



Beamline for Schools 2021

Great things can happen when high school students get involved with innovative science, and that is exactly the environment that CERN and DESY want to create for them by organizing the Beamline for Schools (BL4S) competition.

CERN is well known for the discovery of the Higgs boson and the invention of the World Wide Web, but there is much more to the laboratory than that. A large part of CERN's research and development is carried out at so-called fixed-target beamlines, where particle beams are available for different types of experiments. These projects range from probing the mysteries of antimatter to the testing of new generations of particle detectors.

From the first edition in 2014 until 2018, the winners of the BL4S competition have performed their experiments at the PS accelerator of CERN, door to door with senior physicists and engineers. For the professionals as much as for the participants of Beamline for Schools, 2019 brought some change. The PS as well as all other accelerators at CERN have been stopped for maintenance until the end of 2021.

In order to continue BL4S, CERN has teamed up with DESY, Hamburg, the German national laboratory for particle physics, accelerators and photon science. Like CERN, DESY operates several large accelerators. Its flagship, the European XFEL, is a linear accelerator able to produce intense flashes of X-rays that allow scientists to map atomic details of viruses, to film chemical reactions, and to study the processes in the interior of planets. Links between CERN and DESY have traditionally been strong and researchers of either organization participate actively in the research programs of the other.

Despite the high demand for beam time from professional physicists, DESY has reserved time for BL4S at its "DESY II" electron / positron accelerator. The winners of BL4S 2021 will perform their experiments at this facility and will receive support from experts from both DESY and CERN.

BL4S is open to high-school students of age 16 and older who, if they win, are invited (with two supervisors) to DESY to run their experiment. Teams must have at least five students but there is no upper limit to a team's size, although just nine students per winning team will be invited to DESY. Teams may be composed of students from a single school or from a number of schools working together (even from different countries).

To participate, teams should read carefully the information about the beamline and experimental facilities (<https://www.cern.ch/bl4s/resources/useful-documents>), and describe in their proposals why they think they should win the chance to carry out their experiment at one of the world's leading laboratories for particle physics. The teams are encouraged to ask their teachers or professional physicists (e.g. from a nearby university, or from the list provided here: <https://www.cern.ch/bl4s/bl4s-competition/national-contacts>) for help in choosing a subject or/and to discuss with them the feasibility of an idea they had themselves. Alternatively, the teams can pick one of the example experiments (<https://www.cern.ch/bl4s/resources/useful-documents>) and work it out in detail. We are not necessarily expecting to receive fully developed experimental proposals. However, there is no limit for your own ideas and suggestions of alternative experiments. Experience shows that effort will pay out. BL4S will offer support to teams while they are preparing their proposals. The main objective of the competition is that the students increase their knowledge about physics while working together on their idea.

Registration

Online registration (optional) is already open. By registering the name of the team, the country and the email address of the team's coach, you will give us the possibility to provide you with additional information such as supplementary documentation, mail addresses of physicists that you may contact for help or reminders of deadlines. Please note that you are not supposed to have a proposal ready when you register your team.

Registration will require:

1. Team name
2. Country/countries
3. Email address of the team coaches

Proposal submission

This is the mandatory step for a team to take part in the competition. The teams have to provide information about the team and its members, contact details and, very important:

- I. A written proposal of up to 1000 words that explains:
 - a. Briefly (around 100 words) why you want to participate
 - b. In detail (around 800 words) how you would like to use the particle beamline for your experiment.
 - c. Briefly (around 100 words) what you hope to take away from the experience.
- II. A 1-minute video that summarizes your written proposal in an original, creative, entertaining way and introduces the members of the team (get inspired by the videos of previous participants). **Note** that the video is not mandatory, but encouraged.

The proposal has to be submitted by an adult, usually the team coach. **Note** that for the selection of the winners, only the written proposal will be judged.

The written proposal will be evaluated according to the following criteria:

- Feasibility of the experiment

- Motivation of the experiment and why you want to participate
- Creativity of the experiment
- Your ability to follow the scientific method

The submission must be in **English**. However, BL4S provides contact persons in several countries to respond to questions in the national language(s).

The submission of the proposals will close at **midnight CET on 15 April 2021**. The proposals will be evaluated by a committee of senior scientists from CERN and DESY. The winners will be notified in June 2021.

Prizes (intended prizes without liability)

First prize:

The first prize is a trip of about two weeks to DESY to carry out your experiment in autumn 2021. Two teams are selected and each winning team can have a maximum of 11 people (up to nine students and up to two accompanying adults). BL4S will cover the full costs including travel, accommodation and meals. Members of the team that do not come to DESY will still be able to take part in the data analysis and participate in the experiment via the exchange of web-based data and videoconferences.

Second prize:

The teams that make it with their proposals into the shortlist will receive:

- A portable particle detector for their school
- One BL4S T-shirt for each team member.

The team that will realize the **best video proposal** will be included in the short list!

Participation Certificates:

All team members that submit a complete proposal as a team receive a certificate of participation.

You can find out more about the prizes [here](#).

All complete proposals that were submitted on time, or extracts from them, may be showcased on the websites of CERN and DESY and used for their outreach purposes after the competition closes.

Please take the time to read the [terms and conditions](#) applicable to the Beamline for Schools competition.

Intrigued? Discover the competition and join the adventure! Find more inspiring videos in our [Video Section](#). Enjoy!

Useful information about the BL4S competition at a glance:

- Beamline for Schools Website: <https://www.cern.ch/bl4s>
- Our mail address: bl4s.team@cern.ch
- Information in your own language and other useful documents: <https://www.cern.ch/bl4s/resources/useful-documents>

- Prizes: <https://www.cern.ch/bl4s/prizes>
- How to take part: <https://www.cern.ch/bl4s/how-apply>

Good luck! We are looking forward to meeting you!



