

Education, Outreach and Public Relations of the Pierre Auger Observatory

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The scale and scope of the physics studied at the Pierre Auger Observatory continue to offer significant opportunities for original outreach work. Education, outreach and public relations of the Auger Collaboration are coordinated in a dedicated task whose goals are to encourage and support a wide range of efforts that link schools and the public with the Auger scientists and the science of cosmic rays, particle physics, and associated technologies. We focus on the impact of the Collaboration in Mendoza Province, Argentina and beyond. The Auger Visitor Center in Malargüe has hosted over 95,000 visitors since 2001, and a fifth Collaboration-sponsored science fair was held on the Observatory campus in November 2014. The Rural Schools Program, which is run by Observatory staff and which brings cosmic-ray science and infrastructure improvements to remote schools, continues to broaden its reach. Numerous online resources, video documentaries, and animations of extensive air showers have been created for wide public release. Increasingly, collaborators draw on these resources to develop Auger related displays and outreach events at their institutions and in public settings to disseminate the science and successes of the Observatory worldwide. We also highlight education and outreach activities associated with the planned upgrade of the Observatory's detector systems and future physics goals.

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1. Introduction

Education and public outreach (EPO) have been an integral part of the Pierre Auger Observatory since its inception. The collaboration's EPO activities are organized in a separate Education and Outreach Task that was established in 1997. With the Observatory headquarters located in the remote city of Malargüe, population 28,000, early outreach activities, which included public talks, visits to schools, and courses for science teachers and students, were aimed at familiarizing the local population with the science of the Observatory and the presence of the large Collaboration of international scientists in the isolated communities and countryside of Mendoza Province. As an example of the Observatory's integration into local traditions, the Collaboration has participated in the annual Malargüe Day parade since 2001 with collaborators marching behind a large Auger banner (see Fig. 1). Close contact with the community fosters a sense of ownership and being a part of our scientific mission. The Observatory's EPO efforts have been documented in previous ICRC contributions [1, 2]. We report here highlights of recent activities, as well as plans for future activities related to the upgrade of the Observatory.



Figure 1: Auger collaborators participating in the November 2014 Malargüe Day parade.

2. The Auger Visitor Center in Malargüe

The Auger Visitor Center (VC), located in the central office complex in Malargüe, continues to be a popular attraction. Through February 22, 2015, the VC has hosted 93,475 visitors. Fig. 2 shows the integrated number of visitors since Nov. 2001. The noticeable increase of visitors since 2008 occurred after the opening of a nearby planetarium [3] in August of that year. The VC is managed

by a small staff led by an Observatory employee; they share the task of giving presentations and tours to visitors and school groups. The upgrade of the Observatory provides an opportunity to

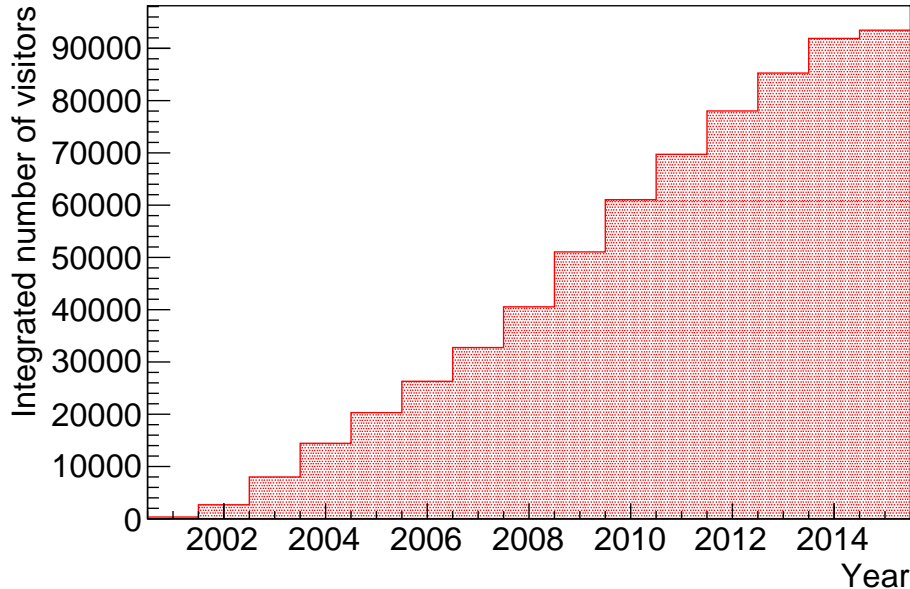


Figure 2: The integrated number of visitors logged at the Auger Visitor Center since 2001.

modernize the local visitor center, and thereby re-inviting people who have seen the Observatory in the past to relive this experience. It shows a genuine interest of the Collaboration to communicate with the people from Malargüe about the science and tools of the Observatory. The modernization of the center will enable visitors to tour the exhibit on their own. Audio and video displays explain the Observatory. Several objects and 3D models will help to understand the different topics. At the same time, the setup of the VC will be flexible enough to allow for lectures to complete school classes. A possible new layout is shown in Fig. 3.

3. The Rural Schools Program and Education Fund

The Rural Schools Program, initiated by the Observatory staff who volunteer their time, continues to bring information about the Observatory and needed infrastructure improvements directly to remote schools that otherwise have difficulty exposing their students to the Observatory. The Rural Schools Program is supported by an Education Fund managed by the Observatory staff who collect voluntary financial contributions from collaborating institutions and individuals.

4. The 2014 Auger Science Fair

The Observatory hosted its fifth biannual Science Fair in the Assembly Building on November 19-21, 2014, as shown in Fig. 4. Thirty-three student teams from all over Mendoza Province, with

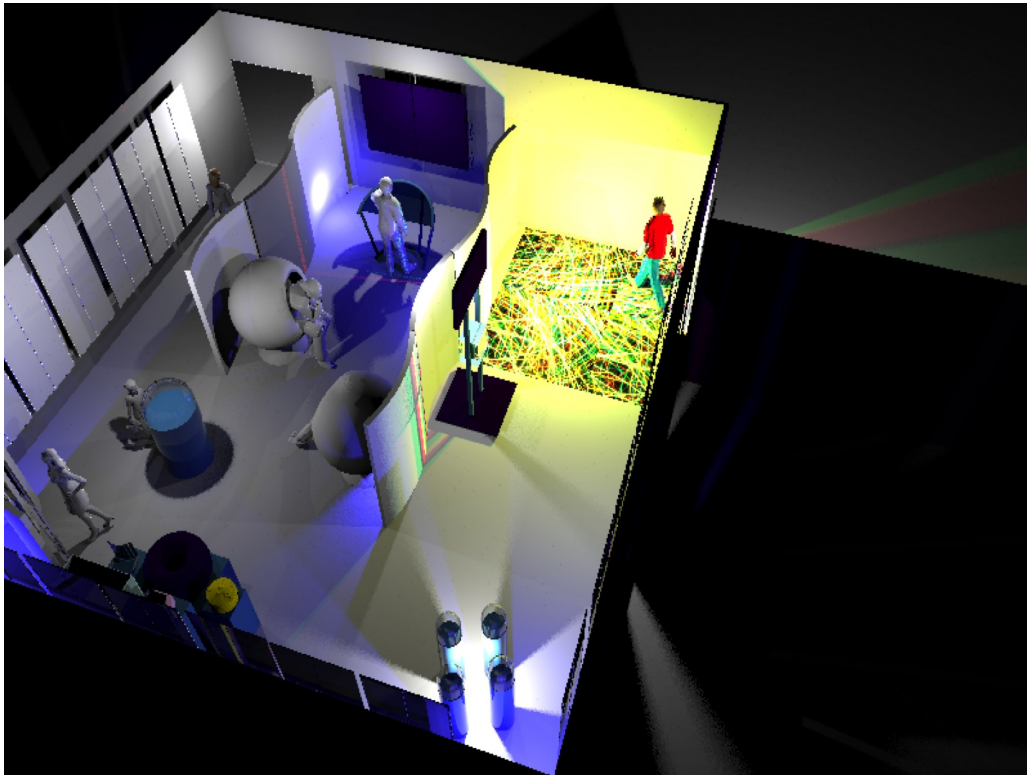


Figure 3: Impression of a possible upgraded Auger Visitor Center in Malargüe.

ages ranging from primary school through high school, presented research projects in the areas of natural science, exact science, and technology. More than 30 Auger collaborators, from different nationalities, and a few invitees served as judges for the student projects. Prizes were awarded to the top teams in several categories in the closing ceremony on November 21. The November 2014 Science Fair owes its success to the Observatory staff, the collaborators who served as judges, the Municipality of Malargüe, the participating teachers and students, and special mention goes to the lead local organizers: Miguel Herrera, Fabian Amaya, and Alicia Piastrellini.



Figure 4: Left: A photo of the 2014 Science Fair. Right: The participants of the Fair.

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5. Public Event Display and Data for Outreach Purposes

The Auger public event display allows the general public to see what information is recorded from an incoming air shower, and grasp the steps involved into obtaining information on the incoming cosmic ray creating this air shower. Until now, 1% of the data has been available for outreach purposes [4]. However, the Collaboration has committed to increasing this fraction to 10% of the data without an upper limit on the event energy. This widens the target group for outreach purposes to include even university students for whom statistical tools and analysis packages such as VISPA [5, 6, 7, 8] are available to handle substantial amounts of data. At the same time, high school students are able to make online selections on the events they would like to see or use for their own purposes thereby reducing the data volume while increasing the number of interesting events substantially with respect to the current situation.

6. Selected Outreach Activities Outside Malargüe

6.1 VISPA

With the VISPA internet platform [5, 6, 7, 8], physics analysis can be performed in a web browser without the need of any software installation. On the start page of the VISPA platform, an overview of different physics examples is presented as shown in the screenshot of Fig. 5. The examples can directly be executed and the analysis code can be modified or extended by the user.

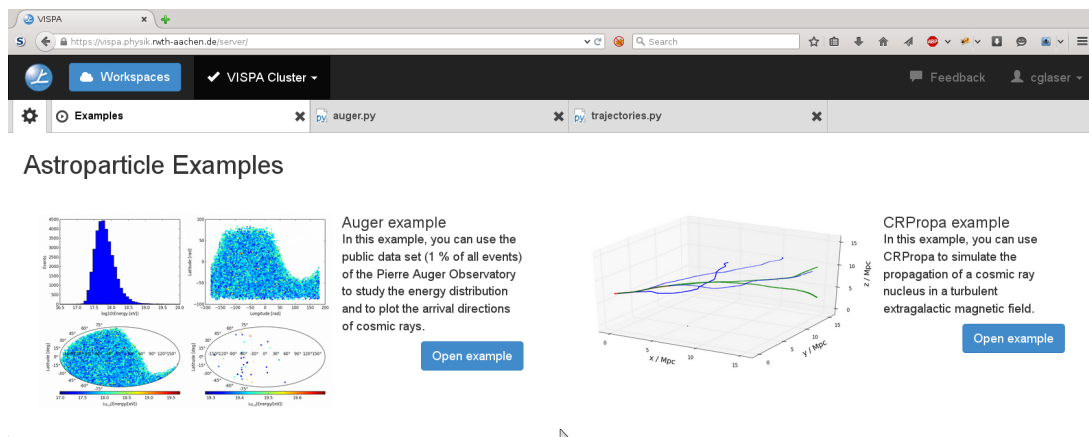


Figure 5: Left: Examples using the Auger public data set. Right: Simulations using the CRPropa package.

In the analysis of the Auger public data set, the energy distribution and the arrival directions of cosmic rays at the highest energies are visualized. Furthermore, the propagation of cosmic rays through the universe can be simulated using the CRPropa software package [9]. It reveals that the propagation of UHECRs is essential to understand the data distributions and to find the sources of cosmic rays.

6.2 Outreach Activities in Argentina

The Pierre Auger Observatory has played a prominent role in temporary exhibits in Mendoza (La Brújula, "The Compass" [10]) and Technopolis in Buenos Aires [11]. These exhibits attract

in total several million visitors, and are important events in Argentina that promote science for the general public. In addition to these temporary exhibits, the Observatory is permanently present in the planetarium in Buenos Aires [12], as can be seen in Fig. 6.



Figure 6: Permanent setup of the Pierre Auger Observatory at the planetarium in Buenos Aires.

6.3 Outreach Activities in Romania

The popular European Space Expo, an initiative of the European Commission, made a stop in Craiova, Romania, April 19-27, 2014 [13], and attracted over 50,000 visitors. The Expo highlights numerous European space programs using interactive touch-screen displays and attractive signage, providing information on space science to the general public in an accessible way. Auger Collaborators from the Institute of Space Science (ISS) in Bucharest have given several presentations about the Pierre Auger Observatory during the Expo's visit, as shown in Fig. 7. Furthermore, this group provided a featured speaker who discussed the Pierre Auger Observatory during the European Researchers Night [14] which takes place each year simultaneously in many European cities. The September 24, 2014, event in Bucharest was held in a public park and attracted hundreds of people.

During the ISS open house event of 2015 [15], which targets young students and teachers who want to learn about the Institute's scientific and education programs, the Pierre Auger Observatory was prominently featured by our collaborators.

These activities have led to several interviews on radio and television about the Observatory and the upgrade plans for the Observatory [16, 17], reaching wide audiences throughout the country. The ISS group recently released an informative YouTube video [18] about the Central Raman Lidar Facility at the Observatory.

7. Conclusions

The Pierre Auger Observatory continues to provide unique education and outreach opportunities which expose people of all ages to the excitement of astroparticle physics. Its Visitor Center,



Figure 7: Romanian collaborator P. Gina Isar speaking about the Pierre Auger Observatory at the European Space Expo in Craiova in April 2014.

Rural Schools Program, and Science Fairs have great local impact near Malargüe, while collaborators around the world ensure that the Observatory's science and successes have international reach. The planned upgrade of the Observatory provides an excellent opportunity to modernize the Visitor Center and discuss the physics of the upgrade on the internet and in outreach events around the globe.

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