



Stories from the classroom

International Masterclasses

Particle Physics Masterclasses are a successful tool to engage high-school students with high energy physics. Young people become scientists for one day and perform a tailor-made physics analysis involving real LHC data under the supervision of physicists.

The International Particle Physics Outreach Group (IPPOG) organizes Particle Physics Masterclasses in the framework of the program International Masterclasses. Universities and research labs in more than 50 countries worldwide participate in the program and invite high-school students to a day-long activity. The students hear lectures from active scientists and perform measurements on real data from particle physics experiments at the LHC (ALICE, ATLAS, CMS, LHCb). At the end of each day, up to five student groups join in a video conference with CERN or Fermilab for discussion and combination of their results. Michael Kobel of the Technische Universität Dresden, Germany, leads the program. With its unique approach the International Masterclasses supports various aims:

- link school and research institutions
- bridge the gap between science education at school and modern scientific research
- stimulate interest in science
- improve understanding in science and scientific research
- demonstrate the scientific research process
- provide an attractive opportunity to get a first glimpse of modern physics research

The program started as a solely European project. It has experienced considerable growth since 2006, when QuarkNet joined and American students participated for the first time. Since then, the coordination is shared between Uta Bilow, TU Dresden, and Ken Cecire, QuarkNet. QuarkNet coordinates the program for universities and research labs in North and South America and Far East, giving high-school students in countries such as the U.S., Canada, Argentina, Chile, Colombia, Mexico, Peru, Venezuela, Japan, or China the chance to get engaged with high energy physics. For these participants, videoconferences with Fermilab are arranged by QuarkNet.

The involvement of QuarkNet is indispensable for the success of the program. QuarkNet is a reliable partner and has helped the program to develop to a global activity. With help of QuarkNet, the highly solicited Particle Physics Masterclasses are now offered in more than 50 countries worldwide. The possibility to connect to a videoconference with Fermilab or CERN fosters the participation of countries from other time zones.

Netzwerk Teilchenwelt

Netzwerk Teilchenwelt is a German-wide outreach program in particle physics and astroparticle physics. It was launched in 2010 and is led by Michael Kobel and Uta Bilow. Scientists from 29 German research institutes work with high school students and teachers to bring cutting edge research to the classroom and share the excitement of particle and astroparticle physics research. Activities are offered on four levels, ranging from one-day activities like a masterclass at school up to workshops at CERN and research

projects at universities and institutes. Netzwerk Teilchenwelt also focuses on teachers training and the development of context material that can be used in classrooms.

QuarkNet was the role model for Netzwerk Teilchenwelt, when we launched the program in 2010. The proven success of QuarkNet was instrumental to develop the idea for this Netzwerk Teilchenwelt and for getting funding for it.

International Cosmic Day

Another very fruitful cooperation between QuarkNet and us is the International Cosmic Day (ICD), which was organized in 2017 for the sixth time, with more than 60 groups of young people in 17 countries around the world participating.

At the ICD, high-school students from around the world are invited to research labs or universities, where they investigate cosmic rays, discuss their results with scientists and work like a scientific international collaboration.

ICD is organized jointly by QuarkNet and the German partners DESY (Deutsches Elektronen-Synchrotron) in cooperation with Netzwerk Teilchenwelt.

Here again the success of the program and its continuous growth is a clear result of strong engagement on both sides of the Atlantic, which can build up on established contacts and networks.

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