

Idea Circle Dinner Discussion #3 | cern.ch/s-cool-lab | 17 April 2019 IdeaSquare, CERN

S'Cool LAB: From hands-on learning activities to questionnaires and escape games



Current opportunities

Cloud Chamber WS



A 90-minute hands-on particle physics workshop for high school students (aged 14 and above) and high-school teachers.

6370 participants in 2018 (5420 students & 950 teachers)

S'Cool LAB PLUS+



A half-day programme for high school students (aged 16-19) which includes cloud chambers, + one additional experiment, + participation in PER projects.

650 participants in 2018

Summer CAMP



A two-week residential particle physics summer camp for 30 high school students aged 16-19 from all around the world.

2nd camp in 2018 (24/07 - 04/08)

S'Cool LAB participants



Student participants per country (2017)



Development of S'Cool LAB Activities

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Hands-on experiments in the fields of particle detection, acceleration and medical applications to make CERN's physics understandable



Development of S'Cool LAB Activities

Minds-on experimental tasks structured in POE cycles (White & Gunstone, 1992) to keep students cognitively active



A 3D printable ATLAS magnet model



PARI IDENTITIES

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Réponds à 7 questions et découvre quelle particule élémentaire te correspond le mieux ! W boson werden

Answer 7 questions & find out which particle best fits your personality!



A hands-on tour through particle physics on a small budget

https://scool.web.cern.ch/classroom-activities





Black hoves are a great tool to practice scientific reasoning skills. Students develop hypotheses shout the ernal structure of a black box, and come up with ideas how to test their hypotheses through indirect vation. We know it's temping, but never open the box, that's not how science works ;) You don't have printer? Check out cardboard or pipe alternatives, e.g. here https://resources.perimeterinstitute.ca

> Shake the black box and predic its internal structure. Test and adapt your hypothesis



tering experiments (e.g. Rutherford's gold foil experiment) are an important research tool of nuclea and particle physics. They help us to study interactions between particles and to obtain information about the structure of matter. You can introduce your students to the concepts of scattering experiments with everyday equipment such as marbles or tennis balls and cardboard, or use a 3D printer



nt: The Cloud Ch

The cloud chamber was one of the first particle detectors. It is very easy to build a cloud chamber with everyday material, dry ice, and Isopropyl alcohol. We developed a DIY manual including detailed instructions how to build a cloud chamber, and many information on how to interpret the observations.



If particle physics an overview of education resources available

LĂR

9) Other Ideas:

30 Other latest Test: Tak to your neighbours to find out more about their favourite classroom activities in particle

ave a look at the

Development of S'Cool LAB Activities



Hearts-on interactions through challenging group work and diverse CERN volunteers (42% female) including Q&A with potential role models



Prediction: Mark your prediction for the position of the beam spot with a cross X for the 3 magnet positions below.

Magnet position 1	Student 1	Student 2
		v
	Student 3 \vec{B}	< Stude
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Main Study Research Design

- Single group, pre- and post-test research design with online questionnaires
- Intervention: 4.5 hour hands-on session
- Sample: 509 students in 28 groups from 69 teachers and 13 different countries
- N = 509 students, 36% female, M = 17.0y, SD = 0.9y



Main Study Results: interest development



- Medium sized effect on interest
- Significant difference between girls and boys in dispositional interest (no sign. difference in physics grades)

$$d_{Cohen} = 0.3^{***}$$

♀ M = 0.62, SD = 0.20 ♂ M = 0.68, SD = 0.18 t(507) = 3.3, p < 0.001

Main Study Results: predictors interest/self-beliefs





How to become a S'Cool LAB tutor

Do you like to discuss physics with high school students and teachers? Do you like to perform hands-on experiments? Do you have a physics background or you are interested in physics and willing to learn more? cern.ch/s-cool-lab/how-to-become-tutor

Other activities & fun facts



CERN S'Cool LAB | The complete story



https://www.youtube.com/watch?v=tSqcxTdO43Q

One more correlation ...





Penguins stole an antimatter trap from CERN's antimatter factory. After playing hide and seek with it for an afternoon, they got distracted by the dry ice and liquid nitrogen in S'Cool LAB and forgot the antimatter on the table. Unfortunately, they forgot to switch on the time-super-warp-shift-nano-laser stabilizer. That means the antimatter trap will destabilize and the antimatter will annihilate with normal matter soon ...



We need you to

- Translate particle identities into more languages (SE, DK, NO, RO, IL, HU, FI, BG, BE, IN, LT, PK, UA, …)
- Tell students & teachers from your country about S'Cool LAB
- Become a tutor
- scool.lab@cern.ch

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It's time for pizza & your questions!