T 111: Outreach 3

Time: Friday 9:00–10:30 Location: Geb. 30.22: Lehmann-HS

T 111.1 Fri 9:00 Geb. 30.22: Lehmann-HS

The Astroparticle Immersive Synthesizer AIS^3 — •Lasse Halve[1], Jan Audehm[1], Charlotte Benning[1], Jonas Häussler[1], Johanna Hermannsgabner[1], Adam Rifaie[1], Tim Otto Roth[2], Lea Schlickmann[1], Miriam Seidler[2], Christopher Wiebusch[1], and Simon Zierke[1] — [1]III. Physikalisches Institut B, RWTH Aachen, Sommerfeldstr. 16, 52074 Aachen — [2]Imachination Projects, Bahnhofstr. 1, 77728 Oppenau i. Schw.

The Astroparticle Immersive Synthesizer (AIS^3) is a sound laboratory created by conceptual artist and composer Tim Otto Roth in cooperation with the IceCube Neutrino Observatory. The data from large-volume neutrino telescopes like IceCube, ANTARES, and KM3NeT are interpreted in sound and light. The installation consists of 444 spherical loudspeakers, each equipped with LEDs and a synthesizer. The loudspeakers, representing the photosensors of the neutrino detectors, are hanging on thin wire ropes allowing the visitors to move freely through the installation. The photosensor data are encoded by sound frequencies and additionally visualized by colored illumination of the loudspeakers, which allows the visitors to experience the time sequence of neutrino events in the 3D environment. The project creates a fundamental experiment in psychoacoustics for everyone by immersing the visitor in the sound generator. We describe the design and construction of the installation, the interpretation of the physics data as a natural source by Tim Otto Roth, and the exhibitions in Berlin, Munich, Aachen, and Paris.

T 111.2 Fri 9:15 Geb. 30.22: Lehmann-HS

Belle II - Development of an interactive 3D detector representation — •Johanna Häusler and Thomas Kuhr — Ludwig-Maximilians-Universität München

Public outreach is an essential part of modern science. This includes not just raising public awareness for physics questions themselves * and especially for particle physics questions * but also providing novel tools to reinforce learning and understanding of basic physics principles and of the technology required for studying those principles.

The general progress in the field of 3D technologies allows for entirely novel learning strategies that enable pupils to interact with the educational object, thereby increasing both learning and interest. 3D printing and displaying technologies are especially suitable for presentation of complex experimental arrangements * so as particle physics detectors to convey relatively simple cognitive access to the most basic principles behind those setups. The talk presents a 3D educational project of the Belle II Detector in its early stages of development.

T 111.3 Fri 9:30 Geb. 30.22: Lehmann-HS

Citizen Science in Data-Intensive Physics: PUNCH4NFDI Perspective — •Victoria Tokareva[1], Michael Kramer[2], Andreas Haungs[1], and Ramesh Karuppusamy[2] — [1]Karlsruhe Institute of Technology, Institute for Astroparticle Physics, 76021 Karlsruhe, Germany — [2]Max-Planck-Institut für Radioastronomie, 53121 Bonn, Germany

In recent years, citizen science projects have garnered widespread participation globally, fostering collaboration between enthusiastic individuals and professional researchers. Recent studies indicate that such collaborations yield a positive impact on social well-being by promoting continuous education, rational thinking, and active engagement in local and international social initiatives.

This contribution delves into the realm of citizen science projects within the data-intensive physics domain, specifically focusing on initiatives related to research within PUNCH4NFDI (Particles, Universe, NuClei and Hadrons for Nationale Forschungs-Daten Infrastruktur) scientific communities, such as astrophysics, astroparticle and particle physics, nuclear physics, and related fields. Our analysis aims to explore the experiences gained from citizen science projects across diverse research domains. This exploration aims to uncover the transformative potential of such collaborations, both within the realm of scientific inquiry and in the broader societal context.

This work is supported by the DFG fund "NFDI 39/1" for the PUNCH4NFDI consortium.

T 111.4 Fri 9:45 Geb. 30.22: Lehmann-HS

Outreach modules for new particle Ssarches using the ATLAS Forward Proton detector, Higgs boson physics, and portals for Higgs bosons and SUSY particles — •Peter Zacik and Andre Sopczak — Czech Technical University in Prague

We present two modules as part of the Czech Particle Physics Project (CPPP). These modules are intended as learning tools in masterclasses aimed at high-school students (aged 15 to 18). The first module is dedicated to the detection of an Axion-Like-Particle (ALP) using the ATLAS Forward Proton (AFP) detector. The second module focuses on the reconstruction of the Higgs boson mass using the Higgs boson golden channel with four leptons in the final state. Two further modules are educational aid and source for expert information, web portals dedicated to Higgs boson and Supersymmetry research. The modules are accessed at the following link: http://cern.ch/cppp.

T 111.5 Fri 10:00 Geb. 30.22: Lehmann-HS

Designing a Time Projection Chamber for Schools — •Annika Hoverath, Laura Rodríguez Gómez, Jochen Kaminski, Klaus Desch, Johannes Streun, Malte Koch, and Maximilian Meiss — Physikalisches Institut, University of Bonn

The CLEOPATRA project - CLassroom Experiment On PArticle TRAcking - is aimed to develop a new experiment in portable size for physics lessons in German high schools. Since there are only a few experiments, which focus on modern particle physics and which can be shown in lessons, CLEOPATRA visualizes how particles, especially cosmic muons and electrons from radioactive sources, can be detected in modern research. The idea is that pupils get an adequate insight into the research process and how knowledge about nature is obtained in science. The heart of this experiment is a time projection chamber. This detector type is often used in fundamental research. In this setup a so-called GridPix is used to measure the charge signals and to identify the particle track. The track projection on the anode yields two-dimensional information. With the usage of scintillators around the gas volume, the system is triggered and records the timing for three-dimensional information. With this detector particle tracks can be reconstructed digitally in three dimensions and almost in real-time.

In this talk, the CLEOPATRA detector and the corresponding physics will be presented and current developments and challenges will be explained. Currently, the detector will be improved by a magnetic field for track bending to distinguish particles and a scintillator will be developed around the whole gas volume for full track reconstruction.

T 111.6 Fri 10:15 Geb. 30.22: Lehmann-HS

A new release of ATLAS open data for education — •David Koch — LMU, Munich, Germany

The ATLAS Open Data project aims to provide data and tools to high-school, undergraduate and master students, as well as teachers and lecturers, to help educate them in physics analysis techniques used in experimental particle physics. Sharing data collected by the ATLAS experiment aims to generate excitement and enthusiasm for fundamental research, inspiring physicists of the future. The approach followed by the ATLAS Open Data & Tools Group is to not only publish recorded and simulated datasets but to also accompany the release of open data with high quality documentation in the form of tutorials, Jupyter Notebooks and interactive webpages to explore the data. The provided material is aimed at people with a wide variety of expertise, ranging from high-school students to teachers and the interested general public, to undergraduate and even master students of particle physics.

In the past, ATLAS has already released proton-proton collision data and associated simulated data at center-of-mass energies at 8TeV and 13TeV. These releases were eagerly received by the community and public.

In this talk I will present the status and plans of the ALTAS Open Data & Tools Group to publish a new release of ATLAS Open Data. The new release will include new, larger datasets that will allow for more advanced analysis techniques such as machine learning, as well as a revised web appearance and educational software and tools.