Open Data

Workgroup 5

Group Members

- Dieter Bartneck
- Jim Deane
- Anna Goryunova
- Chiara Maugeri
- Angela Reisner
- Ian Watkins

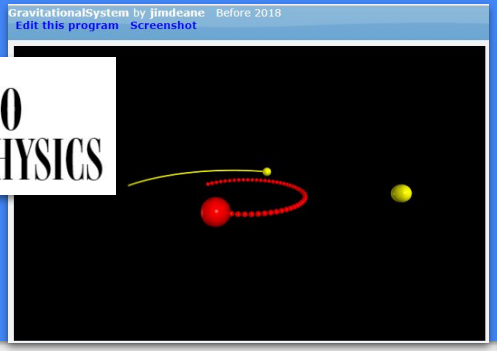
Open Data Advisors

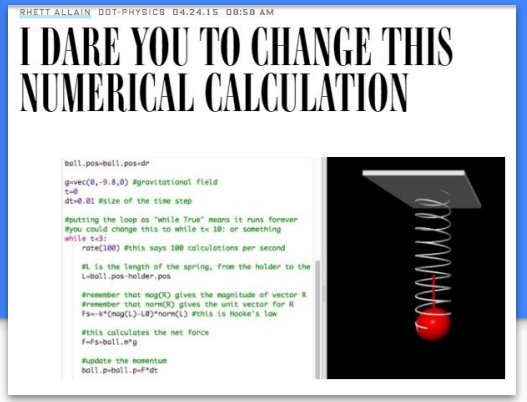
- Mikko Lager
- Peitsa Veteli
- Kati Lassila-Perini

Open Data

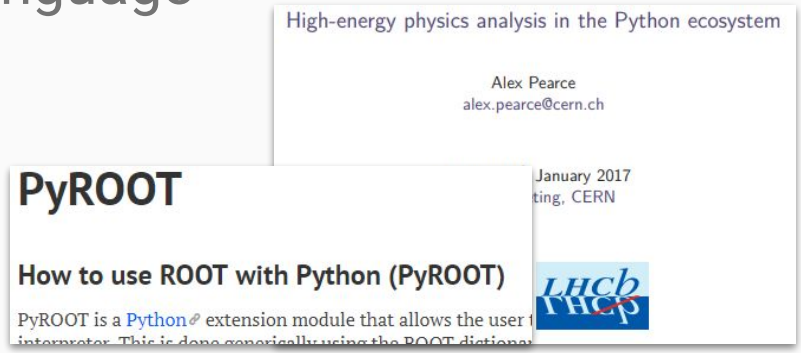
- Open Data : Data from scientific, governmental, or other organizations
- What makes it “open”? -- Sharing datasets
- Who can use it?
- Where do you find it?
  - http://opendata.cern.ch/
  - Google with “open data” in the search terms!

Python





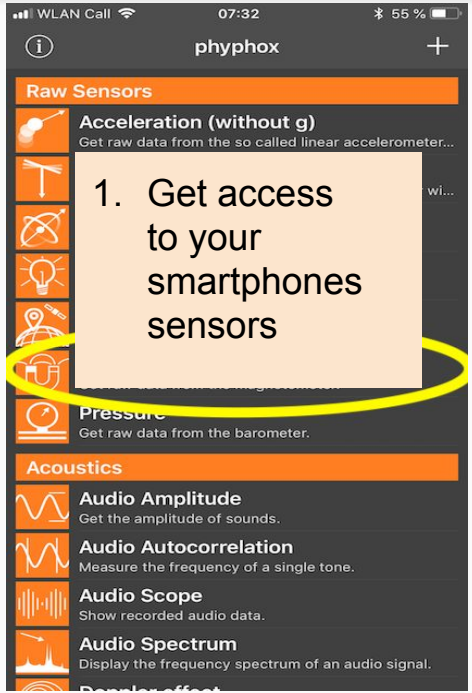
- Python: A popular, powerful, free computer language.
  - According to TIOBE, an industry source, Python is the fourth most popular programming language today.
  - Also very popular in HEP
  - Popularity leads to tools, use, documentation and help.



Jupyter and MyBinder

- Jupyter: Open source system to program and run Python code in a notebook-like environment.
- MyBinder: A web app that permits opening Jupyter notebooks from Github easily online.
- These combined with storage of your Jupyter files in a Github repository make it easy to manage and deploy files.

Record data from smartphone sensors with phyphox App (android & iOS)



Sensors*

- Magnetometer
- Barometer
- GPS
- Accelerometer
- Gyroskop
- Microphone
- (Light sensor)

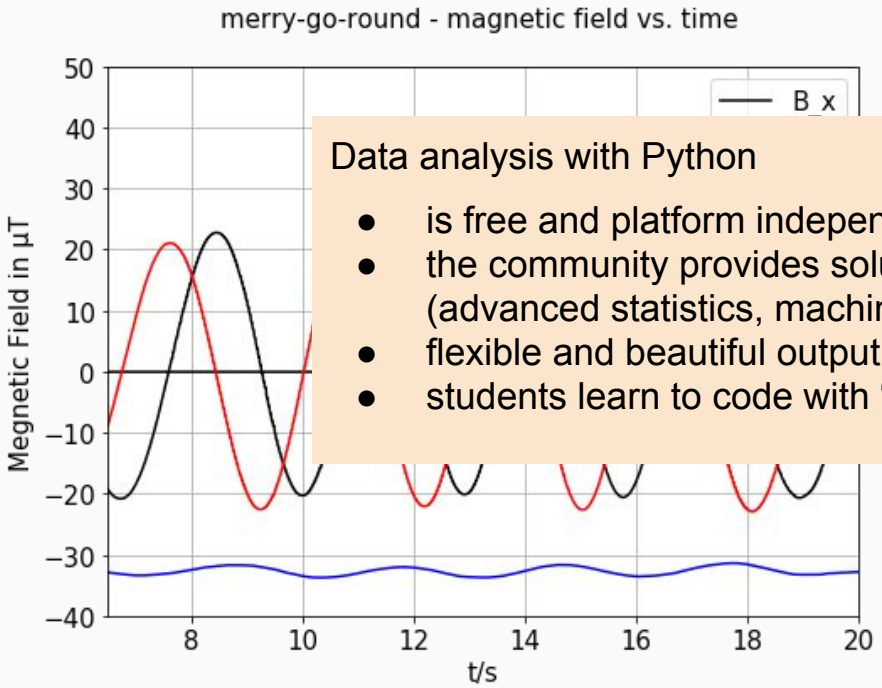
StopWatch

Many experiments

Remote control

* depending on the phone

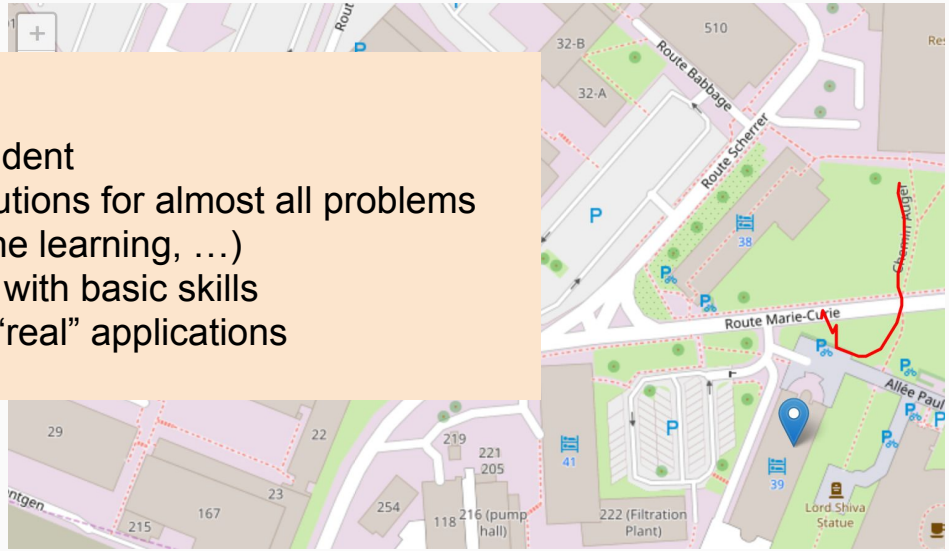
Visualize and analyze the data with Python



Data analysis with Python

- is free and platform independent
- the community provides solutions for almost all problems (advanced statistics, machine learning, …)
- flexible and beautiful output with basic skills
- students learn to code with “real” applications

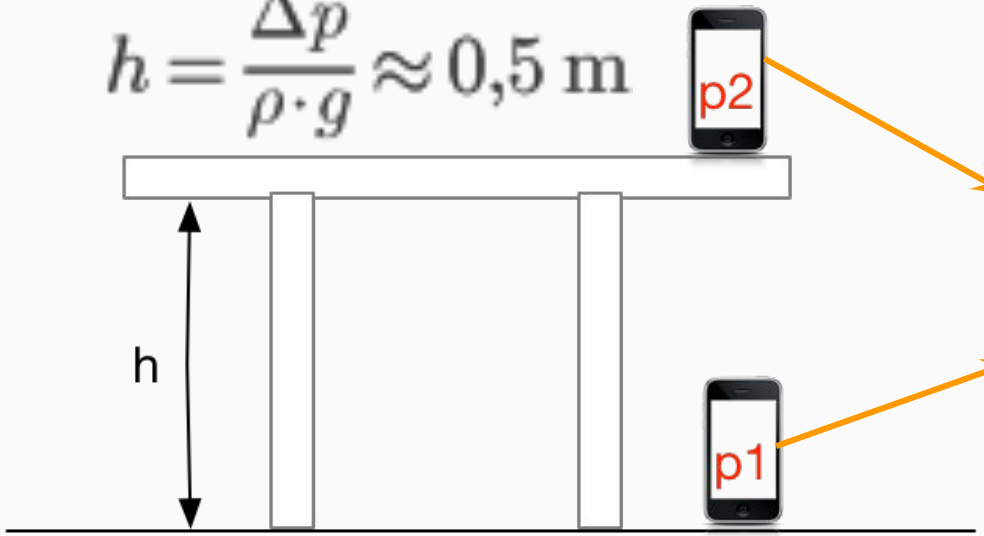
CERN GPS-track from B39 to Restaurant 1

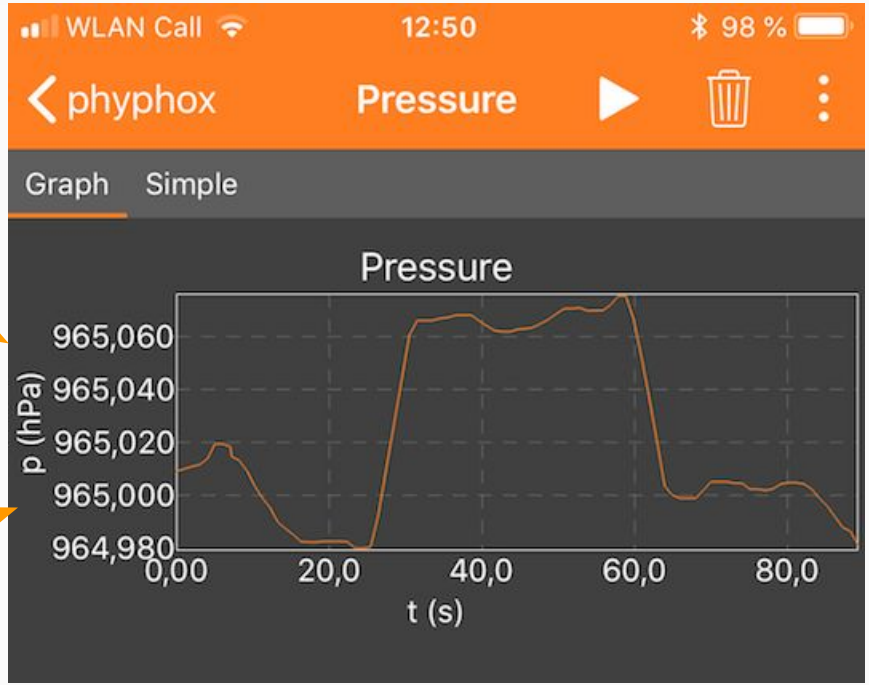


and much more...

Pressure Sensor Demo

$$h = \frac{\Delta p}{\rho \cdot g} \approx 0{,}5\ \mathrm{m}$$





Direct to the code!

The code is divided in two sections:

Basic skills:

a. Import Phyphox data;
b. Plot and preliminar analysis;
c. Linear regression.

Advanced skills:

a. Infer new quantities;
b. Analyze the behaviour of these quantities;
c. Physical considerations.

Simple example for teachers: pressure data in the elevator (going up and down).

Where is particle physics?

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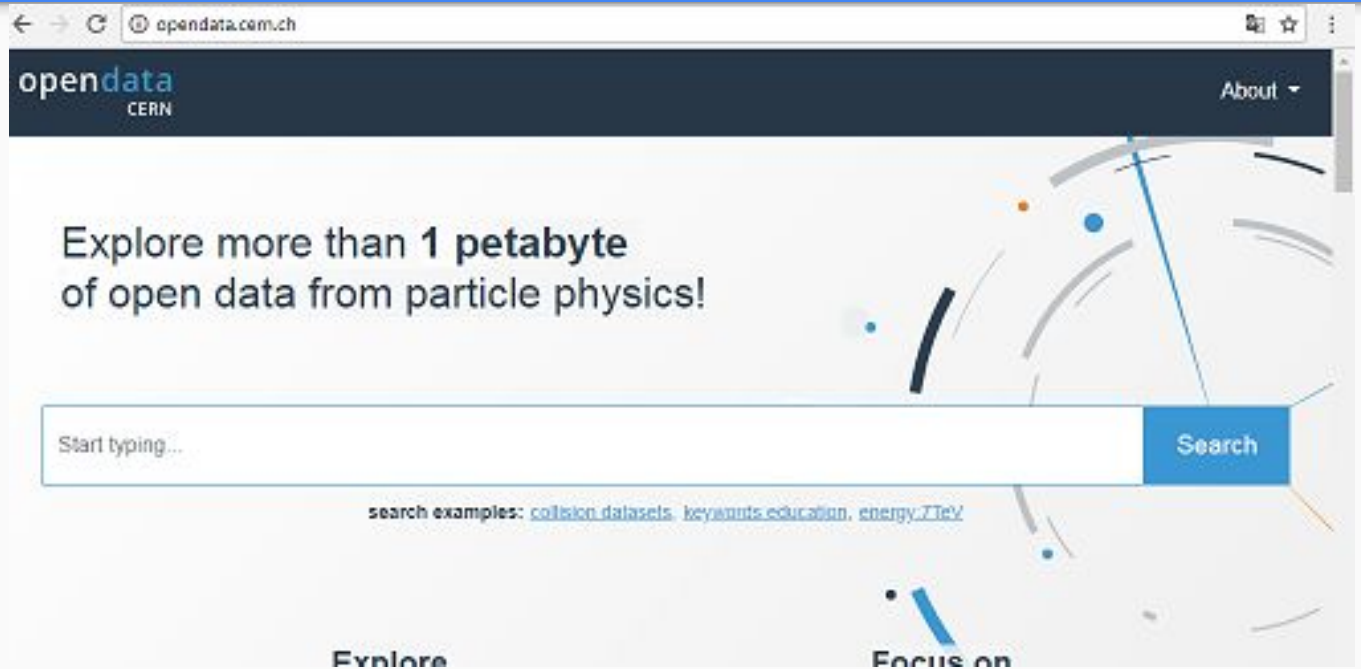
CERN Open Data portal http://opendata.cern.ch/



How to implement? Problems and solutions

GitHub resource

J/Psi task

Teacher's guide

Where to find everything

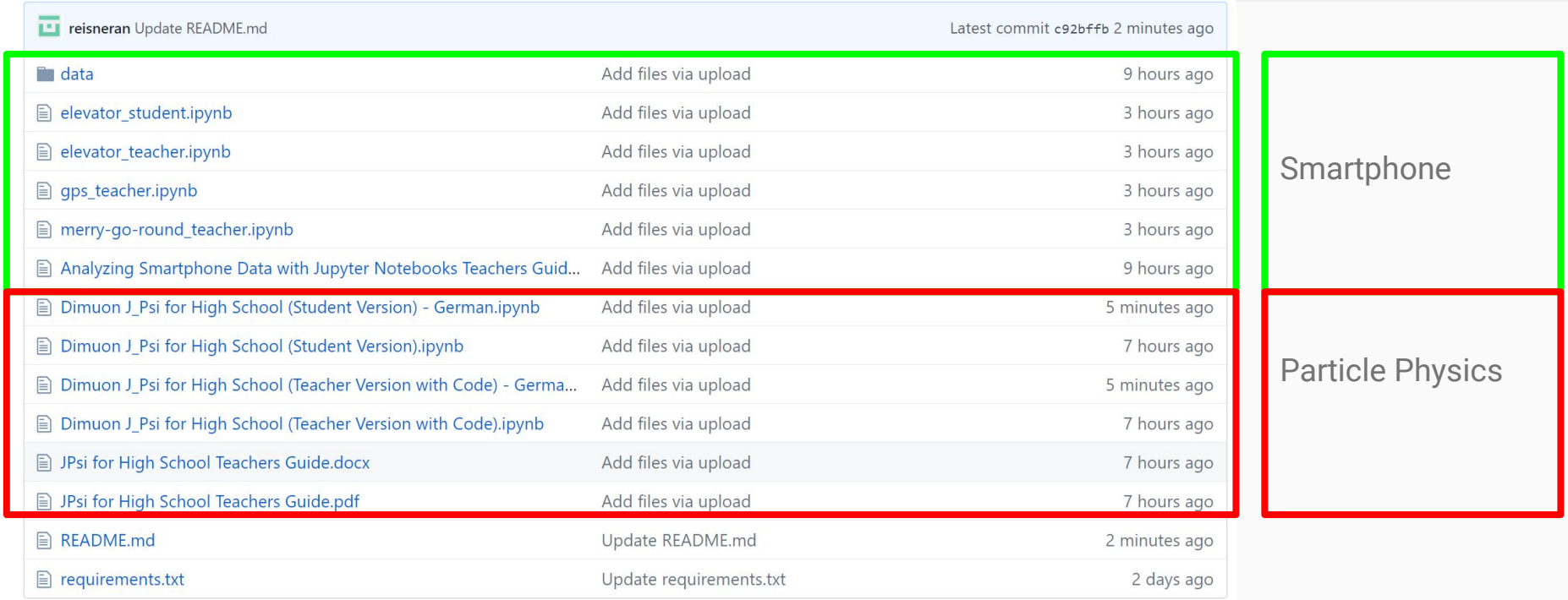
Source:
https://media3.giphy.com/media/l3q2Ph0I1osaagoQE/giphy.gif

Open Data

- CERN:
  - http://opendata.cern.ch/
- General:
  - https://www.europeandataportal.eu/
  - https://www.opendatasoft.com/a-comprehensive-list-of-all-open-data-portals-around-the-world/
- Many others

Notebooks and extended stuff:

https://github.com/cms-opendata-education/HST-2018



reisneran Update README.md — Latest commit c92bffb 2 minutes ago

data	Add files via upload	9 hours ago
elevator_student.ipynb	Add files via upload	3 hours ago
elevator_teacher.ipynb	Add files via upload	3 hours ago
gps_teacher.ipynb	Add files via upload	3 hours ago
merry-go-round_teacher.ipynb	Add files via upload	3 hours ago
Analyzing Smartphone Data with Jupyter Notebooks Teachers Guid...	Add files via upload	9 hours ago
Dimuon J_Psi for High School (Student Version) - German.ipynb	Add files via upload	5 minutes ago
Dimuon J_Psi for High School (Student Version).ipynb	Add files via upload	7 hours ago
Dimuon J_Psi for High School (Teacher Version with Code) - Germa...	Add files via upload	5 minutes ago
Dimuon J_Psi for High School (Teacher Version with Code).ipynb	Add files via upload	7 hours ago
JPsi for High School Teachers Guide.docx	Add files via upload	7 hours ago
JPsi for High School Teachers Guide.pdf	Add files via upload	7 hours ago
README.md	Update README.md	2 minutes ago
requirements.txt	Update requirements.txt	2 days ago

Smartphone

Particle Physics

HST-2018

Tasks and documentation developed by the open data workgroup at CERN HST 2018. There are two main tasks here:

High School Level Task using smartphone data recorded with phyphox app & Jupyter notebooks

You can run these notebooks in binder by using the link below. Refer to the teachers' guide document for further details.

- Elevator - measure air pressure: -- elevator_student.ipynb -- elevator_teacher.ipynb
- Merry-go-round - measure magnetic field: -- merry-go-round_teacher.ipynb
- GPS - show a gps track on a map: -- gps_teacher.ipynb

launch binder

Click here to open the notebooks

High School Level Task using CMS open data & Jupyter notebooks to find evidence for J/Psi

You can run these notebooks in binder by using the links below. Refer to the teachers' guide document for further details.

- Student Version: launch binder
- Teacher Version (with code): launch binder
- Studen Version / Teacher Verison (with Code) German: launch binder

Teacher’s Guide

Smartphone

- Objectives
- Resources Provided
- Background knowledge
- Instructions for Teachers
- Differentiation
- Tasks

Teacher’s Guide

Particle Physics

- Why should I use this task?
- Target group & required knowledge
- Skills developed
- Some particle physics
- Jupyter Notebooks
- Differentiation and assessment
- Using Jupyter notebooks in general

Thanks to all our Workgroup supervisors!


Cap. Corno Gries CAS 1 ore
Val Corno -
Ulrichen 4 ore 45 min
Griespass 2 ore 10 min
CERN