

Education and Public Outreach of the Pierre Auger Observatory

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The Auger collaboration's broad mission in education, outreach and public relations is coordinated in a separate task. Its goals are to encourage and support a wide range of outreach efforts that link schools and the public with the Auger scientists and the science of cosmic rays, particle physics, and associated technologies. This report focuses on recent activities and future initiatives.

1. Introduction

The Education and Outreach Task of the Pierre Auger Observatory, established by the collaboration in 1997, has been particularly active for 5 years since major detector construction and installation activities began on the Pampa Amarilla in Mendoza Province, Argentina. The Observatory headquarters are in the remote city of Malargüe, population 20,000. Early outreach activities are described in a previous report [1]. The early activities, which included public talks, visits to schools, and courses for teachers and students, were aimed at familiarizing the local population with the science goals of the Observatory and the presence of the large collaboration of international scientists in the isolated communities and countryside of Mendoza Province. With the assistance of the Malargüe Office of Tourism and municipal authorities, the collaboration has been successful becoming part of the local culture. As an example of the Observatory's integration into local traditions, the collaboration routinely participates in the annual Malargüe Day parade. Figure 1 shows the collaboration marching behind the Observatory banner in the November 2004 parade. This report focuses on recent education, outreach, and public relations efforts.

2. Auger Visitor Center in Malargüe

When the office complex and data-acquisition facility of the Observatory, the Auger Center Building, was constructed in 2000-2001, a 10 m × 12 m room at the entrance was reserved for the Auger Visitor Center (VC). The multi-purpose VC serves as a first stop on a tour of the Auger campus and facilities in the field – the surface detectors (SDs), fluorescence detectors (FDs), and communications towers – but also provides a self-contained visitor experience. A dedication ceremony served to inaugurate the Auger Center Building in November 2001, and over 700 people toured the VC on its opening night. The VC seats up to 50 people and is outfitted with a PC and multimedia equipment to project video presentations led by a collaboration member or a public relations guide. Other displays include a quarter-sized model of an FD mirror set-up (see Figure 2) donated by the Forschungszentrum Karlsruhe, a small model of an SD station, other detector elements, a number of posters mounted on tripods that explain the science and detectors of the Observatory, and a large scrapbook in which news articles about the Observatory are collected. A full-sized SD station is situated at the entrance to the building. Also available is a portable Geiger counter display, designed by electrical engineers at Fermilab, which beeps when cosmic ray muons traverse the Geiger tubes, allowing visitors to witness the omnipresence of cosmic radiation. In addition, there is a small library with science periodicals and books in several languages that visitors can access. The Visitor Center has hosted an increasing stream of visitors of all ages since its opening. A local Observatory staff member, Analía Cáceres, maintains the VC, schedules visits, gives Observatory presentations, and logs visitor statistics. Through the end of May 2005, the VC has hosted over 17,000 people. The majority of visitors are from Argentina (95%) and the remainder come from over 25 countries worldwide. Figure 3 shows students and teachers from Malargüe's Escuela Gendarme Argentino outside the Auger Center Building during their visit to the Observatory in October 2004. The VC web page [2], available in both Spanish and English, affords remote visitors the opportunity to take a virtual tour of the

Observatory. Upcoming enhancements to the VC include professionally produced educational videos about the Observatory aimed at different school levels and animated visualizations of air showers, the latter under development by the COSMUS [3] education/outreach group.

3. *Eureka Science Museum in Mendoza*

The collaboration designed and installed an Auger Observatory exhibit at the *Eureka* museum, a popular hands-on science center in the provincial capital of Mendoza. Exhibit elements are located both inside and outside the museum. Figure 4 shows a full-sized FD mirror set up at museum's entrance with fascinated young visitors. The mirrors, formerly a prototype used at the Los Leones FD building, were donated to *Eureka* by Italy's INFN. Figure 5 shows two prototype SD stations, donated by the Observatory's Mexican groups and outfitted by UTN staff, along with free standing signage. Other exhibit entries include a glass cabinet of Auger electronics, a Geiger counter display which responds to cosmic rays with audible beeps, computers displaying the Auger web site, a number of handsome wall-mounted posters, and Auger brochures for visitors to take. An opening ceremony for the exhibit held in November 2003 attracted a number of dignitaries, including representatives from the Argentine embassies of several collaborating countries and Mendoza government officials.

4. *The James Cronin School in Malargüe*

Emeritus spokesperson Dr. James Cronin has led an effort to secure funding to construct a new building for a secondary school in Malargüe, Escuela 4-190, that presently holds classes in temporary quarters and has an enrollment of about 200 students. The school has been named the James Cronin School of Communication, Art, and Design. The new building is made possible, in part, by a generous donation from the Grainger Foundation in the United States. Located on a site donated by the city of Malargüe, a ground-breaking ceremony was held on February 7, 2005. The 822 m^2 facility is foreseen to be completed by the end of 2005.

5. *Other Recent and Ongoing Efforts*

Each new Observatory structure is inaugurated with a ceremony and media event attended by local and provincial authorities. Most recent was the inauguration of the Los Morados FD building in November 2004. The collaboration continues to offer local students the opportunity to name SD stations. Certificates were awarded to students whose proposed names were accepted in a ceremony in November 2003. Collaborators have also served as mentors to Mendoza Province students preparing science fair exhibits. Collaborators who specialise in teacher training continue to present workshops on the use of hands-on science teaching techniques. As an example, a 2-day workshop was offered by Rebeca López in November 2004 to about 20 Malargüe teachers for grades 1 to 7. Using readily available materials, the teachers developed a number of simple experiments to illustrate a wide range of physics principles. The teachers' experiments were documented in a detailed users manual for use in the classroom. Figure 6 shows workshop participants demonstrating an optics experiment. Public talks and telescope viewings are regularly offered in Malargüe to coincide with astronomical events such as eclipses, the closest approach of Mars in 2003, and the transit of Venus in 2004. The collaboration sponsored a World Year of Physics event in Malargüe by inviting Dr. Raúl Grigera, President of the Physical Society of Argentina, to present a public talk on Einstein's accomplishments in March 2005. Collaborators also mounted a WYP2005 display in the Malargüe Convention Center as shown in Figure 7.

The Auger Observatory was featured at CERN's 50th Anniversary Open Day held in October 2004. Figure 8 shows the Auger display that included tabletop sized SD and FD models, posters, laptops showing Auger images, Argentine flags, Mendoza wines, and brochures in French, English, and Spanish. Several thousand people visited the Auger exhibit and collaborators were on hand to answer questions about the Observatory. The Observatory is also featured in Fermilab's "From Quarks to the Cosmos" display.

6. Upcoming Events

In early November 2005, as the construction of the southern hemisphere site nears completion, the collaboration will host the Auger Celebration, a two-day event whose purpose is to present the experiment to a large number of invited dignitaries. Guests are expected to include representatives from the science funding agencies and Argentine embassies of the collaborating countries, institute and university administrators, media representatives, and other VIPs. The program will include a dedication ceremony, presentations on the science and status of the Observatory, and tours of the vast Observatory site. Following the Celebration, the collaboration will sponsor a Science Fair that will showcase exhibits on a number of science topics prepared by teachers and students from schools in Mendoza Province. Sixty exhibits are foreseen to be mounted in Observatory's large assembly building for a two-day period. The Fair is being organised and publicised by a committee of Malargüe teachers. Observatory scientists will serve as exhibit judges, and prizes will be awarded in a number of topic and age categories.

7. Acknowledgements

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References

- [1] Education and Public Outreach of the Pierre Auger Observatory, G. R. Snow (for the Pierre Auger Observatory Collaboration), Proceedings of the ICRC 2001, Hamburg, Germany, ©Copernicus Gesellschaft.
- [2] See <http://www.auger.org.ar/>
- [3] The COSMUS education and outreach group at the Kavli Institute for Cosmological Physics at the University of Chicago. See <http://astro.uchicago.edu/cosmus/projects/auger/>.



Figure 1. Collaborators in the Malargüe Day parade.



Figure 2. VC manager Analía Cáceres with quarter-sized FD mirror.



Figure 3. Malargüe students visit the Observatory.



Figure 4. FD mirror and visitors at Eureka.



Figure 5. SD stations and signage outside Eureka.



Figure 6. Malargüe teachers at the November 2004 workshop.



Figure 7. World Year of Physics display at the Malargüe Convention Center.



Figure 8. The Auger Observatory display at CERN's 50th Anniversary Open Day.