



HEPscape: an escape room about High Energy Physics

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Particle Physics Involving People



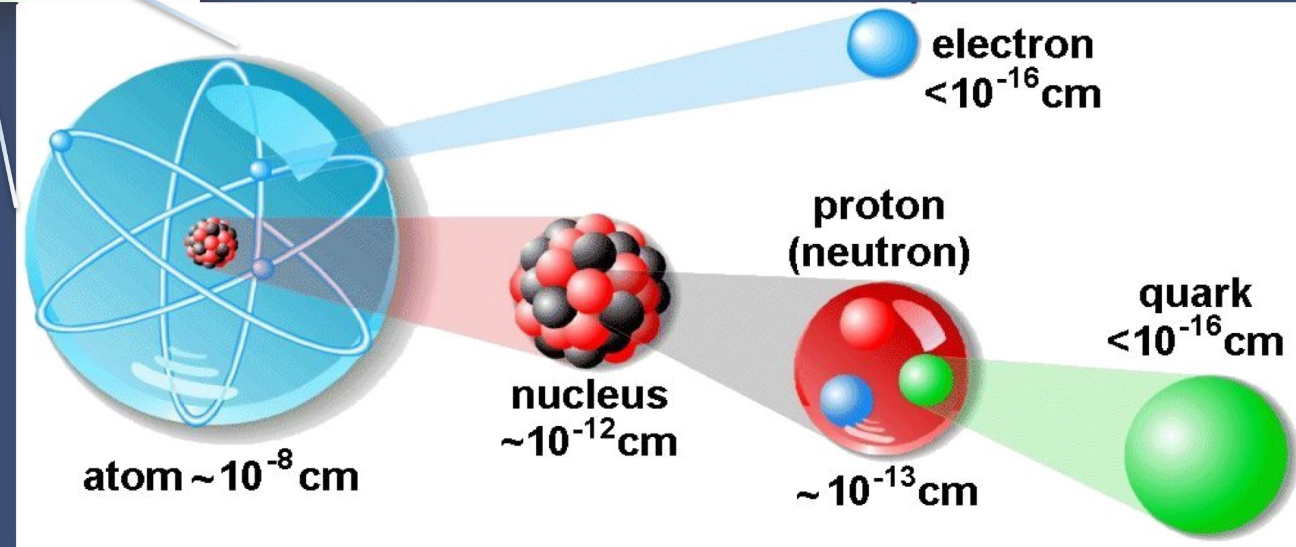
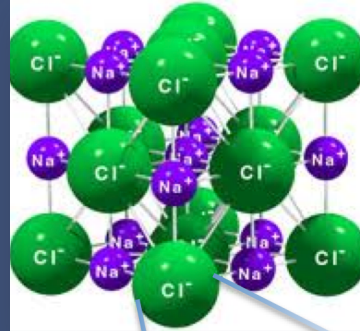
UNCOVER
THE SECRETS
OF NATURE



UNDERSTAND
THE
BUILDING
BLOCKS OF
MATTER AND



LOOK INTO
THE
INFINITELY
SMALL AND
UNDERSTAND
WHY IS SO
IMPORTANT
TO DO IT!

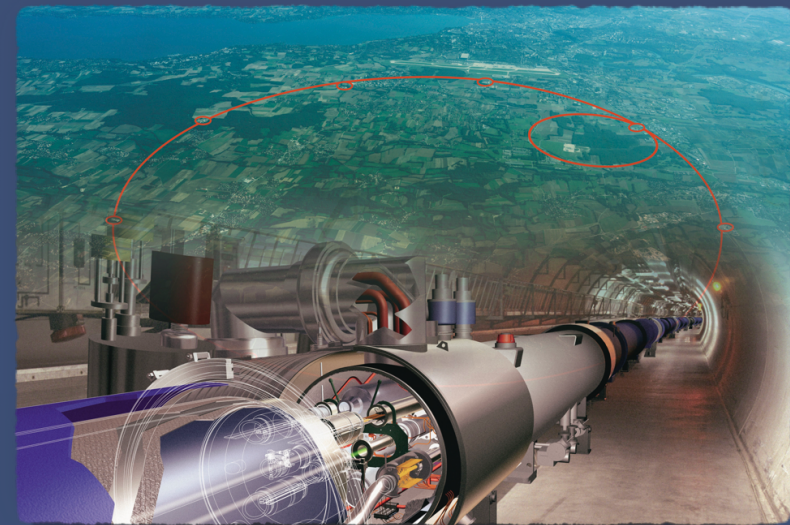
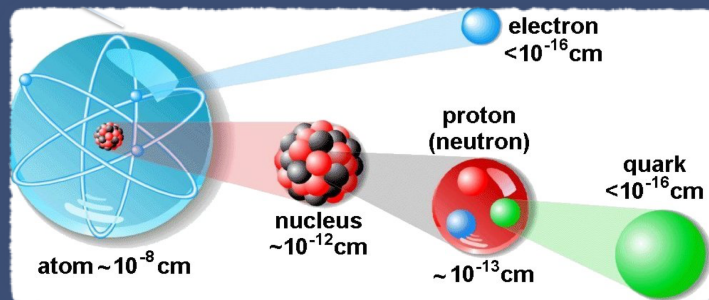


A Very Powerful Microscope

- To look at a cellule ($d \sim 10^{-5}$ m) we need visible light ($E \sim \text{eV}$)

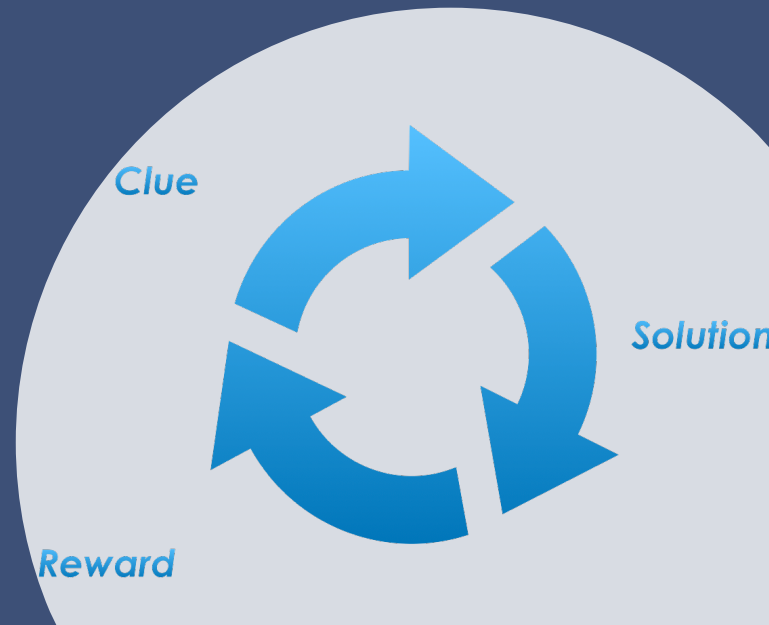


- LHC is the most powerful microscope we have to investigate the infinitely small
- With it we look at the particles and we understand how they behave and why
- Quark ($d \sim 10^{-18}$ m) we need visible light ($E \sim \text{TeV}$)



What is an Escape Room?

- An escape room is like a treasure hunt, with clues hidden in a room. One by one the clues unblock the next puzzles. A moderator guides the solution of the game.
 - It is very popular nowadays among teens because it is fun, and also among work teams as team building exercise.
 - Escape rooms have been adopted also for science outreach, see [here](#), and at the CERN open days in 2019.
 - Science is fun !
-
- The solution to the one clue "opens the locker" and give access to the next one: immediate feedback and dynamic learning
 - A facilitator guides the experience and stimulates the discussion on the results found



Escape Room Methodology

Activity diversified
by age

Parallel concepts, autonomy
and mastering technique

Higher involvement
w.r.t. frontal teaching

Out-of-the-box
thinking

External stimulation
and challenges

Team work

Advanced skills: organization,
memorization, logical thinking,
patter recognition,
compartmentalization.

4Cs: Critical thinking,
Cohoperation, Creativity,
Communication

[Roekel, 2011](#)

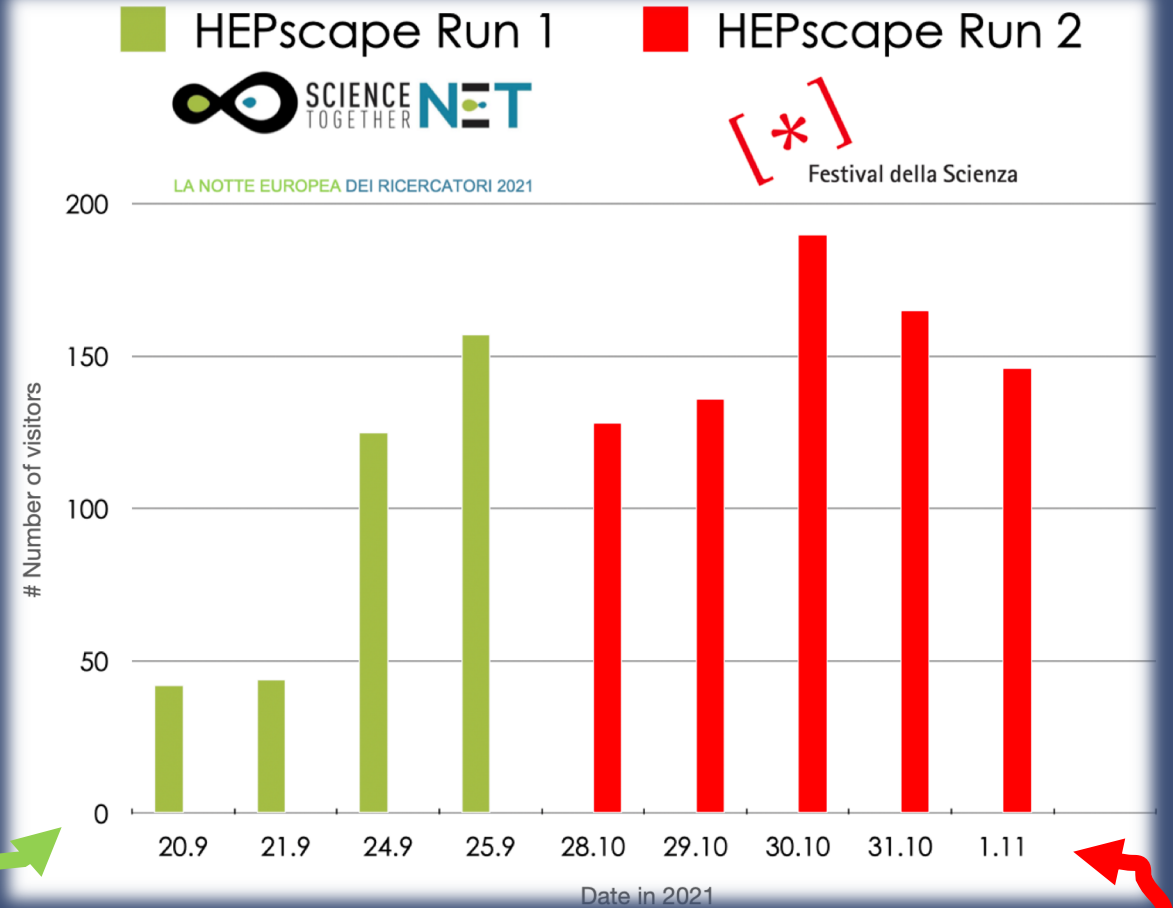
HEPscape

- In 2021 a team from INFN Rome has built an escape room about high energy physics, called HEPscape.
- It was presented as an attraction at the **European researchers' night in Rome** and at the **Science Festival in Genova**.

<https://sites.google.com/view/hepscape/home>



Number of visitors



Researchers' night Rome

Science festival Genova

>1100 visitors !!!

The entrance

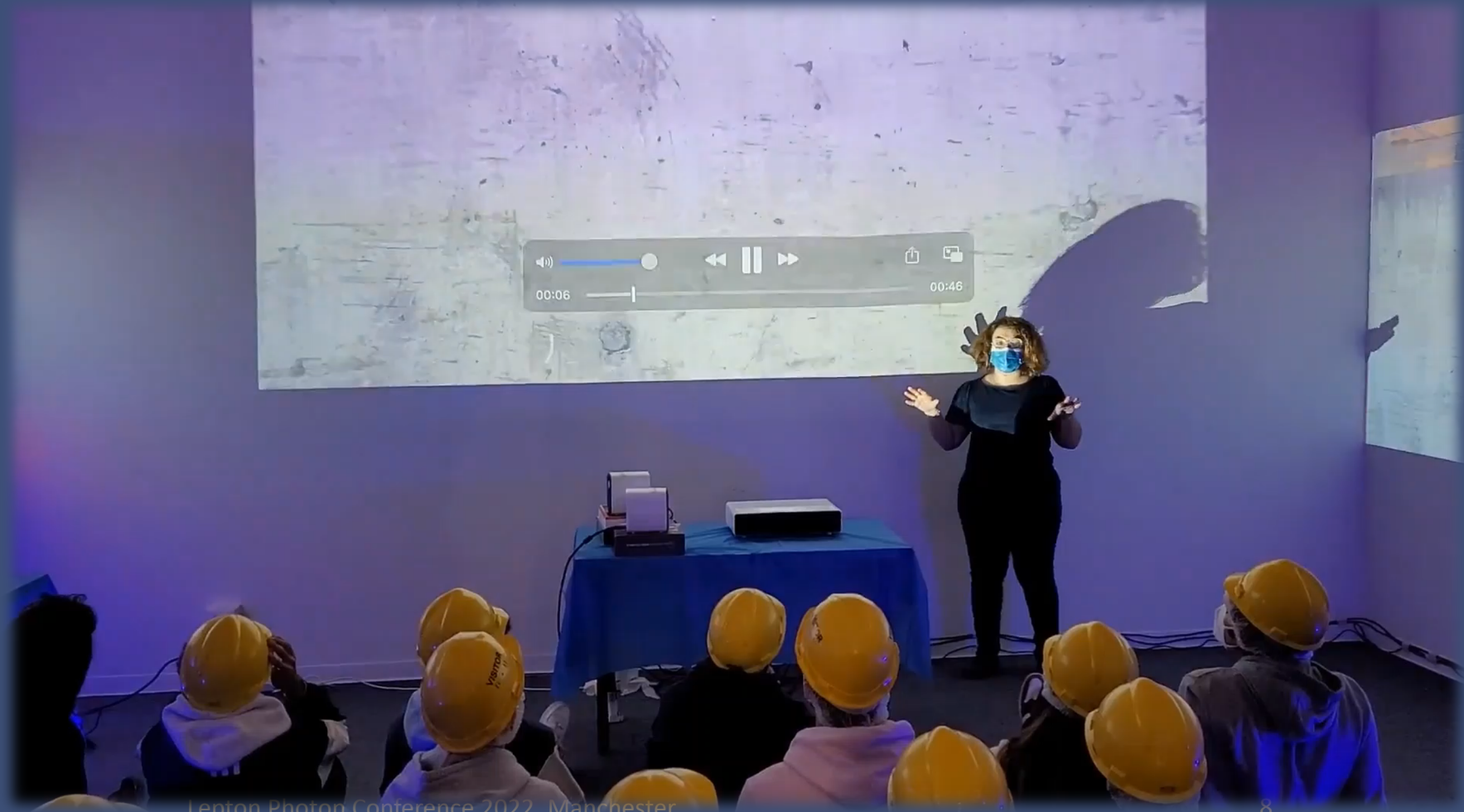
- It can be installed indoor or outdoor in a gazebo
- The visitors have the impression of entering one of the LHC experimental caverns underground
- They are given an helmet and they are told that they are going underground
- A group is composed by 10-20 visitors.
- The entire experience is roughly 30-40 mins long.



The HEPscape room

- We play some games and quizzes. The clues are hidden in the room.
- We use light projectors to direct the attention of the visitors to the clues.
- Through some clues, the visitors discover the working principles of particle accelerators and high energy physics experiments.
- The games are tuned to the age group, resulting in a fun experience for all.
- During the games we give a badge that the visitors can keep.
- The room has posters with all ingredients needed to solve the puzzles.

- We make use of projectors on 3 sides of the room.
- First we project the movie of the lift going underground in the LHC pit on the 3 sides (courtesy of CERN SM18 visitor point).
- Then we project the CMS control room on the side projectors and we use the middle projector for the game content or explanations.



Behind the scenes of HEPscape

- Three home-cinema projectors are used and controlled by a laptop using a videowall. The computer screen is ideally divided into 4 sections. Each section manages one of the projectors
- Six LED lights are used to guide and help the visitors in the solution of the clues. The lights can change colour and are controlled remotely via Bluetooth from a tablet
- The entire HEPscape material can be packed in four large size luggage. It has been conceived as a portable kit that can be mounted in roughly two hours by three people

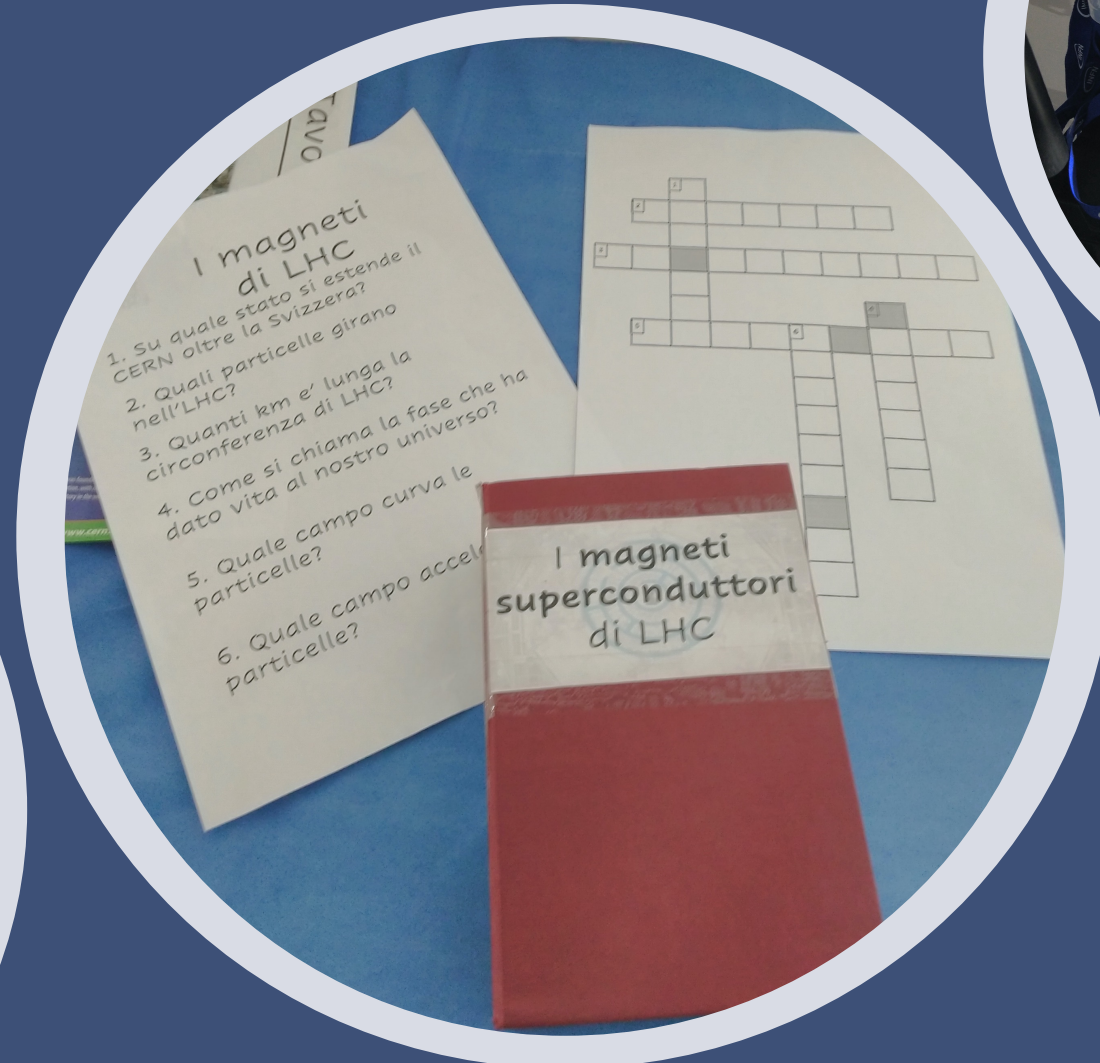




Game n. 1:
How many meters did
the elevator go down?

Game n. 2:

How does the LHC works?



Game n. 3: How many quarks are inside the proton?

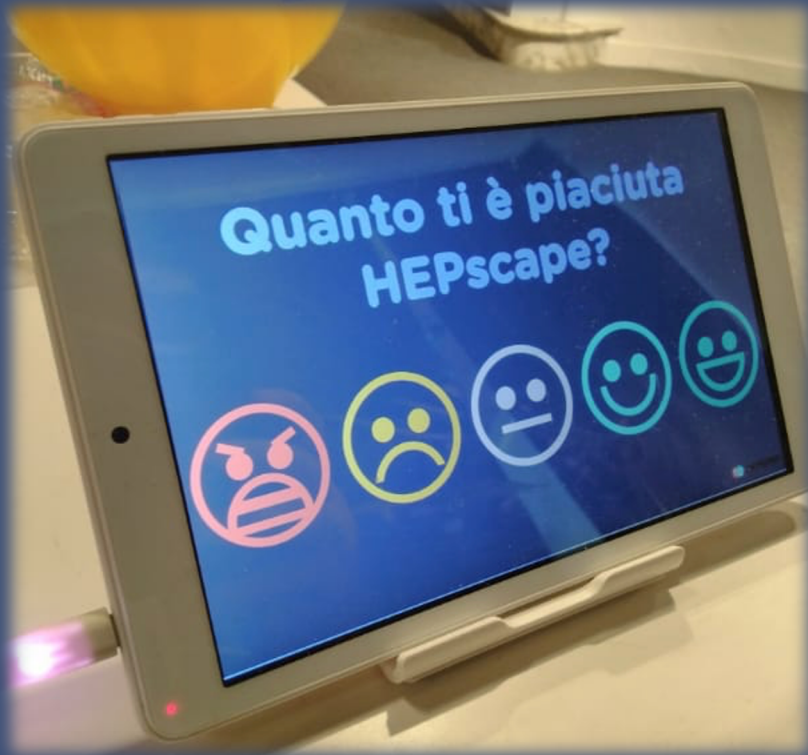


Game n. 4: Can you find the Higgs Boson?



The exit of HEPscape: Rating and Socials

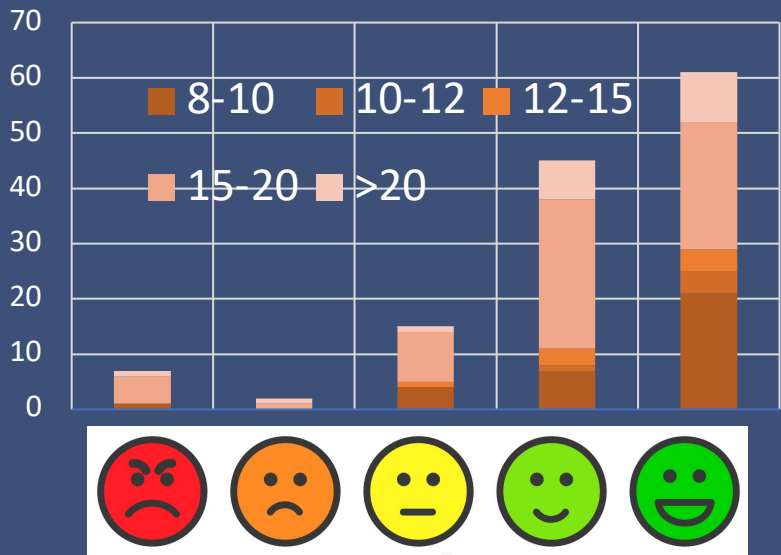
- At the exit there is an Instagram photo booth [@hepscape](https://www.instagram.com/hepscape)
- We also ask to complete a satisfaction test (2 questions: age and rating)



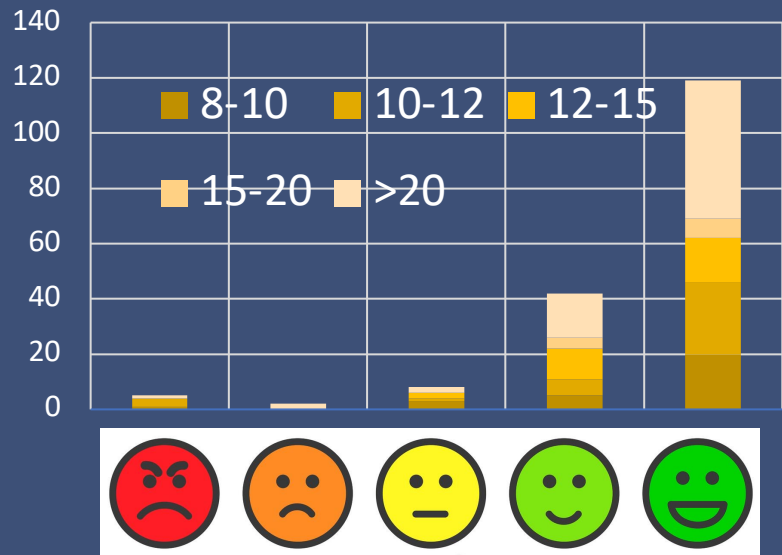
Satisfaction test

4,4

school groups



mixed groups



total



Dissemination and Plans



= proceedings and/or publication



= Best Poster Prize



INTED 2022
16th International
Technology, Education and
Development Conference
7-9 March, 2022
Valencia (Spain)

INFN Summer
Camp?

ERN2022, Festival di
Roma, Napoli,
Genova..

HEPweek in
Dipartimento

Planned
Events/Activities
in 2022

+ events in the schools upon
request (need to
announce/spread this
possibility)



tutte le
strade
portano
alla fisica

La intersezione delle Scienze
La intersezione delle Scienze
La intersezione delle Scienze

59°
CONGRESSO
NAZIONALE A.I.F.
17/18/19/20 novembre 2021
Polo Fommio
ROMA
Via Cristoforo Colombo, 116

NOTTE EUROPEA DEI RICERCATORI
SCIENCE
TOGETHER NET
VENTIQUATTRO SETTEMBRE 2021

LEPTON PHOTON
2021
MAN
Online Conference - 10-14 January 2022



Festival della Scienza
Genova, 21 ottobre - 1 novembre 2021 | www.festivalscienza.it
Mappe

All activities documented on [HEPscape website](https://hepscape.org)

Conclusion and Outlook



HEPscape exploits the escape room concept for science outreach in a fun way



It can be built in one hour and transported to different sites



The games can be adapted to the age group



It can be duplicated, the content can be adapted to other experiments, and it can be translated into different languages (also sign language)

