Beamline for Schools

A physics competition for high-school students

Welcome to CERN and DESY!

What is BL4S?

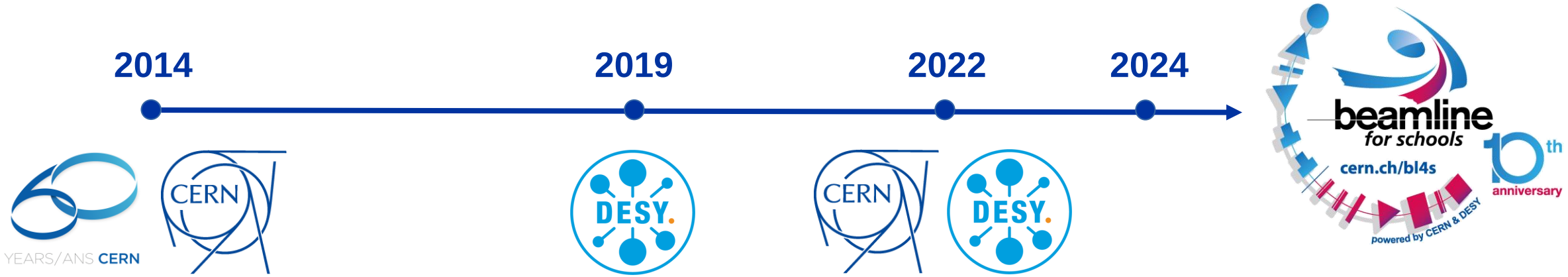
Perform your own experiment at a real particle accelerator!

You can be a scientist

Teams of high school students from all around the world can propose an experiment that they want to perform at a particle accelerator.

What is BL4S?

The 2024 edition is the 10th anniversary of the competition!



Who can participate in BL4S?

- **Teams:** min. 5, max. 9 people
- Enrolled in **high-school** in the school year 2023/2024 or gap between school and university
- Each team has to be led by an adult “**team coach**” (max. 2 per team)

Special prizes 2024

Award for the best video proposal: BL4S t-shirts and DIY cloud chamber – **1 team**

Award for the best outreach proposals: BL4S t-shirts and telescopes (sponsored by the Belgian project “Stars Shine For Everyone”) – **10 teams**

Shortlisted teams: BL4S t-shirts and DIY cloud chamber and pixel detector – **30 teams**

Winning teams 2024

Two winning teams will be invited to **CERN** in Geneva, Switzerland, to conduct their proposed experiments.

One winning team will be invited to **DESY** in Hamburg, Germany.

BL4S will cover the full costs of the winners' stay (~2 weeks) at CERN or DESY, including travel, accommodation at CERN or DESY, and meals. Before their arrival, the winning teams will have the unique opportunity to work together with scientists to optimise their proposed experiment.

Experiment proposal

Submission deadline:

April 10, 2024

You are not alone!

Get in touch with your national contacts or directly with us (see website)

Online events

Home » Outreach » Educational Outreach » Student Programmes » Beamline for Schools » Beamline for Schools 2024

Beamline for Schools 2024

Enter your search term

Create event

March 2024

- 19 Mar Beamline for Schools | Introduction and visit to engineering labs at CERN
- 14 Mar Beamline for Schools | Q&A session

February 2024

- 23 Feb Beamline for Schools | Interactive introduction to DESY

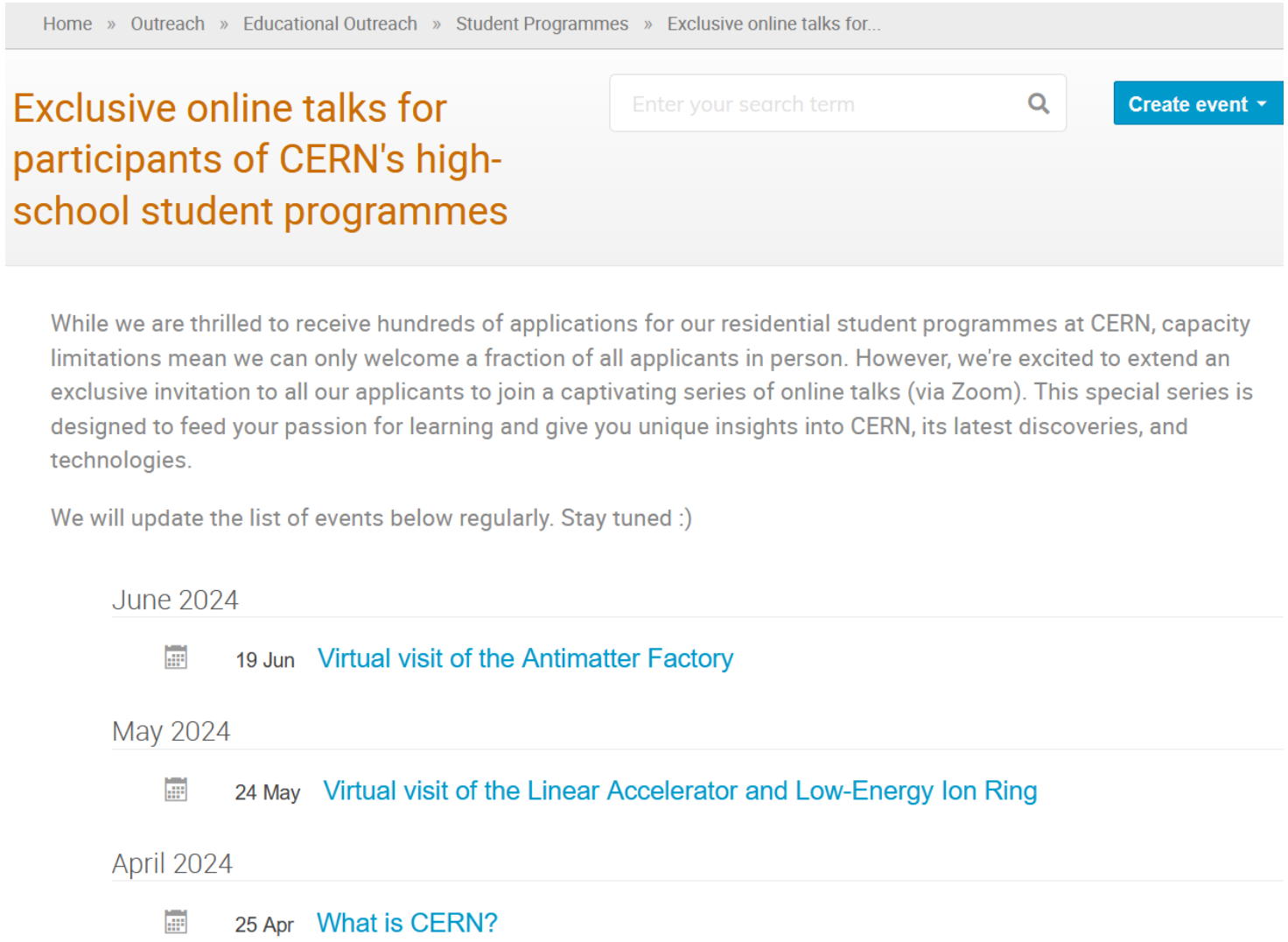
January 2024

- 26 Jan Beamline for Schools | Virtual visit to the ATLAS detector

December 2023

- 05 Dec Introduction to Beamline for Schools (incl. Q&A)
- 01 Dec Beamline for Schools | Interactive introduction to CERN

Online events



Home » Outreach » Educational Outreach » Student Programmes » Exclusive online talks for...

Exclusive online talks for participants of CERN's high-school student programmes

Enter your search term

Create event

While we are thrilled to receive hundreds of applications for our residential student programmes at CERN, capacity limitations mean we can only welcome a fraction of all applicants in person. However, we're excited to extend an exclusive invitation to all our applicants to join a captivating series of online talks (via Zoom). This special series is designed to feed your passion for learning and give you unique insights into CERN, its latest discoveries, and technologies.

We will update the list of events below regularly. Stay tuned :)

June 2024

19 Jun Virtual visit of the Antimatter Factory

May 2024

24 May Virtual visit of the Linear Accelerator and Low-Energy Ion Ring

April 2024

25 Apr What is CERN?

It’s time to design your experiments!

Questions?

Experiment proposal

Written proposal (~1000 words)

- Motivation (~ 100 words)
- Proposed experiment (~800 words)
- What you hope to take away from this experience (~100 words)

Video proposal

(~1 min, optional)

Experiment proposal

The proposals will be evaluated by a committee of scientists.

Evaluation Criteria:

- Feasibility of the experiment
- Motivation of your experiment idea and your participation
- Creativity of the experiment
- Following a scientific method

Proposal extension

Would you like to win an outreach prize (i.e. a telescope)?

Describe a **science education or outreach activity** that the members of your team have already organised or will organise in their community (up to 200 words; in addition to the 1000 words limit of your BL4S experiment proposal).

Target audience: a part of your community usually less exposed to science

Preparing your experiment proposal

What is a beam and a beamline?

In particle physics, the term **'beam'** refers to a large number of particles moving in the same direction. These particles can be accelerated to high energies.

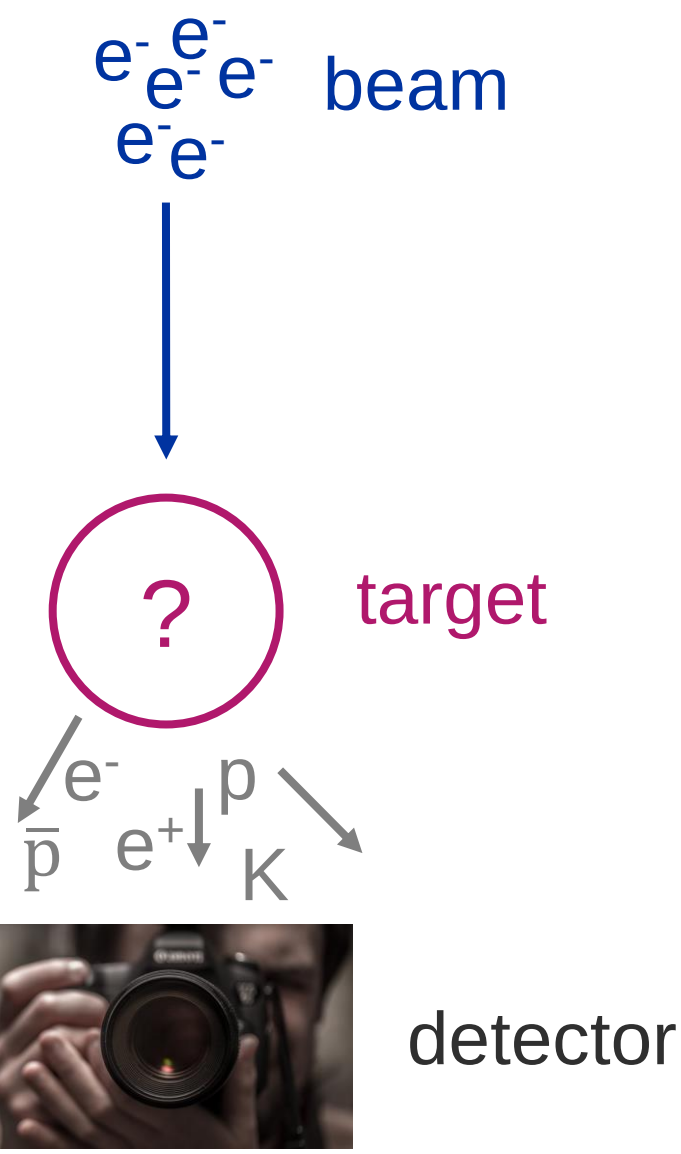
The term **'beamline'** commonly refers to a straight section of a particle accelerator leading the particles to an experimental area.

A beamline

… is a straight section of a particle accelerator leading the particles to an experimental area.

This experimental area might look empty ⇨ You can fill it with your experiments! :)

Experiment requirements



The proposed experiment must be designed in a fixed target configuration.

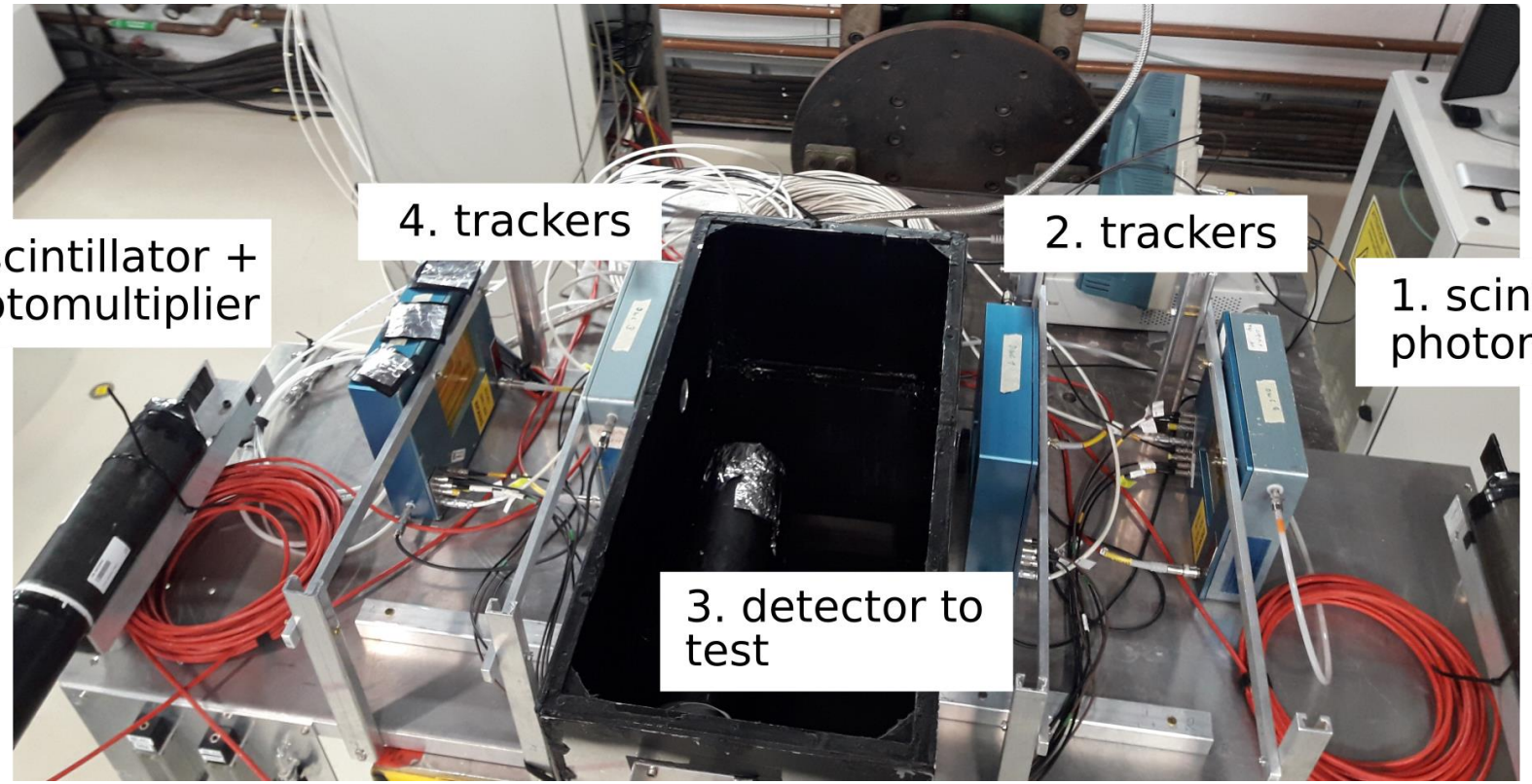
- **Fixed target configuration:** beam crossing or passing close to a target (solid, liquid, gas)
- **Experiment design:** beam, target, detectors, and trigger/readout

(new) particles moving in many different directions

detector

Note that we cannot perform collider-type experiments in BL4S

An experimental setup



~ 1 m

Some useful questions

- How do high-energy particles interact with matter?
- How can we detect high-energy particles?
- What can we learn from interactions of particles with matter?
- How can we use these phenomena (e.g. applications in medicine or industry)?

Find a phenomenon that triggers your curiosity and start to draft your experiment!

Example experiments: https://beamline-for-schools.web.cern.ch/sites/default/files/Experiment_examples_2024.pdf

Beam properties

- Protons: uud
- When they interact with a target they can produce different particles, both elementary and not.
- Given the energy provided by the PS, one can have **electrons, muons and particles composed of u,d, and s quarks (pions and kaons)**.