

HEPscape: an escape room about High Energy Physics

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Particle Physics Involving People



What is an Escape Room?

- Like a treasure hunt, with clues hidden in a room. One by one the clues unblock the next puzzles.
- A moderator guides the experience and stimulates the discussion on results
- Very popular nowadays among teenagers because it is fun, and also among work teams as team building exercise.
- Escape rooms have been adopted for science outreach (see <u>here</u>) and at the CERN open days in 2019.

• Science is fun!



Escape Room Methodology

Activity diversified by age

Higher involvement w.r.t. frontal teaching Parallel concepts, autonomy and mastering technique

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 <u>Roekel, 2011</u>

https://doi.org/10.3389/feduc.2021.622860

HEPscape

Number of visitors

- Prototypes: CERN open days, CERN CMS stage for high school students
- In 2021 a team from INFN Rome built an escape room about high energy physics, called HEPscape.
- 2021: presented as an attraction at the European researchers' night in Rome and at the Science Festival in Genova
- 2022: presented at Frascati Open Lab day



https://web.infn.it/hepscape



The entrance

- Can be installed indoor or outdoor in a gazebo
- 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 ~30-40 mins long.



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The room

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

- 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 controlled by a laptop using a videowall.
- Six LED lights used to guide the visitors in the solution of the clues.
 Lights can change color 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?

91

109

Game n. 2: How does the LHC work?







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

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At the exit:

- Instagram photo booth <u>@hepscape</u>
- Satisfaction test (2 questions: age and rating)





Satisfaction test



 $\left(\begin{array}{c} \cdot \\ \cdot \\ \cdot \end{array} \right)$

15-20

•••

school groups total mixed groups 8-10 **10-12** 10-12 8-10 12-15 8-10 10-12 12-15 12-15 15-20 >20 15-20 >20 >20 36 36 (\vdots) 36 ••• ••• ••• ••• • •

What's next

- Translation in other languages ongoing
- Plans to translate the games into the sign language
- Atlas and LHCb have shown interest in the project
- We are creating a network of interested institutes and we will all share materials and games

GOALs:

- Increase the diversity of our public
- Reach people in provinces, away from big cities

Conclusion and Outlook



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



Can be built in one hour and moved to different sites



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Games can be adapted to the group age



Can be duplicated, the content can be adapted to other experiments, can be translated into different languages



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