



Beamline for Schools

Great things can happen when high schools get involved with innovative science, and that is exactly the environment CERN wants to create for them by organizing the Beamline for Schools competition.

CERN is famous for the discovery of the Higgs boson, 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. These projects range from probing the mysteries of antimatter to the testing of new generations of detectors.

From the first edition in 2014 until 2018, the winners of the BL4S competition have performed their experiments at the [PS accelerator](#), door to door with senior physicists and engineers. For the professionals as much as for the high-school students, 2019 and 2020 will bring some change. The PS as well as all other accelerators at CERN will be turned off for maintenance.

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](#), produces intense flashes of X-rays that will allow scientists to map atomic details of viruses, film chemical reactions, and 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 programmes of the other.

Despite the high demand for beam time from professional physicists, DESY has reserved time at its "DESY II" electron / positron accelerator. The winners of BL4S 2019 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.

To enter, student teams should study the information about the [beamline and experimental facilities](#), and tell us 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 may ask their teachers or professional physicists (e.g. from a nearby university) to propose a subject to them or to discuss with them the feasibility of an idea they had themselves. Alternatively, the teams can pick one of the [example experiments](#) 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.

The registration

[Online registration](#) (optional) is open from 1 July. 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.

Registration will require:

1. Team name
2. Country
3. Email address of the team coach

The [submission](#) of the proposal

This is the mandatory step that enters a team into the competition. It requires:

1. Team name
2. Country
3. Name and email address of the team coach
4. Number of students, gender and age of each student team member (minimum of five students)
5. Name of school(s) or organization(s) represented by the team
6. A **written proposal** of up to 1000 words that explains:
 - a. Briefly (around 100 words) why you want to come 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.
7. A **1-minute video** that summarizes your written proposal in an original, creative, entertaining way and introduces the members of the team.

The submission has to be done by an adult, usually the team coach.

Note that for the selection of the winners, the written proposal and the video will be judged equally.

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

- Feasibility of the experiment
- Motivation of the experiment and why you want to come to participate
- Creativity of the experiment and the 1-minute video
- Your ability to follow the scientific method

Submissions must be made in **English**. BL4S will provide [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 31 March 2019**. The proposals will be evaluated by a committee of senior scientists of CERN and DESY. Winners will be notified in June 2019.

The prizes (Intended prizes without liability)

First prize:

The first prize is a 10-12 days long trip to DESY for two teams to carry out their experiments at a time to be agreed between DESY, CERN and the winning teams, ideally between August and October 2019. Each 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 school 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.

Second prizes:

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

- One functional particle detector (CosmicPi) for their school
- One BL4S T-shirt for each member

Certificates:

All teams that submit a complete proposal will get a printed certificate of participation with their team name from BL4S.

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 website of CERN and DESY after the competition closes.

Please take the time to read the [terms and conditions](#) applicable to the Beamline for Schools competition. Important information can be found in this document, including for instance the need for submissions to be your own work.

Intrigued? Discover the competition and learn more about the experience of e.g. the 2016 BL4S winners at CERN in this [2016 BL4S video](#). Find more inspiring videos in our [Video Section](#). Enjoy!

Now there is only one last thing to say:

Good luck and we are looking forward to meeting you!



Useful information about the BL4S competition at a glance:

- Beamline for Schools Website: cern.ch/bl4s
- Our mail address: bl4s.team@cern.ch
- Information in your own language:
<https://www.cern.ch/bl4s/usefuldocuments#languages>
- Useful documents: <https://www.cern.ch/bl4s/useful-documents>
- Prizes: <https://www.cern.ch/bl4s/prizes>
- How to take part: <https://www.cern.ch/bl4s/how-apply>