



A beamline for schools

Great things can happen when high schools get involved with cutting edge science, and that is exactly what CERN is proposing by launching a new Beamline for Schools competition for 2017!

CERN is famous 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. These projects range from investigating the inner workings of protons to probing the mysteries of antimatter. In 2017, CERN will once again be making a fully-equipped beamline available for schools, with beam-time being allocated to two winning teams via scientific competition, just as it is allocated for all CERN experiments.

The competition is open to high-school students of 16 and older, in teams of at least five students, up to nine of whom would – if their team wins – come to CERN to run their experiment.

Teams may be composed of students from a single school, or from a number of schools working together. Proposals will be pre-selected by a committee of CERN scientists, with the short list being sent on to the SPS and PS experiments Committee (SPSC), the committee that validates all proposals for experiments at the laboratory's SPS and PS accelerators.

To enter, student teams should study the attached information about the beamline and experimental facilities, and tell us why they think they should win the chance to carry out experiments at the world's leading laboratory for particle physics.

Each team's entry must be submitted by an adult on behalf of the team. The adult will serve as the team's coach and will organise the submission will need to be made in **English**, though the content of the submission should ultimately be the student team members' own work.

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. CERN and the physics community will also offer support to teams preparing entries. The main objective of the competition is that the students increase their knowledge about physics while working together on their proposal.

The competition will take place as follows.

The launch:

July 2016: Via social media posts and mailing lists, students, teachers and other science enthusiasts are encouraged to take part in the event and spread the word about the competition.

The pre-registration:

Online pre-registration will open on 18 July 2016. It is optional and notifies CERN of your intention to submit a proposal. Pre-registered teams will receive additional information from CERN such as clarifications or reminders about the deadline for submission.

Pre -registration will require:

1. Team name
2. E-mail 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. Names, dates of birth and gender of each student team member (minimum of five students).
5. Name of school(s) or organisation(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 CERN;
 - 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.

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

Registration will close at midnight CET on 31 March 2017.

It will be possible, but not mandatory, to make a pre-registration. By registering the name of the team and the e-mail 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.

Team members may be changed, if necessary, up to the closing date by e-mail to ["beam-line-4-schools@cern.ch"](mailto:beam-line-4-schools@cern.ch). Please note that while any number of students may be on a team, only nine students from the winning teams (all of whom will need to be at least 16 years old on the first day of their visit to CERN) will be able to come to CERN; other team members from the winning teams, who are unable to visit CERN, may nonetheless participate remotely in the experiments through data analysis and live streaming.

CERN will offer the winning teams a fully equipped beamline and experimental programme and is not necessarily expecting to receive a fully developed experimental proposal. However, there is no limit for your own ideas and suggestions of alternative experiments!

Submissions must be made in English. CERN will also provide a contact point in several countries to respond to questions in the national language(s).

The students should create the proposal for the experiment themselves but adults, in particular the team coach, are encouraged to help them understand what the particle beam is capable of and how the experiment could be designed. CERN will provide a list of experienced physicists that can be contacted by the team in case they have any questions.

The winning teams will have the opportunity to work with CERN scientists to refine their ideas before they come to CERN.

As mentioned above, proposals must be received by midnight CET on 31 March 2017. They will be evaluated by a committee of CERN scientists, with a shortlist being submitted to the SPS and PS committee, as are all proposals for experiments on these two CERN accelerators. Winners will be notified in June 2017.

Proposals will be evaluated according to the following criteria:

- Feasibility of the proposal
- Motivation of the students
- Creativity
- Demonstration of ability to follow the scientific method

The prizes:

- First prize:

The first prize is a one week trip to CERN for a maximum of 11 people (up to nine students and up to two accompanying adults) to carry out experiments at a time to be agreed between CERN and the winning team, ideally in September 2017. CERN will cover the full cost including travel, accommodation and food.

Members of the school that do not come to CERN 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 proposal to the shortlist being submitted to the SPS and PS committee will receive:

- One functional particle detector (CosmicPi) for their school
- One BL4S t-shirt for each member of the team

All teams that submit a complete proposal will get a printed certificate of participation from CERN. In addition, these teams will receive priority should they wish to organize a visit to CERN.

All complete proposals that were submitted on time, or extracts from them, may be showcased on the CERN website 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.

Finally, you can find several videos about Beamline for School on CERN's YouTube channel. Even though some of them were made for previous editions, they provide useful background information. Enjoy!

<https://www.youtube.com/watch?v=ehaSTYsIZxg>

<https://www.youtube.com/watch?v=8mZLJjR3M44&index=2&list=PLAk-9e5KQYEpKvo-8lqqkd8ekCvqf7ktS>

<https://www.youtube.com/watch?v=FBm965fiH3s&list=PLAk-9e5KQYEpKvo-8lqqkd8ekCvqf7ktS&index=1>

<https://www.youtube.com/watch?v=t1nENDU7VnI&index=3&list=PLAk-9e5KQYEpKvo-8lqqkd8ekCvqf7ktS>

https://www.youtube.com/watch?v=_Dq46qCwZCw&index=9&list=PLAk-9e5KQYEpKvo-8lqqkd8ekCvqf7ktS

Now there is only one last thing to say:

Good luck!