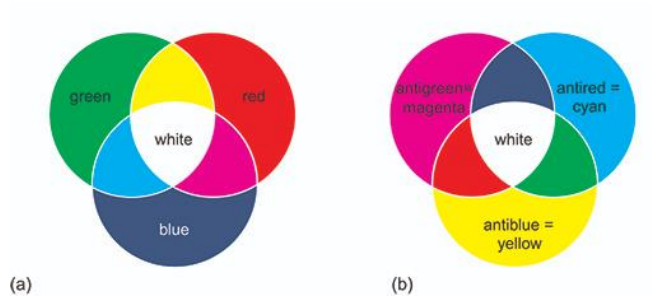


Why we are all here?



Potential Students' Conceptions & Challenges

- **Visualizing things we cannot see**
 - The use of pictures and analogies can be helpful and dangerous at the same time.



Potential Students' Conceptions & Challenges

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 - **Vocabulary and correct use of words**
 - Examples:
 - particle versus system of particles
 - decay versus transformation
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- **Relation between models and reality**
 - Possibility of new models in the future
 - Students life will not be easy



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 - **Vocabulary and correct use of words**
 - Examples:
 - particle versus system of particles
 - decay versus transformation
 - **Relation between models and reality**
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Useful Material & Resources

- **CERN**

- <https://cern.ch/PER>
- <https://www.damtp.cam.ac.uk/user/tong/particle.html>
- <https://atlas.physicsmasterclasses.org/en/index.htm>

- **Youtube: PBS Space Time channel**

- <https://www.youtube.com/c/pbsspacetime>

- **Quarknet Data Activities**

- <https://quarknet.org/data-portfolio>

- **Perimeter Institute**

- <https://resources.perimeterinstitute.ca/collections/lessn-compilations/products/beyond-the-atom-remodelling-particle-physics?variant=17148738886>
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Best Practice Example

- Cloud Chamber



**Where we try to see
very small particles**

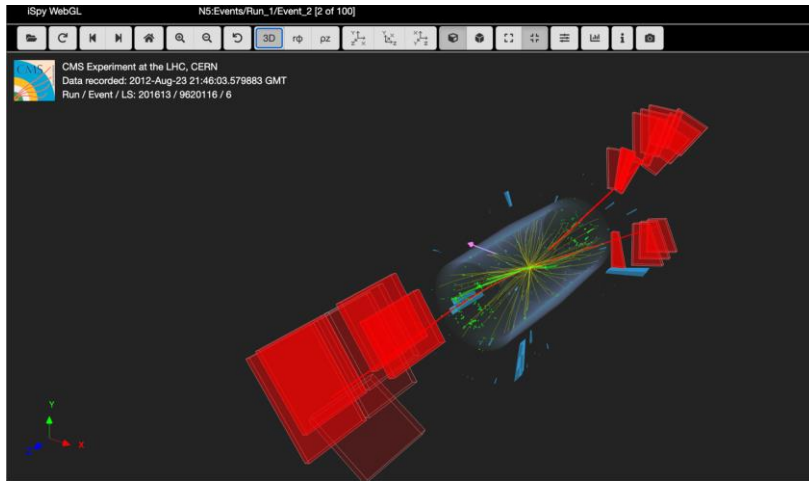
Best Practice Examples

- Cloud Chamber
- Black Box (PI)



Best Practice Example

- Cloud Chamber
- Black Box (PI)
- Masterclass - Particle Physics



CIMA
CMS Instrument for Masterclass Analysis

Choose your Masterclass

TestEvents-07Jan2022
Sarntander-13May2024
CERN-27Nov2023
Salo-07Dec2023
Sofia-13Dec2023
CERN-LAMAP-08Dec2023
MP-15Jan2024
Čakovec-24Jan2024
Bristol-27Mar2024
CERN-09Feb2024
Sandbox-31Dec2023
CERN-20Feb2024
CERN-26Feb2024
CERN-29Feb2024
CERN-22Feb2024
CERN-01Mar2024
CERN-04Mar2024
CERN-06Mar2024
CERN-08Mar2024
CERN-11Mar2024
CERN-13Mar2024
CERN-19Mar2024
CERN-22Mar2024
CERN-27Mar2024
FNAL-01Mar2024
FNAL-08Mar2024

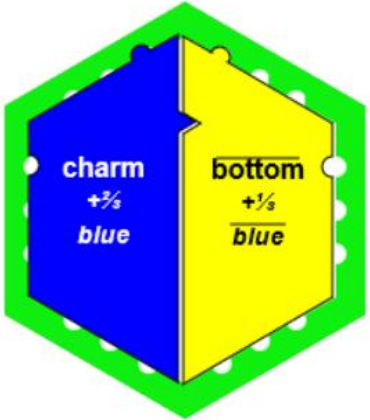
Netzwerk
TEILCHENWELT

INTERNATIONAL
MASTERCLASSES
hands on particle physics

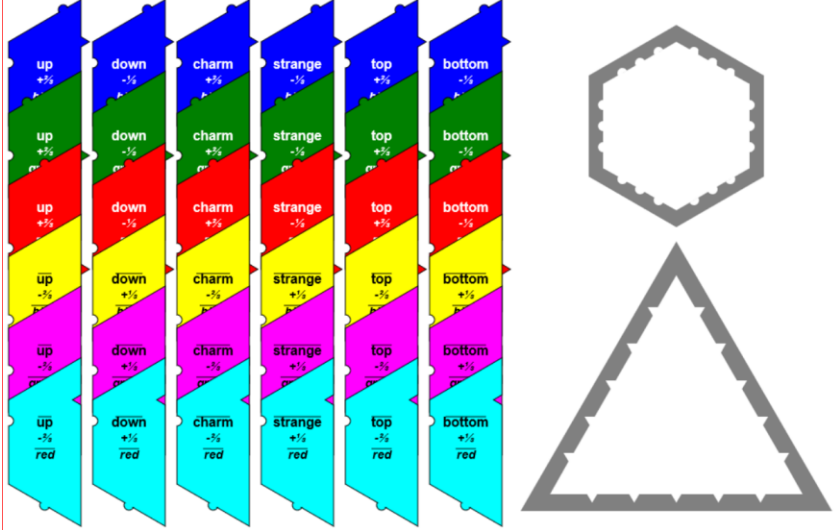
International Particle
Physics Outreach Group

Best Practice Example

- Cloud Chamber
- Black Box (PI)
- Masterclass - Particle Physics
- Quark Workbench



Quark Workbench (right-click to rotate quarks clockwise; control right-click to rotate anticlockwise; on touch devices double-touch to rotate)



HST2024 Study Group 7

Gabriel (Brazil), Gunther (Belgium), Marina (Spain), Juhaina (Oman), Janet (USA)

One way in which our thinking has changed

**The power of open
and collaborative science!**



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Our Favorite Things

Physics memes (M)

Friendship (Gu)

Cooperation (Ju)

Importance of teachers (Ga)

Cool Physics Learning (Ja)

Thank you for your attention!

We hope we didn't exceed our time
so Jeff won't be sad

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Thank you for your attention!

But happy instead!



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Any questions?
