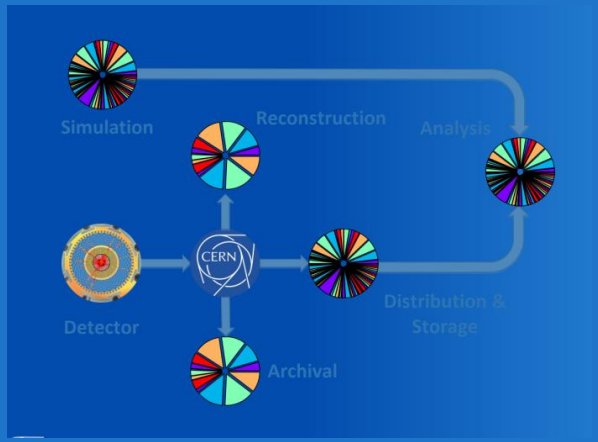
COMPUTING at CERN

HST2024 Study Group 5 - The Quacks



Curriculum & Classroom Connections

If a student understands some of the history and where things came from, it will spark an interest.

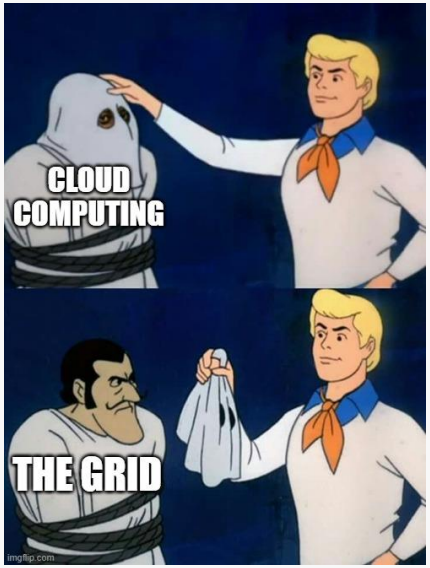
What are some of the huge inventions that have happened at CERN that they use everyday (“old TV,” WWW, touchscreen)

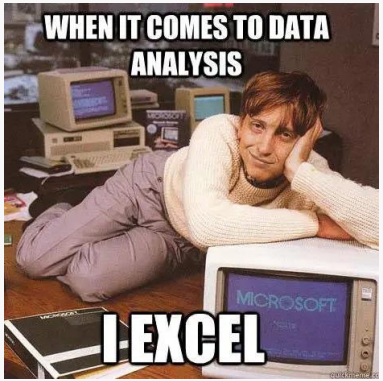
Curriculum connections can be found in the area of “Nature of Science”.

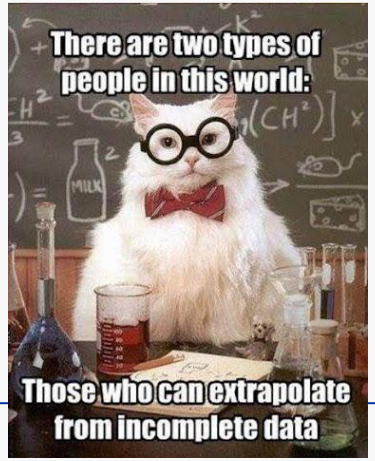
(Some) relevant activities: Using Excel for data analysis (e.g. error bars), using smartphone sensors.

National standards: Literacy in computing and programing.

Ideas







1. At this point we - both in science and everyday life - get so much data that we need to filter and reduce it. The main challenge is finding criteria that reduce the amount of data without losing important information.

2. You need a theory or run a simulation to check the data against. And vice-versa.

3. Data is used differently in science than in business: information is freely shared and accessible - science is based on collaboration.

4. Out of necessity and the demands of science, new technologies are developed - especially in computing. Fundamental research is a driver for innovation.

Pote

Useful Material & Resources

Coach 7

Vernier SCIENCE EDUCATION

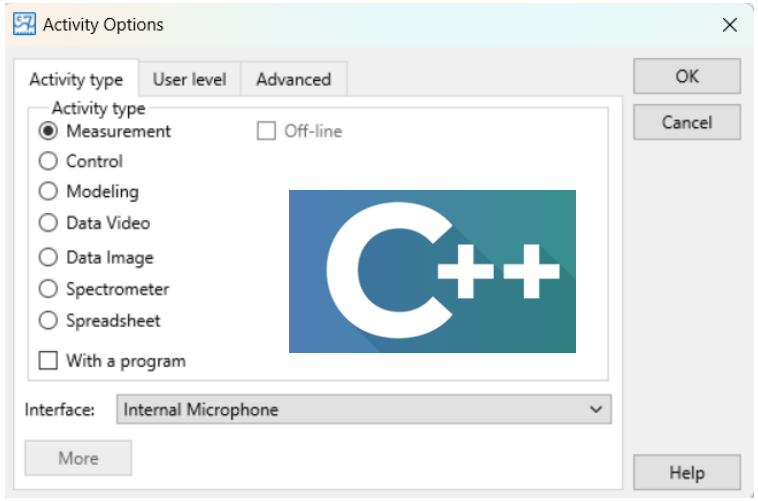
PhET INTERACTIVE SIMULATIONS

University of Colorado Boulder

FizziQ

Tracker Video Analysis and Modeling Tool — A project of OSP open source physics

eurostat



Theory → Real life data → Comparison

Theory
Simulation
Collected data

CERN

Observe - measure - experiment

Collect real life data

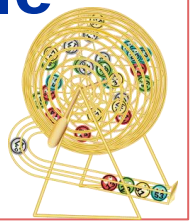
Theory and real life:

a) Good fit
we think we know

a) Bad fit
new theory or new experimental set - up

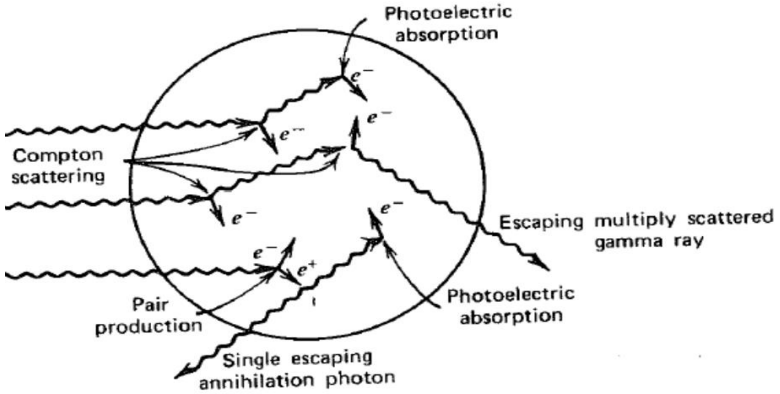
Best Practice Example

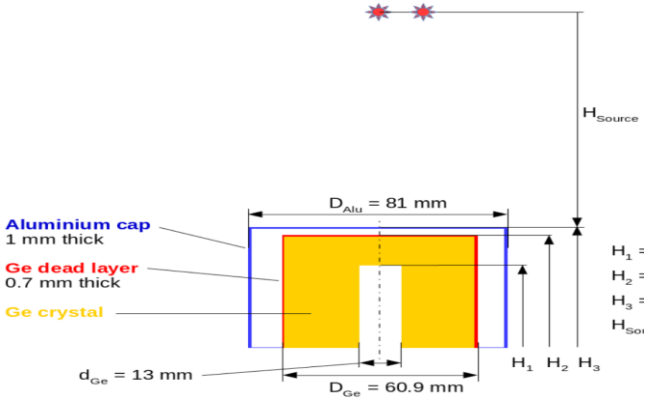
Monte Carlo Simulation

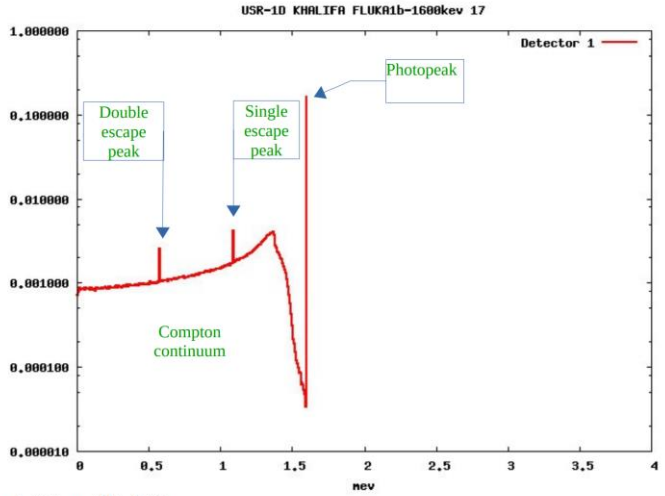


-Principle of Monte Carlo Simulation.

-Visualize and interpret the outcomes.







Total efficiency TE= 0.721
Full-energy peak efficiency FEPE= 0.1634

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Arantxa (Mexico), Daška (Slovakia), Gayle (USA), Kotiba (Sweden), Philipp (Austria)

One way in which our thinking has changed…

CERN is an … come and information … plicated on internati… deep care in community.

…

What a Joy!

Finding ways to teach simple physical principles in the context of current research.

Seeing how all the different backgrounds at CERN collaborate.

Our whole group of teachers, Jeff, Milena, the lecturers…