

Physics education and communication: Good practice examples within the Swiss Physics Community

Friday, 13.09.2024, Room ETZ E 8

Time	ID	PHYSICS EDUCATION AND COMMUNICATION: GOOD PRACTICE EXAMPLES WITHIN THE SWISS PHYSICS COMMUNITY <i>Chair: Andreas Müller, Université de Genève</i>
13:30	91A	<p style="text-align: center;">A Course on General Relativity and Cosmology for High School Students</p> <p style="text-align: center;"><i>Alice Gasparini, Université de Genève</i></p> <p>We will present the results of the project initiated by SwissMAP, which aims to introduce the themes of cosmology and general relativity at upper secondary level (senior high school). After an overview of the motivations and challenges inherent in this educational effort, we will provide illustrative examples of activities, as well as the feedback collected during field implementation and the resulting impact on students.</p>
	91B	<p style="text-align: center;">A hands-on test module in schools on astrophysics and computer science</p> <p style="text-align: center;"><i>Matthieu Heller, Sebastien Murphy, Université de Genève</i></p> <p>Based on simulated data from the SST-1M observation system, a former prototype for an international gamma-ray telescope experiment (CTAO) involving the University of Geneva, we've created a Python data analysis project suitable for high school students. This project is part of an interdisciplinary learning approach that combines physics and computer science and is intended to be completed over the course of one week. By using their prior knowledge in computer science and physics, this novel pedagogical sequence aims at immersing students in the world of scientific research, focusing on an authentic and meaningful topic.</p> <p>This presentation covers the project, focusing on programming from the students' viewpoint and making a complex physicist-designed environment more accessible. It also reviews educational choices and their didactic reasoning. We've tested this project with 47 third year students from the College Rousseau in Geneva, analysing the outcomes and feedback gathered on Moodle. Based on these findings, we also outline potential improvements.</p>
14:00	92	<p style="text-align: center;">Physics in Advent</p> <p style="text-align: center;"><i>Gernot Scheerer, CHUV</i></p> <p>With about 70'000 registered participants and over 1 million clicks on the web page every year, Physics in Advent (PiA for short) is one of the major physics outreach projects in Europe. PiA is an playful physics Advent calendar of the Georg-August University in Göttingen. From 1 to 24 December, an experiment riddle will be posted on the PiA homepage every day. The goal of PiA is to foster pupils' curiosity and interest in physics and science and to help understand natural physical phenomena without complex formulas, to make science alive in the living room. We will give a short overview on the Physics in Advent project and how the Swiss Physical Society is fostering its impact in Switzerland.</p>
14:20	93A	<p style="text-align: center;">Physics and Sustainability at School</p> <p style="text-align: center;"><i>Peter Kreuzer, Université de Genève</i></p> <p>In this contribution, we present an innovative physics course on the topic of energy for upper secondary school students, contextualized within the Earth's environment and climate change. By immersing students in real-world climate issues and encouraging both critical thinking and problem-solving, this course aims to foster a generation of environmentally conscious individuals equipped to address the challenges of our changing planet.</p> <p>The content of the course is mapped to the official physics curriculum and delves into climate related topics such as the greenhouse effect. Among others, students engage in order of magnitude calculations concerning key climate phenomena, such as the projected sea level rise attributed to global temperature increases, or the aviation industry's contribution to global greenhouse gas</p>

	93B	<p>emissions. Practical activities involve climate-oriented laboratory experiments and computer simulations. In addition, students are provided with an overview of recent scientific findings, encouraging advancements and innovative technology concerning sustainable development. An early version of this course has already been tested on a class of 16 high-school students in Geneva in 2022, accompanied by a study on its effects on motivation of students. We will report the outcomes of this teaching experience and the related motivation study and describe how this teaching project has been evolving since, as well discussing its future perspectives.</p> <p style="text-align: center;">Physics and Sustainability at University</p> <p style="text-align: center;"><i>Tomoko Muranaka, EPFL</i></p> <p>Starting fall 2024, all EPFL departments will introduce sustainability-oriented topics into both bachelor's and Master's classes with a focus on real-world applications. What are the challenges for students and for professors? In this flash talk, three pillars for integrating sustainability in physics education will be shared.</p>
14:40	94	<p style="text-align: center;">International Physicists' Tournament and International Young Physicists' Tournament</p> <p style="text-align: center;"><i>Samuel Byland, VSMP: IYPT, Mathieu Suter, ETHZ: IPT</i></p> <p>The International (Young) Physicists' Tournament, short I(Y)PT, is a physics competition for students (IYPT: pre-university, IPT: university) with a strong focus on project and teamwork. In contrast to most other science competitions, the problems are published about a year before the tournament. An ideal I(Y)PT problem should allow for experimental and theoretical investigations on different levels and aspects of an interesting phenomenon (see https://www.iypt.org/problems/problems-iypt-2024/ and https://iptnet.info/problems/ for lists of current problems). Students get the opportunity to develop their own models and setups working on these open problems, engaging them with the process of real research. At the competition, teams present, discuss and review the solutions in so-called physics fights. This interactive format mimics a research conference and is an excellent experience for young scientists.</p> <p>Over the last twenty years a national competition (Swiss Young Physicists' Tournament, SYPT) has been established with the intention to promote more project-based physics teaching at Swiss high schools.</p>
15:00	95	<p style="text-align: center;">Youth@STEM4SF</p> <p style="text-align: center;"><i>Barbora Gulejova, CERN</i></p> <p>The interest of youth in STEM, particularly physics and engineering studies, is experiencing a decline, despite the pressing need for a new generation of specialists to drive cutting-edge research crucial for innovation, economic progress, and sustainable development. To address this challenge, innovative approaches are needed to inspire more students to pursue STEM careers. Contextualizing STEM disciplines within real-life scenarios, especially those related to sustainable development, proves to be a potent tool for fostering students' interest and appreciation. The pioneering project Youth@STEM4SF (Youth at STEM for Sustainable Future), initiated in Switzerland in May 2023 with support from SPS, SCNAT, and education21, offers a unique high school program integrating physics and STEM subjects with real-life scenarios and sustainable development contexts. Through applied R&D in physics-based industries and inspirational role models in these fields, the program in form of a thematic school day aims to engage young talents, especially girls, in physics and basic sciences. It also seeks to educate future society leaders on the importance of science for sustainability. Initial assessments show promising changes in interest and attitude. The project aspires to have a broad national and international impact by aligning with educational plans and gaining recognition from educational authorities.</p>
15:20	96	<i>Discussion</i>
15:45		END