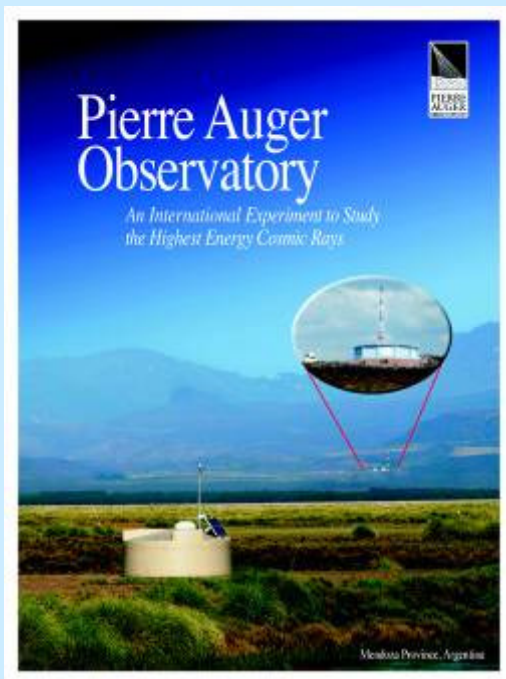
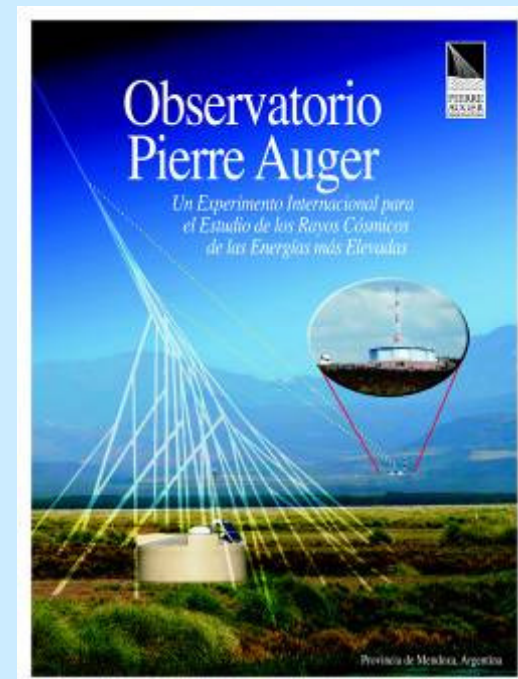




# PIERRE AUGER OBSERVATORY



## Education and Outreach



*Gregory Snow*

*University of Nebraska*

*DPF 2009, Detroit, 28 July 2009*



# Outline

- **Introduction to the Auger Observatory and Goals of the Education and Outreach Task**
- **Efforts in Mendoza Province, Argentina**
  - **Public Lectures**
  - **Building Open House Celebrations**
  - **Science Fairs**
  - **Visitor Center in Office Building**
  - **Relations with Schools and Municipality**
  - ***Eureka* Science Museum in Mendoza**
- **Other Education/Outreach Efforts**
  - ***Galileium* Museum in Teramo, Italy**
  - **Online Resources**
  - **Southern Site Inauguration**
  - **Michigan Technical University Scholarship**
- **Northern site outreach**
- **A few words about CROP in Nebraska**



# The Auger Collaboration

## 67 Institutions, 369 Collaborators

Argentina  
Australia  
Bolivia\*  
Brazil  
Czech Republic  
France  
Germany  
Italy  
Mexico

Netherlands  
Poland  
Portugal  
Slovenia  
Spain  
U.K.  
USA  
Vietnam\*

Argonne  
Case Western  
Colo. School of Mines  
Colo. State  
Fermilab  
Louisiana State  
Michigan Tech

### U.S. Institutions (17)

NYU  
Northeastern  
Ohio State  
Penn State  
UCLA  
Chicago  
**Nebraska**

N. Mex.  
Penn  
Utah  
Wisconsin

\* *associate*



**Alan Watson** **Jim Cronin**



PIERRE  
AUGER  
OBSERVATORY

Auger  
north is  
planned in  
Colorado

# The Pierre Auger Observatory



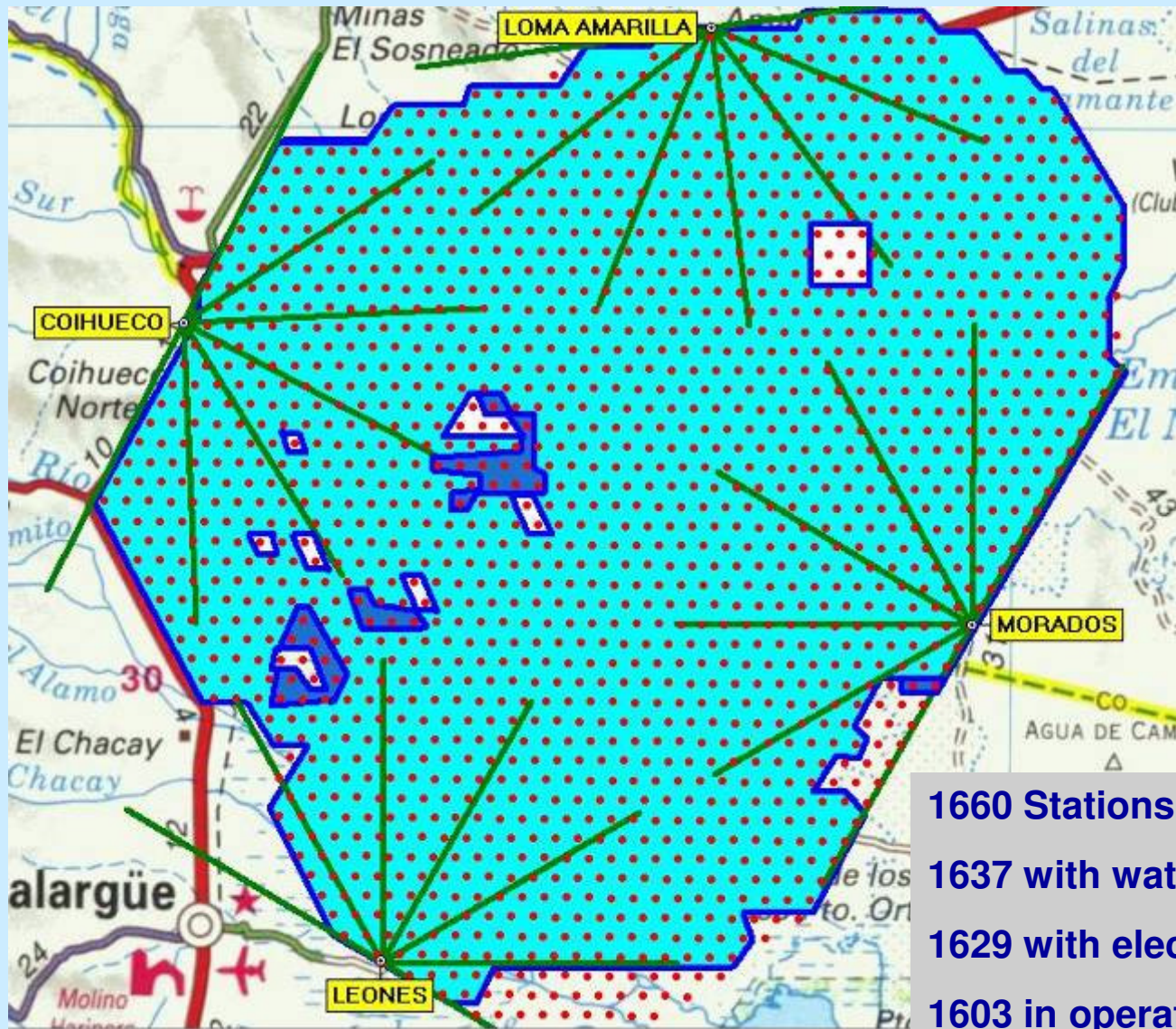
Auger south  
is here.

Malargüe is a small town on the high plains, the foothills of the Andes. **Mendoza Province** is also the wine making region of AR.





# Surface Array (*April 2009*)



1660 Stations in the Field  
1637 with water  
1629 with electronics  
1603 in operation



PIERRE  
AU  
Obs

# Aerial Photos of Fluorescence Buildings November 2006



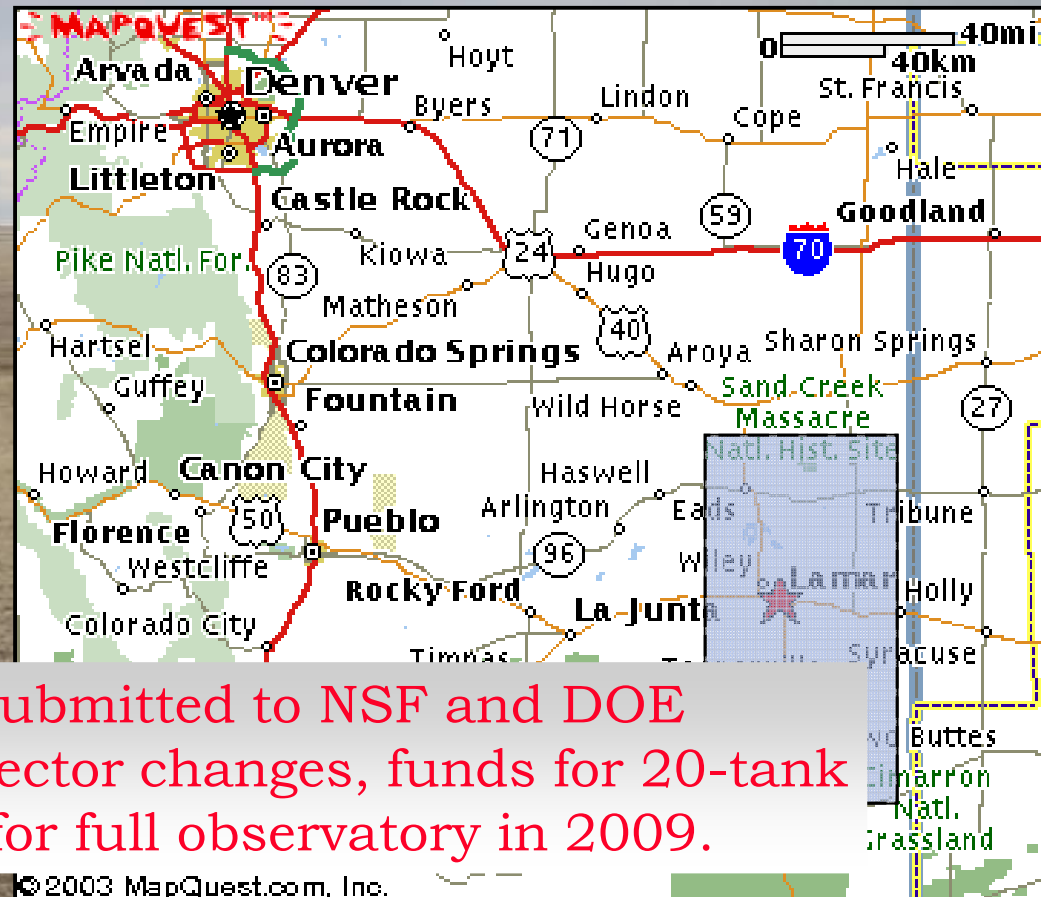
LIDAR  
Enclosure



□  
A

# The Auger Collaboration has chosen the southeast corner of Colorado, near Lamar, as the site for Auger North

- Flat (easy deployment)
- Large area available (>10000 km<sup>2</sup>)
- Altitude & Latitude requirement
- 38° N, 102° 30' W, 1200-1400 m.a.s.l
- Infrastructure available, yet no pollution
- Good atmospheric clarity



Northern site R&D proposal submitted to NSF and DOE in October 2007: R&D for detector changes, funds for 20-tank engineering array. Proposals for full observatory in 2009.



- **Education and Outreach paper and poster presented at each ICRC along with science papers**
- **Example: Łódź, Poland 2 weeks ago**



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 Auger Education and Outreach – G. Snow

## Education and Public Outreach for the Pierre Auger Observatory

G. R. Snow\*, for the Pierre Auger Collaboration<sup>†</sup>

\*University of Nebraska, Lincoln, Nebraska USA

<sup>†</sup>Observatorio Pierre Auger, Av. San Martín Norte 304, (5613) Malargüe, Mendoza, Argentina

**Abstract.** The scale and scope of the physics studied at the Auger Observatory offer significant opportunities for original outreach work. Education, outreach and public relations of the Auger collaboration are coordinated in a separate task whose goals are to encourage and support a wide range of education and outreach efforts that link schools and the public with the Auger scientists and the science of cosmic rays, particle physics, and associated technologies. The presentation will focus on the impact of the collaboration in Mendoza Province, Argentina, as: the Auger Visitor Center in Malargüe that has hosted over 40,000 visitors since 2001, a collaboration-sponsored science fair held on the Observatory campus in November 2007, the Observatory Inauguration in November 2008, public lectures, school visits, and courses for science teachers. A Google-Earth model of the Observatory and animations of extensive air showers have been created for wide public release. As the collaboration prepares its northern hemisphere site proposal, plans for an enhanced outreach program are being developed in parallel and will be described.

**Keywords:** Auger Education and Outreach

### I. INTRODUCTION

Education and public outreach (EPO) have been an integral part of the 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 20,000, 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. The collaboration has been successful becoming part of the local culture. 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). The Observatory's EPO efforts have been documented in previous ICRC contributions [1]. We report here highlights of recent education, outreach, and public relations efforts.



Fig. 1: The Auger collaboration and Science Fair participants in the November 2007 Malargüe Day Parade.

### II. THE AUGER VISITOR CENTER IN MALARGÜE

The Auger Visitor Center (VC), located in the central office complex and data acquisition building in Malargüe, continues to be a popular attraction. Through the end of April 2007, the VC has hosted 43,777 visitors with an average of about 6000 per year. A noticeable increase of visitors occurred after the opening of a new, nearby planetarium [2] in August 2008. Fig. 2 shows the number of visitors logged per year from November 2001 through April 2009. The VC is managed by a small staff led by Observatory employee Analía Cáceres which includes local teacher Miguel Herrera and other Auger collaborators. Fig. 2 shows Auger physicist Julio Rodríguez explaining the Observatory to a visiting school group in the data acquisition center.

Recent exhibits that were field tested at the VC, notably the illuminated scale model of the Observatory developed at the Forschungszentrum Karlsruhe [1] and the Google Earth fly-over animation [3] developed by Stéphane Coutu of Pennsylvania State University, have since been replicated elsewhere. As examples, copies of each display are in the interim Auger North VC at Lamar Community College in Colorado and in a new physics and astrophysics learning center called the Galileum in Teramo, Italy, whose director is Auger collaborator Aurelio Grillo.

### III. THE 2007 AUGER SCIENCE FAIR

Following a successful Science Fair held in November 2005, the Collaboration sponsored a second Fair on November 16-17, 2007, that attracted the exhibition of 40 science projects in the areas of natural science, mathematics, and technology (see Fig. 3), in contrast to





# Goals of the Education/Outreach Task

- **Use the Auger Observatory and international collaboration to enhance science literacy and technology skills in the regions of the Auger sites and internationally**
- **Increase public awareness and support for basic research in physics, astrophysics, and all areas of science**
- **Encourage and support a wide range of education/outreach projects which link schools, community groups, and the public with the science and scientists of the Auger Observatory**
- **Provide technical and non-technical information on Auger to a wide range of audiences – students, public, government officials, scientific colleagues**
- **Recruit and encourage the participation of groups underrepresented in science in Auger education/outreach activities**



# Auger collaborators participating in Malargüe Day parade - a tradition !!



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# Auger collaboration participates in Malargüe Day parades





# Public Lectures in Malargüe



- Nightly science talks given to student and adult groups during collaboration meetings
- Thanks to Office of Tourism for hosting



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# Some nights in Spanish



**Hans spoke Spanish**



**Tere got inspired**



**40 students and teachers in attendance**



**Many collaborators participate**

**Hans: Welcome**

**Beatriz: Physics intro**

**Ingo: SD status**

**Alberto: FD status**

**Tere: Results**

# Some nights in English



**68 people in attendance,  
mostly students of English**

**Question to Alan:  
“What do cosmic rays have to do  
with the origin of the Universe?”**



# Assembly Building Inauguration and Open House, November 2000





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## The Collaboration has sponsored two Science Fairs in its Assembly Building

16 y 17 de Noviembre de 2007

 Segunda  
**Feria de Ciencias**  
Observatorio Pierre Auger

 PIERRE  
AUGER  
OBSERVATORY

**Cs. Naturales, Cs. Exactas y Tecnología**

Tal como en el año 2005, el Observatorio Pierre Auger de Malargüe te convoca a participar, junto a tu profesor, de una experiencia diferente. Tendrás la oportunidad de compartir experiencias junto a científicos de distintos lugares del mundo, conocer la envergadura y la importancia del Observatorio Pierre Auger, compartir con otros alumnos de la provincia y TU profesor será un integrante más del grupo.

Nivel inicial, EGB 1, 2 y 3,  
Polimodal

**... Ya se... ¡ Estás interesado !**

Consultá las bases en tu escuela o contactate a [feria@auger.org.ar](mailto:feria@auger.org.ar)

Poster for advertising



25 student-teachers teams from all over Mendoza Province





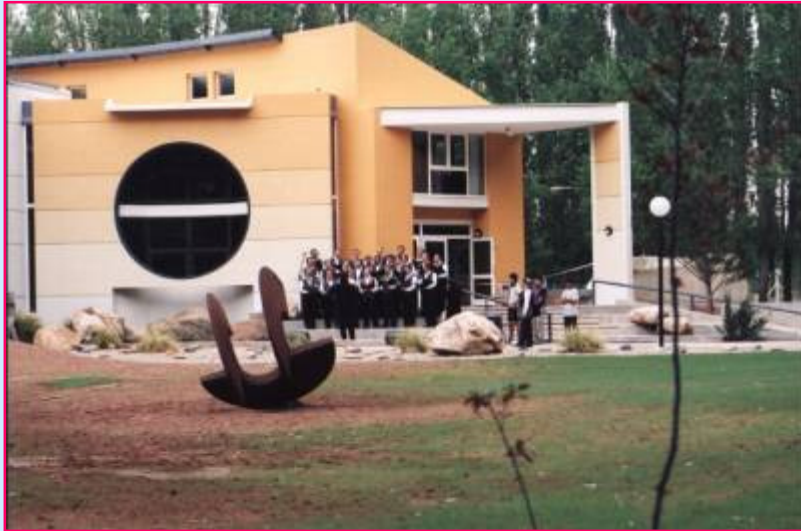
## November 2007 Science Fair drew 42 participating teams



**Jim Cronin with first-place  
team in Technology**



# Auger Center Building Inauguration October 2001





## Visitor Center at Auger Office Building

**Data Acquisition**

**Visitor Center**  
**10 × 12 m<sup>2</sup>**



## Visitor Center at Auger Office Building



**Seats 60 people**



**PC and multimedia  
projection**



**Glass cabinet for  
library and displays**



**Quarter-size FD mirror  
set-up from Karlsruhe**



# Visitor Center Hosts Many School Groups



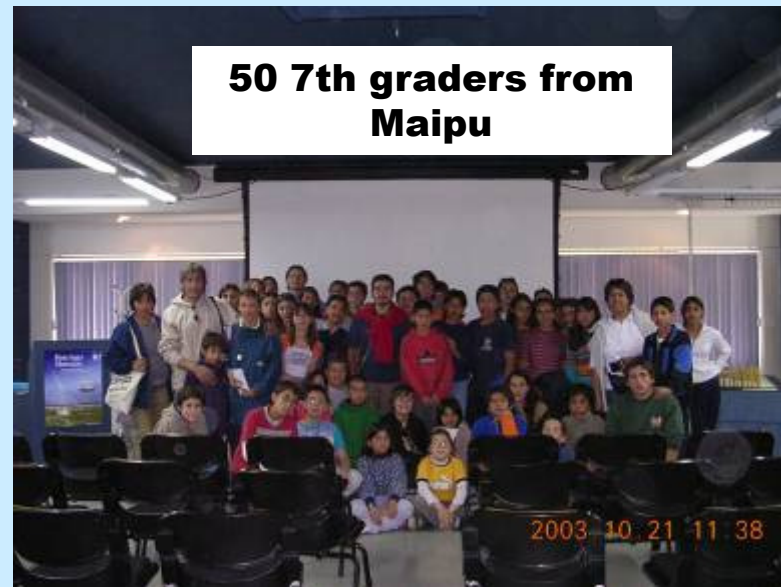
**57 7th graders from  
General Alvear**



**60 elementary students  
from Malargüe**



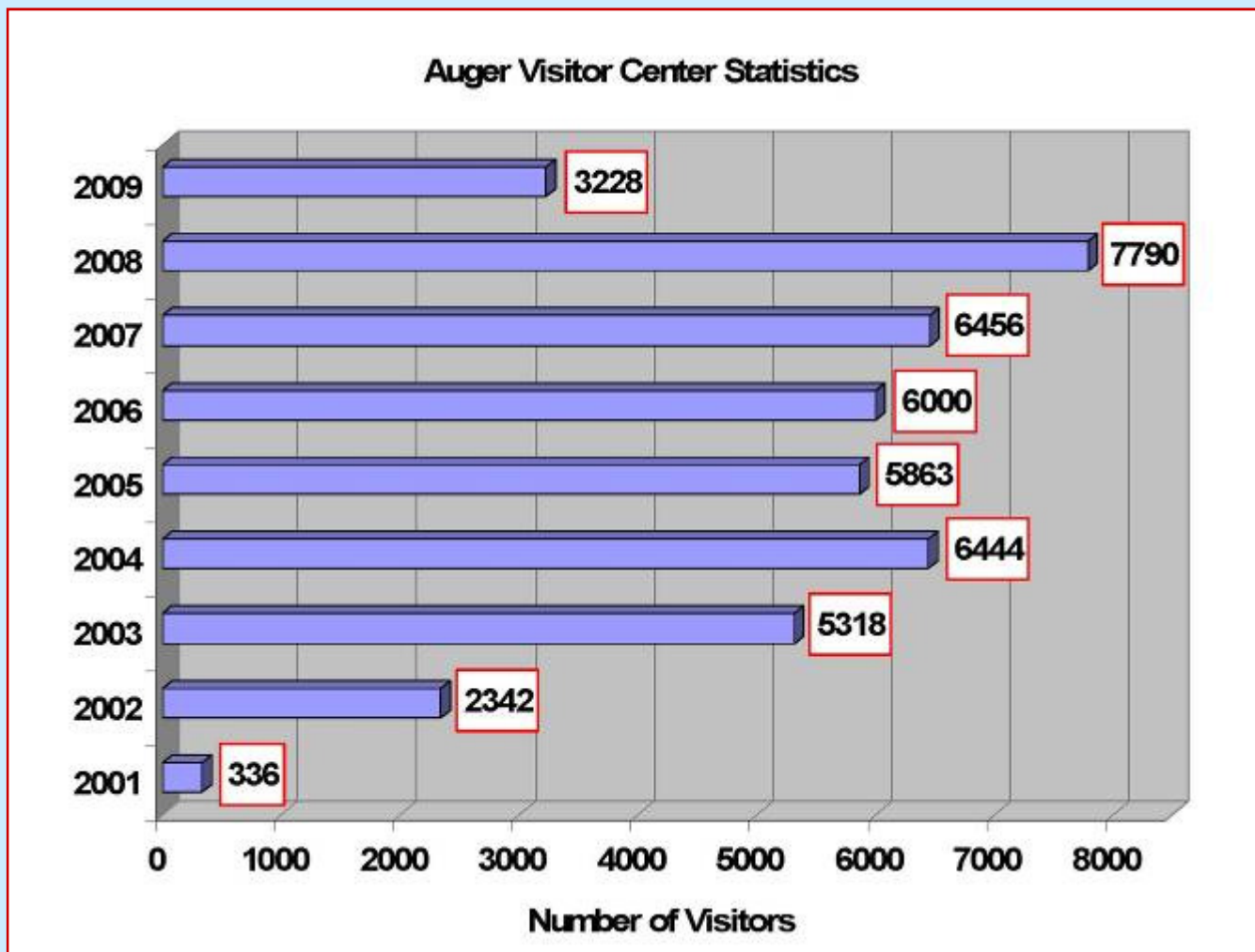
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**50 7th graders from  
Maipu**

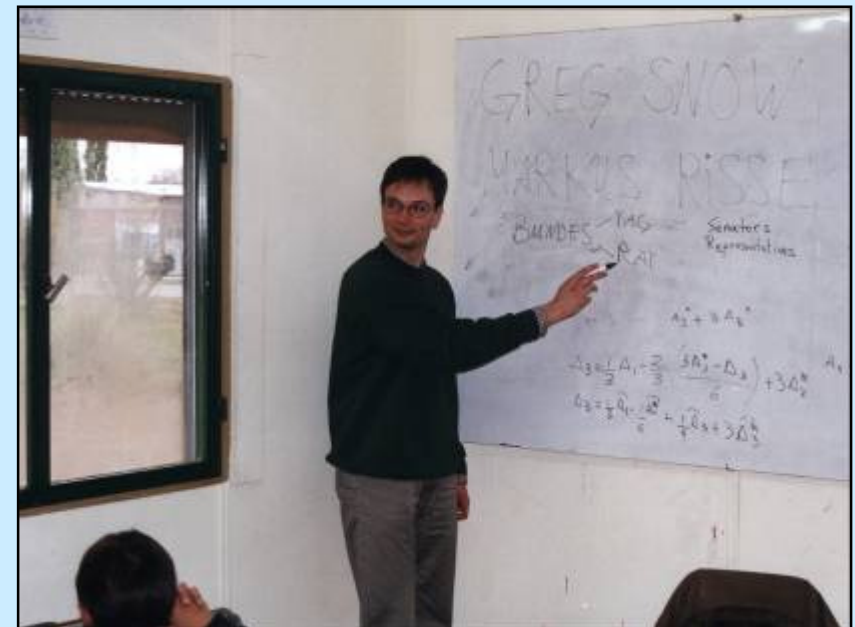


## Visitors logged since 2001 by year



**Over 45,000 total, about 6000 per year**

## Close Contact with Malargüe Schools





## Diplomas for students with names on SD tanks



**November 2003**

- **Tank names solicited from Malargüe students**

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## Forum with Teachers and Students



- **120 participants**
- **8 Auger collaborators**
- **Discussion of future programs requested by teachers and students**
- **Many good ideas: future course topics, coordination with School Board, science fair, ...**



## Collaboration members present frequent **courses for local science teachers**



**Rebeca Lopez (Mexico) explains hands-on optics experiments to Malargüe teachers**



**Rebeca Lopez presenting hands-on course to teachers in General Alvear, 200 km from Malargüe**



**DPF Auge Malargüe teachers demonstrate their own experiments to other teachers**

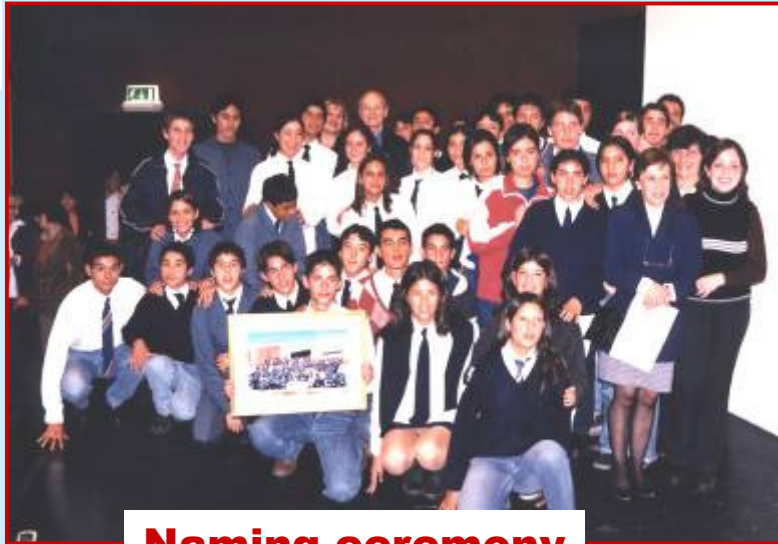


**Beatriz García (UTN Mendoza) presents an astronomy course to Malargüe teachers**



PIERRE  
AUGER  
OBSERVATORY

# The James Cronin School of Communication, Art and Design



**Naming ceremony**



**Visits with students**

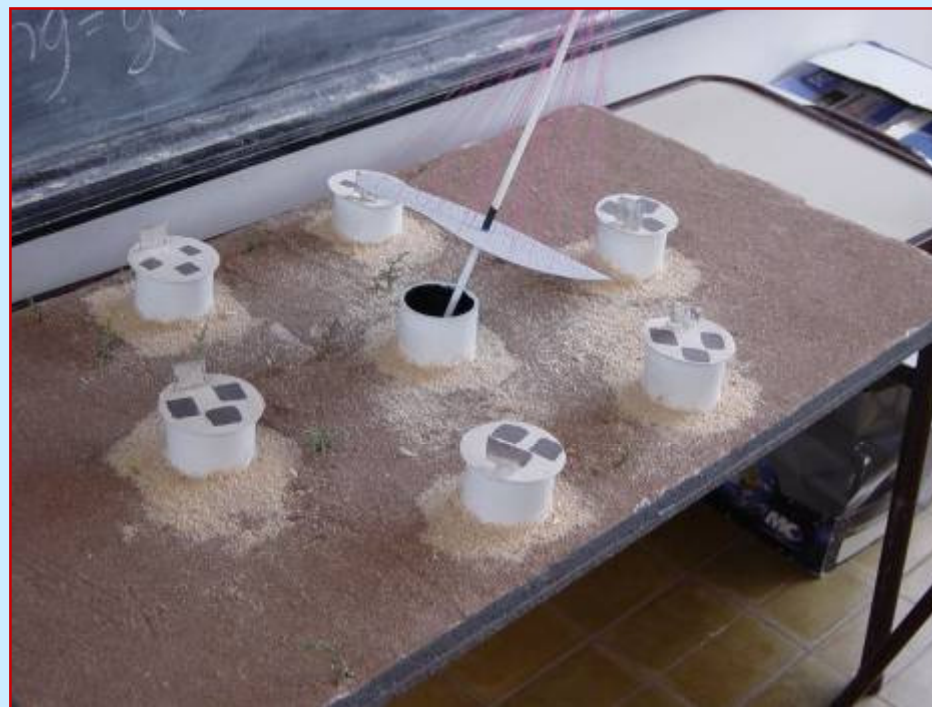


**New building needed  
Funding initiative in  
progress**



**1<sup>st</sup> graduation festival Nov. 2003**

## Collaborators help with local student science projects



**Three students place 11<sup>th</sup> (out of 300) in Mendoza Science Fair with their Auger exhibit and accompanying posters**

# James Cronin School Inauguration

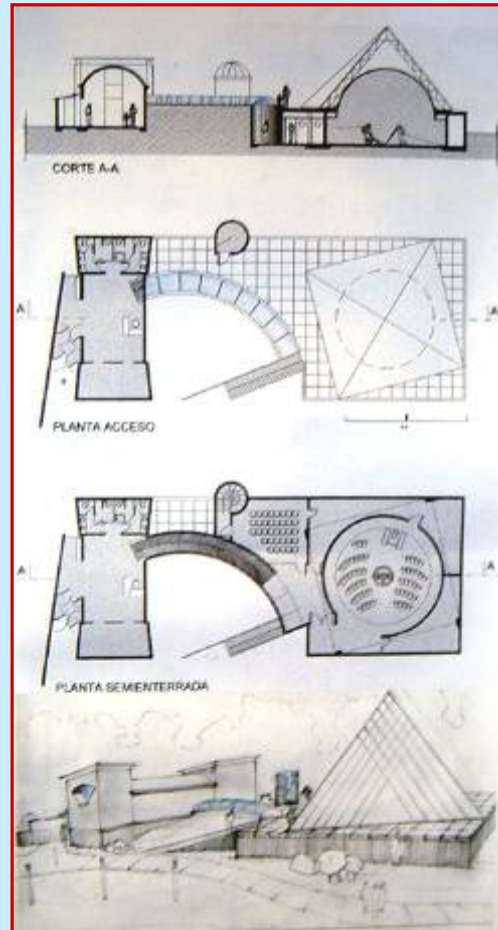


**New school opened  
November 2007**

**Funding from Malargüe,  
Mendoza Province,  
U.S. Grainger Foundation**



## Mendoza Province's only Planetarium in Malargüe



- Auger collaboration and city of Malargüe worked together on the idea of a planetarium

# Press coverage, press releases

CIENCIA PROYECTO

## Malargüe tendrá el primer planetario provincial

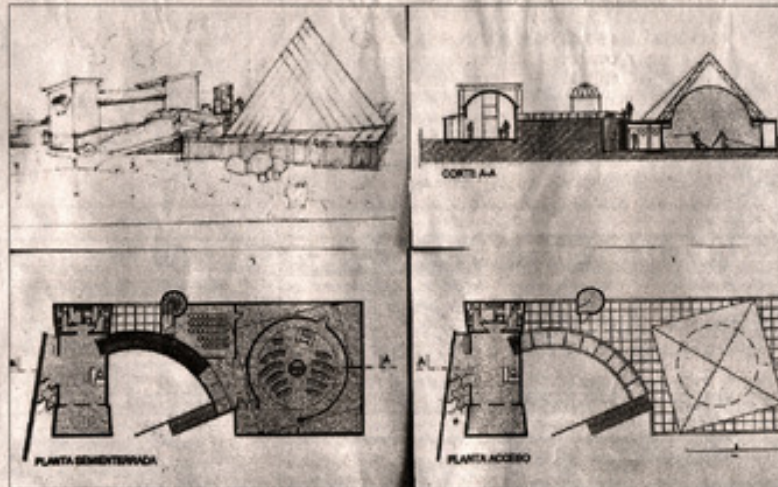
Será el más moderno del país. La Municipalidad dispone de 350 mil pesos para comenzar la obra. Y llegarán más aportes.

WALTER AQUINO  
corresponsalasar@losandes.com.ar

Los malargüinos se entusiasman, porque en pocos meses tendrán el planetario más moderno del país y el primero de Mendoza. En sus flamantes instalaciones científicas, estudiantes, investigadores y el público podrán observar el cielo en forma completa, es decir los hemisferios sur y norte. De esta manera también será más útil que su similar de Palermo (Buenos Aires), que sólo refleja la bóveda celeste del hemisferio austral.

El edificio -contiguo al edificio central del Proyecto Pierre Auger y frente a la dirección municipal de Turismo- tendrá 310 m<sup>2</sup> de superficie cubierta, comenzará a construirse en dos meses y los trabajos terminarán en seis meses.

Se hará en dos etapas bien diferenciadas. Por un lado la obra civil y sus instalaciones complementarias y la restante contendrá la sala de proyección, los complejos equipamientos y las butacas para los espectadores. La estructura estará compuesta por tres cuerpos vinculados: el sector de ingreso, el túnel y el



LA PIRÁMIDE. El proyecto arquitectónico muestra cómo será el planetario malargüino.

domo o sala de proyección.

Según los arquitectos que idearon un pre-proyecto, consiste en montar una pirámide metálica con uno de sus ejes orientado hacia el norte geográfico, que es el sentido de referencia para las investigaciones del Proyecto

Pierre Auger. "Se eligió esta forma volumétrica porque representa el símbolo del conocimiento, la ciencia y las artes de varias civilizaciones antiguas", dijo el intendente Celso Jaque.

A su lado se encontraban destacados científicos internacio-

nales, como el Premio Nobel de Física James Cronin o Alberto Etchegoyen, titular del Observatorio en Argentina, quien dijo "un planetario permite proyectar en su bóveda o techo la esfera celeste, algo imaginario que representa lo que rodea a la

### Esperan más dinero

Ayer también fue un día importante para el financiamiento del Proyecto Pierre Auger. Es que como la comunidad internacional ha cumplido con sus aportes, los científicos esperan lo mismo del gobierno nacional. Por eso se reunieron con la senadora nacional Marita Perceval y con los diputados Arturo Lafalla y Guillermo Amstutz. Los legisladores se comprometieron a acelerar la entrega de las partidas. Antes de junio llegarían 500.000 pesos, es decir un 30% de lo que aportará Argentina.

Tierra. Y en esa ventana al universo se podrán observar la explosión de una supernova, y los cielos en el verano o invierno".

Para el científico, el planetario "irá unido al Pierre Auger y seguramente convertirá a Malargüe en un polo turístico cientí-

fico único en el mundo". Sus palabras tienen fundamento. En el año y medio de vigencia del Observatorio en el departamento, unos 4.000 visitantes pasaron por sus instalaciones e inclusive debieron poner en forma permanente un científico que "haga de guía turístico", explicó.

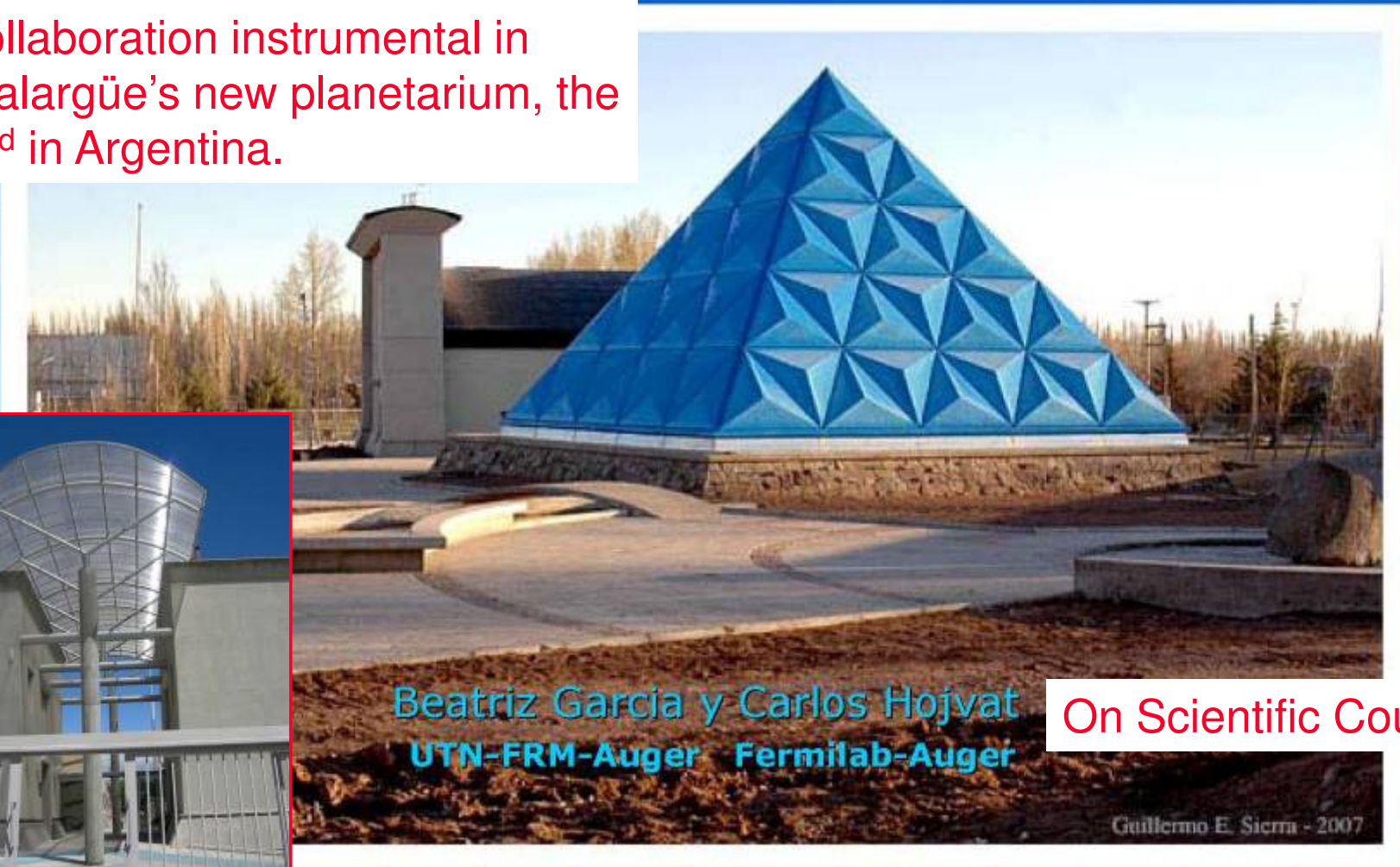
Además el planetario servirá para la capacitación e instrucción de estudiantes de todos los niveles. Por eso el científico Carlos Hojvat apuntó: "Trataremos que sea parte de la currícula y que lleguen alumnos de todas las escuelas de Malargüe, pero también de San Rafael, General Alvear o de otras partes de Mendoza. Nos permitirá integrar a los científicos con la sociedad".

Y para no irse en palabras o anuncios estériles ayer Jaque firmó el proyecto de ordenanza para que le autoricen un aporte de 350.000 pesos, dinero que la comuna ya tiene guardado y que le permitirá comenzar la obra civil. Además con la agrobación de los ediles, la comunidad internacional que colabora con el Proyecto Pierre Auger dispondrá la compra del equipamiento por un monto aproximado a los 250.000 dólares.

# Planetario Malargüe

*Municipalidad de Malargüe*

- Collaboration instrumental in Malargüe's new planetarium, the 2<sup>nd</sup> in Argentina.



Beatriz Garcia y Carlos Hojvat  
UTN-FRM-Auger Fermilab-Auger

On Scientific Council

Guillermo E. Sierra - 2007

Auger Collaboration Meeting, Malargüe,  
November 2007





## **Eureka Science Park in Mendoza Parque de la Ciencia y la Tecnología**



- **Two years of planning and logistics led to the public inauguration of an Auger Observatory exhibit on **November 22, 2003****
- **Outside:** 2 Mexican SD tanks outdoors with explanatory signs
- **Inside:** Italian FD prototype from Los Leones, posters, brochures, PC with interactive activities, small displays



# Eureka Science Museum



- **Mexican prototype SD tanks**
- **Outfitted by UTN, Mendoza, group**

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Auger Education and Outreach – G. Snow





# Eureka Science Museum



**Former Los Leones prototype mirrors donated to Eureka by Torino group/INFN**



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**Children are fascinated by it!**



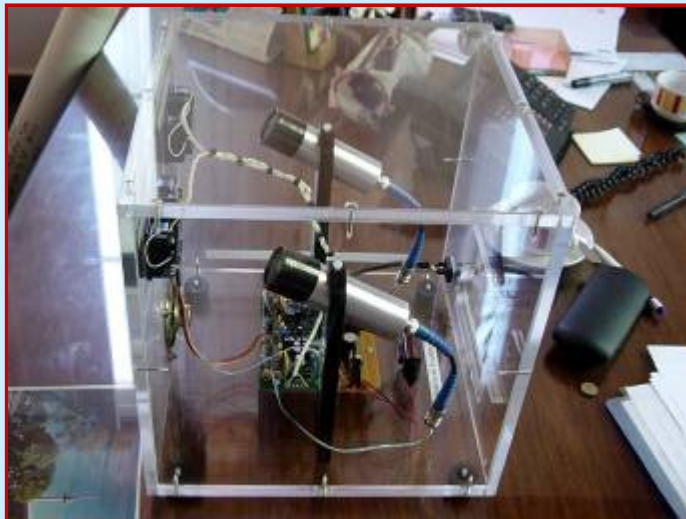
# Eureka Science Museum



**Electronics displays**



**PCs, brochures, posters**

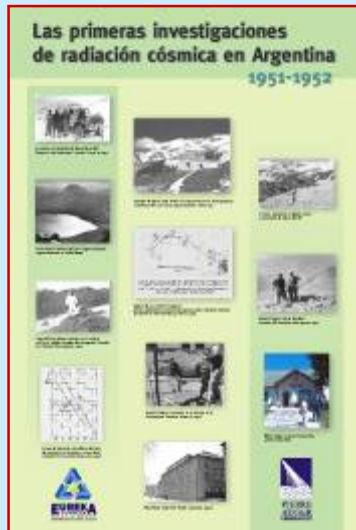
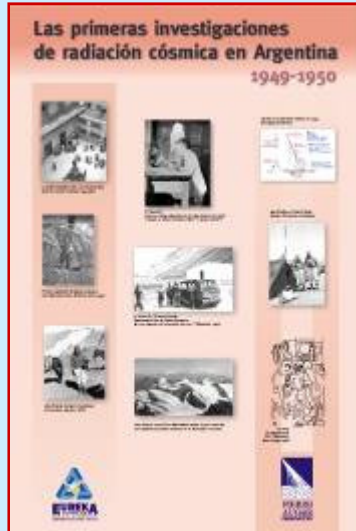


**Beeping Geiger counter display**



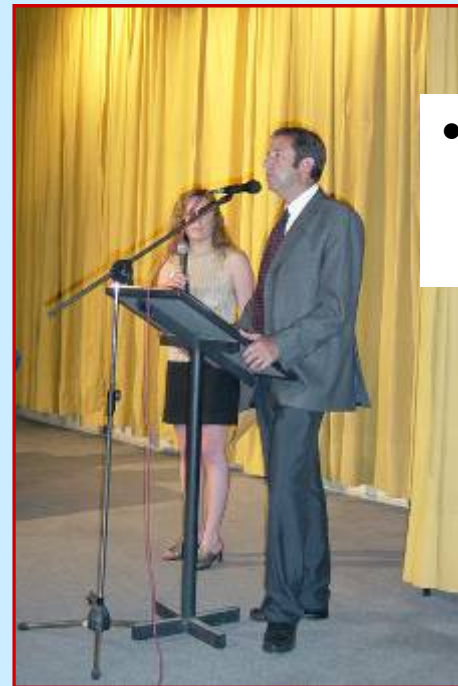


# Eureka Science Museum



## History of cosmic ray physics in Argentina and Auger details

# Auger Exhibit Inauguration



- **Governor elect of Mendoza Province, Ing. Julio Cobos**



- **Press coverage**





# Press coverage, press releases



## Mendoza



Los misterios del Cosmos en una exposición

Para conocer el observatorio de rayos cósmicos más grande del mundo, que está en Mendoza y se llama Pierre Auger, hay que ir a Malargüe. O visitar Eureka, el Parque de la Ciencia que está aquí nomás, en nuestro parque. Allí, chicos y grandes podrán entender el funcionamiento del Cosmos y la meta de una de las investigaciones científicas más ambiciosas del siglo: resolver el enigma de los rayos cósmicos que llegan desde el espacio en forma continua a la Tierra. / PÁGINA 11A

## Eureka exhibit opening

DPF 2009, Detroit, July 28, 2009  
Auger Education and Outreach – G. Snow

**EUREKA**  
PARQUE DE LA CIENCIA

HOY 16 HORAS  
INAUGURAMOS

Exhibición permanente  
"El enigma de los rayos cósmicos"  
Donado por los miembros de la  
Colaboración Internacional del  
Observatorio Pierre Auger

Se mira...  
Se toca... Se aprende

HORARIO DE VISITAS: Miércoles a Viernes de 9 a 16:30 hs.  
Sábado, Domingo y Feriados 10:30 a 17:30 hs.  
Unibuu s/r - Parque Gral. San Martín - Telefax: 4253688-4253756-4250335  
eureka@inet.com.ar

CENCIA RAYOS CÓSMICOS

### La creación del Universo, en lenguaje infantil

El observatorio Pierre Auger abrió un stand en Eureka para divulgar conocimientos físicos. 20 científicos en la presentación.

50 puestos de trabajo en Malargüe

Hay en la Universidad Tecnológica Nacional, se llama el observatorio de rayos cósmicos que va a construir el observatorio de rayos cósmicos en Malargüe. Hay se firma el contrato, después del Estado a Malargüe. Participaron: varias empresas y la gran Carrefour. La construcción va a demorar 18 meses de plazo y está en marcha "Además, en este trabajo se consiguieron la construcción de 50 puestos de trabajo en la Plata de y el centro. El gobierno de Malargüe está interesado en el tema".

La UTN continúa realizando la construcción de los puestos de trabajo en Malargüe. El gobernador de Malargüe, Carlos Cascaño, y el intendente de Malargüe, Carlos Cascaño, participaron en la inauguración del stand en Eureka. También la señora El...

AL IMPORTE: El científico argentino Daniel Cascaño (derecha) y un colega extranjero, durante la presentación de Auger en Eureka.

Los chicos van a poder ver un prototipo interactivo de un stand de los rayos cósmicos de este tipo de sectores. Por ahora no hay un prototipo interactivo, solo se va a hacer un prototipo interactivo de los rayos cósmicos en el stand, en Malargüe, en el mes de agosto, en Malargüe en el mes de agosto de este año.

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**Sóper telesección:** Los del observatorio de rayos cósmicos de Malargüe.



**Aurelio Grillo presented the “Galileium”  
A museum for Astroparticle Physics in Teramo, Italy  
Opened May 6, 2008**

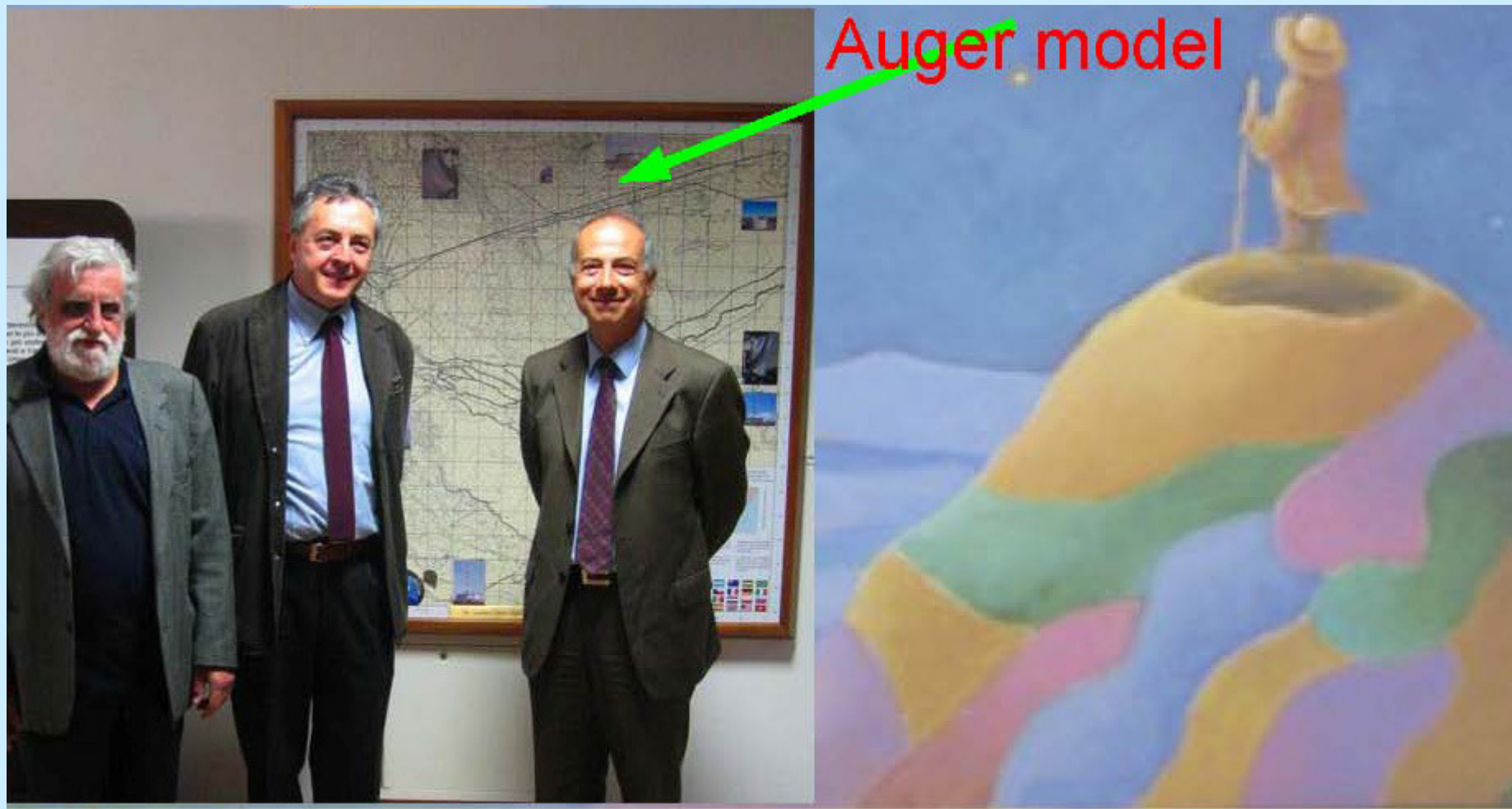


**Two large spaces in  
The Science Park**





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A museum for Astroparticle Physics in Teramo, Italy  
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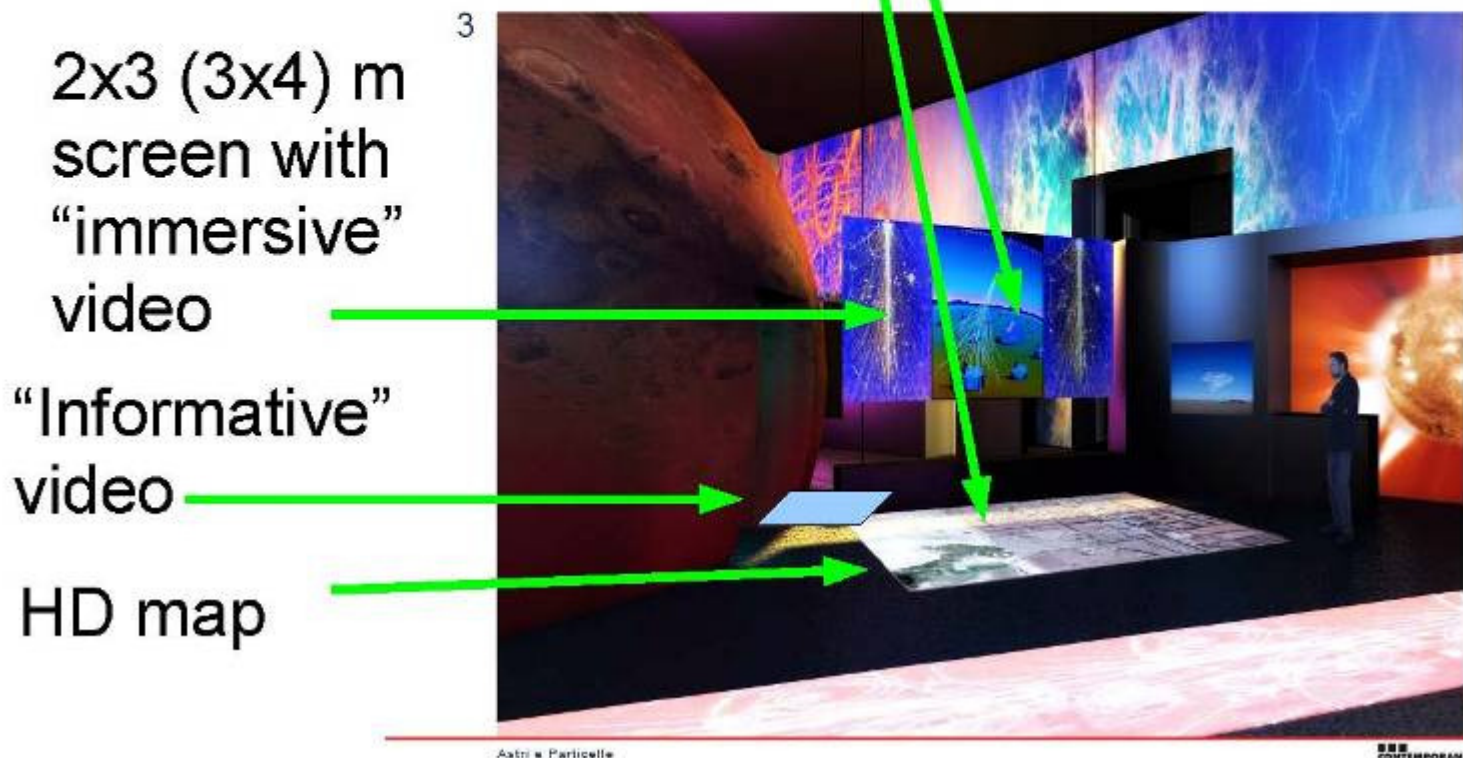


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Auger Education and Outreach – G. Snow



## Report from Aurelio Grillo

An important space is dedicated to the Pierre Auger Observatory





# Press coverage, press releases

EL OBSERVATORIO DE RAYOS CÓSMICOS PIERRE AUGER

## Desde Malargüe hasta el origen del Universo

El sur de Mendoza fue elegido para montar el observatorio de rayos cósmicos más grande del mundo y avanzar en el estudio del cosmos. Allí, alrededor de 250 científicos de 15 países junto a lugareños y universitarios, buscan saber qué son, de dónde vienen, por qué tienen tanta energía y qué origina esas partículas, que bombardean la Tierra en forma continua. **Por PAOLA BRUNO - FOTOS PABLO BERTHICOURT - INFORMACIÓN CLAUDIA SAAYESDA**

**Rumbos Magazine  
(Los Andes)**

DOMINGO 7 de febrero de 2009  
Año 111 N.º 1111  
Precio de venta \$1.000

# Los Andes

Presupuesto: la mitad del aumento que quiere Cobos irá a gastos de personal

**El gobernador electo asumirá el jueves y pretende destinar 120 millones al pago del adicional por antigüedad y su retroactivo, además de tickets para los estibados.**

Tras la elección, Iglesias busca protagonismo en el Congreso

**La UCR en el país de los picaros**

**El Beto Acosta gritó su gol 300 y le dijo adiós al fútbol**

**San Martín perdió e Instituto es el campeón**

**Cada 9 días le hacen un juicio a una escuela**

**Anabel, la Reina que viaja en micro y piensa trabajar en política**

**Kirchner: "Gran Bretaña tiene que pedir disculpas"**

**Hay que desjudicializar la vida de los mendocinos**

**El Beto Acosta gritó su gol 300 y le dijo adiós al fútbol**

**San Martín perdió e Instituto es el campeón**

**Cada 9 días le hacen un juicio a una escuela**

**Anabel, la Reina que viaja en micro y piensa trabajar en política**

**Kirchner: "Gran Bretaña tiene que pedir disculpas"**

**Hay que desjudicializar la vida de los mendocinos**

DPF 2009, Detroit, July 28, 2009  
Auger Education and Outreach – G. Snow



# Press coverage, press releases



December 2003



Louisiana State, Jim Matthews  
January 2004

## Professors, students part of effort to learn about cosmic rays

The mention of Argentina conjures any number of exotic or dramatic images ...  
Eva Peron ... dancing the tango ...  
gauchos riding the plains ...  
falling high-energy cosmic rays .....

*Auger Observatory becomes world's largest air shower array*

### Tracking Down Cosmic Rays

by Kurt Riesselmann

The Pierre Auger Observatory, under construction in Argentina, became the largest cosmic ray air shower array in the world with the completion of its one hundredth surface detector in October. Managed by Fermilab, the Pierre Auger project so far encompasses a 70-square-mile array of detectors that are tracking the most violent and perhaps most puzzling processes in the entire universe.

Cosmic rays are extraterrestrial particles—usually protons or heavier ions—that hit the Earth's atmosphere and create cascades of secondary particles. While cosmic rays approach the earth at a range of energies, scientists long believed that their energy could not exceed  $10^{20}$  electron volts, some 100 million times the proton energy achievable in Fermilab's Tevatron, the most powerful particle accelerator in the world. But recent experiments in Japan and Utah have detected a few such ultrahigh energy cosmic rays, raising questions about what extraordinary events in the universe could have produced them.

"How does nature create the conditions to accelerate a tiny particle to such an energy?" asked Alan Watson, physics professor at the University of Leeds, UK, and spokesperson for the Pierre Auger collaboration of 250 scientists from 14 countries. "Tracking these ultrahigh-energy particles back to their sources will answer that question."

Scientific theory can account for the sources of low- and medium-energy cosmic rays, but the origin of these rare high-energy cosmic rays remains a mystery. To identify the cosmic mechanisms that produce microscopic particles at macroscopic energy, the Pierre Auger collaboration is installing an array that will ultimately comprise 1,600 surface detectors in an area of the Argentine Pampa Amarilla the size of Rhode Island, near the town of Malargüe, about 600 miles west of Buenos Aires. The first 100 detectors are already surveying the southern sky.

"These highest-energy cosmic rays are messengers from the extreme universe," said Nobel Prize winner Jim Cronin, of the University of Chicago, who conceived the Auger experiment together with Watson. "They represent a great opportunity for discoveries."

The highest-energy cosmic rays are extremely rare, hitting the Earth's atmosphere about once per year per square mile. When complete in 2005, the Pierre Auger observatory will cover approximately 1,200 square miles (3,000 square kilometers), allowing scientists to catch many of these events. □

ON THE WEB:  
Pierre Auger Observatory  
[www.auger.org](http://www.auger.org)

FERMINEWS December 2003 | 13



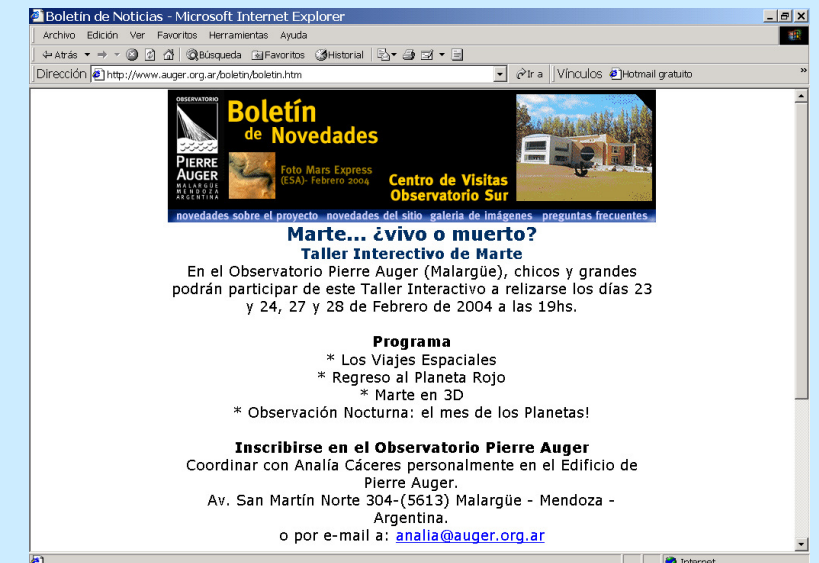
# Visitor Center Web Site



Home page



News postings



Monthly news and events E-mail bulletin



# Google Earth Model of the Observatory

**Auger South in Argentina  
3D images of Observatory  
buildings and detectors**



**Auger North  
footprint of array  
and detector locations**





# Release of event information to public

- 30 October 2007
- 5 languages
- Wikipedia links
- Google site statistics

**Öffentlicher Ereignis-Betrachter**

Herzlich Willkommen beim öffentlichen Ereignis-Betrachter des Pierre Auger Observatoriums.

Die Pierre Auger-Kollaboration hat beschlossen, 1% der Daten öffentlich verfügbar zu machen. Auf dieser Webseite, die täglich aktualisiert wird, können die seit 2004 gesammelten Ereignisse angezeigt werden.

Sie können eine Ereignisnummer (ID) im Suchfenster eingeben, das Menü "Ereignis-Selektion" benutzen oder ein Ereignis anschauen, das schon im Cache geladen ist. Zum Abspeichern auf dem eigenen Computer steht eine [ascii\\_Datei](#) mit allen Ereignissen zur Verfügung.

Der aktuelle Datensatz besteht aus 7446 Ereignissen mit Energien zwischen 0 EeV und 41.1 EeV. Das letzte Ereignis hat die ID [4156500](#) und der Zeitpunkt der Messung war Nov 05 2007 04:01:34, UTC Time.

**Ereignisse im Zwischenspeicher**

Die 3 meistbetrachteten Ereignisse

000001234800    000004128900    000004044700

Pierre Auger Observatorium  
Öffentlicher Ereignis-Betrachter

**Pierre Auger Observatorium  
Ereignis-Betrachter**

**Ereignis-Selektion**

	Min	Max
Anzahl Stationen	5	
Zenitwinkel	0	60
Energie (EeV)	5	

Sortiert: Datum (rückwärts) ▼

Zeige 10 ▼ Ereignisse

Suchen

Gehe zu Ereignis 1234800

Impressum  
astro.uni-wuppertal

DPF 2009, Detroit, July 28, 2009  
**Auger Education and Outreach – G. Snow**

**Xavier Bertou, et al.**

S. Coutu, C. Lachaud, P.L. Ghia, P. Mantsch,  
M. Mostafa, J. Rautenberg, M. Risse, P. Sommers



# Using Auger data released to public



**Lamar, Colorado, high school students win regional science fair**

DPF 2009, Detroit, July 28, 2009  
Auger Education and Outreach – G. Snow





# Inauguration, November 2008



**Over 200 dignitaries  
attended from all over  
the world**

**Mendoza Province Governor  
Celso Jacque (left)**



**Judy!**



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# Inauguration, November 2008



**Argentina Vice President  
Julio Cobos (right)**

**“Asado” with  
traditional dancers and  
music**



# Inauguration, November 2008



**Robert Aymar  
then CERN director**



**Pier Oddone  
Fermilab director**



# Michigan Technological University Scholarship



- **One student from Malargüe supported for 4-year program every other year**
- **Tuition, room and board, fees covered**
- **Students selected by Malargüe's school principals and mayor**
- **1<sup>st</sup> student enrolled Autumn 2001**
- **Angelo Chialva graduates May 2004**
- **Mechanical engineering**
- **2<sup>nd</sup> student enrolled Autumn 2003**
- **Emanuel Marinaro**
- **Biomedical engineering**
- **5<sup>th</sup> student to start in the Autumn 2009**

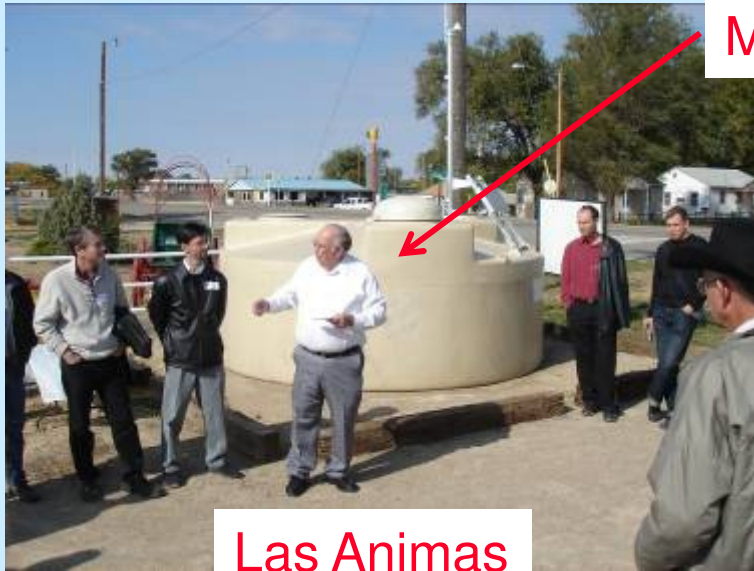


**Dave Nitz and Angelo Chialva at MTU**

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## Colorado Tank Naming Ceremonies, October 27, 2007



Las Animas



Lamar



Local students submitted name suggestions





## Interim Visitor Center at Lamar Community College Library



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## Lamar Days Parade on Saturday, May 10, 2008



# The Cosmic Ray Observatory Project (CROP) in Nebraska



<http://crop.unl.edu>



09, Detroit, July 28, 2009  
Education and Outreach – G. Snow





# CROP article in Lincoln Journal Star, 7 August 2003



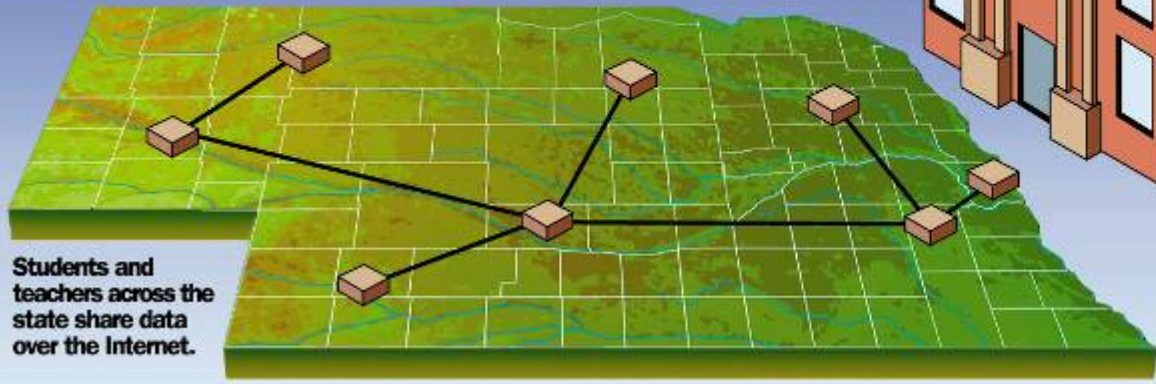
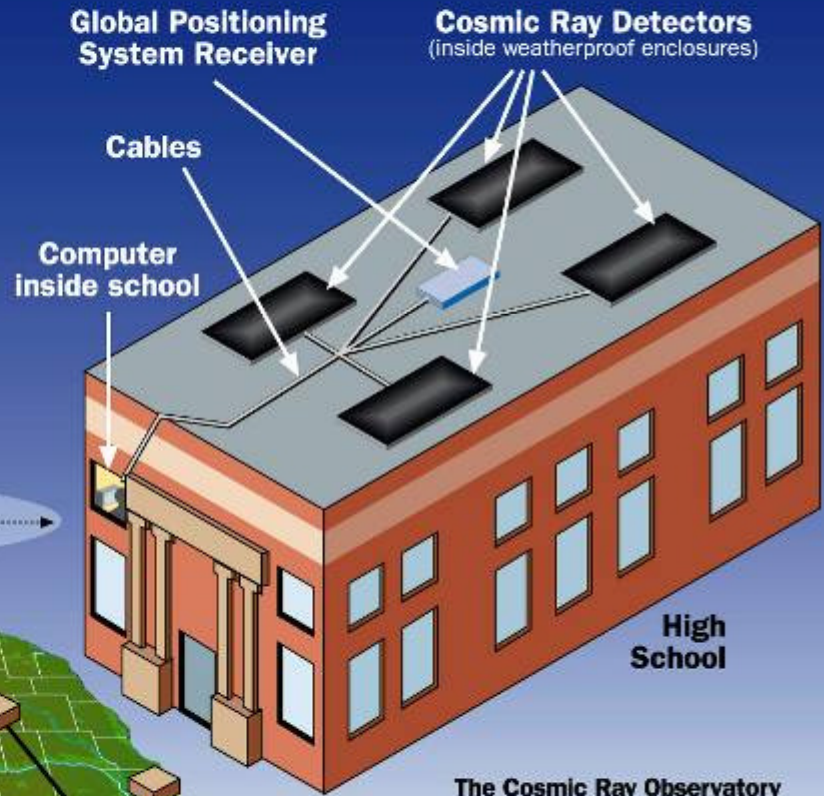
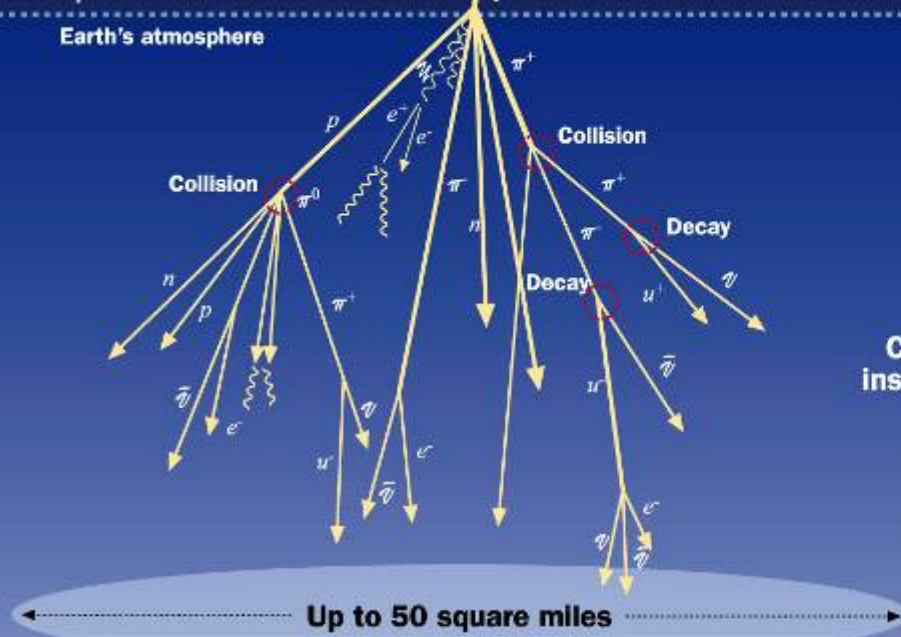
PIE  
AUG  
OBSERV

## Cosmic Rays

Space  
Earth's atmosphere

Primary proton

Cosmic rays are energetic particles that originate from outer space. When they collide with air molecules in the atmosphere, they create an avalanche of subatomic particles. A single one can create a shower that covers an area of up to 50 square miles. The size of the shower varies with the energy of the original particle.



Students and teachers across the state share data over the Internet.

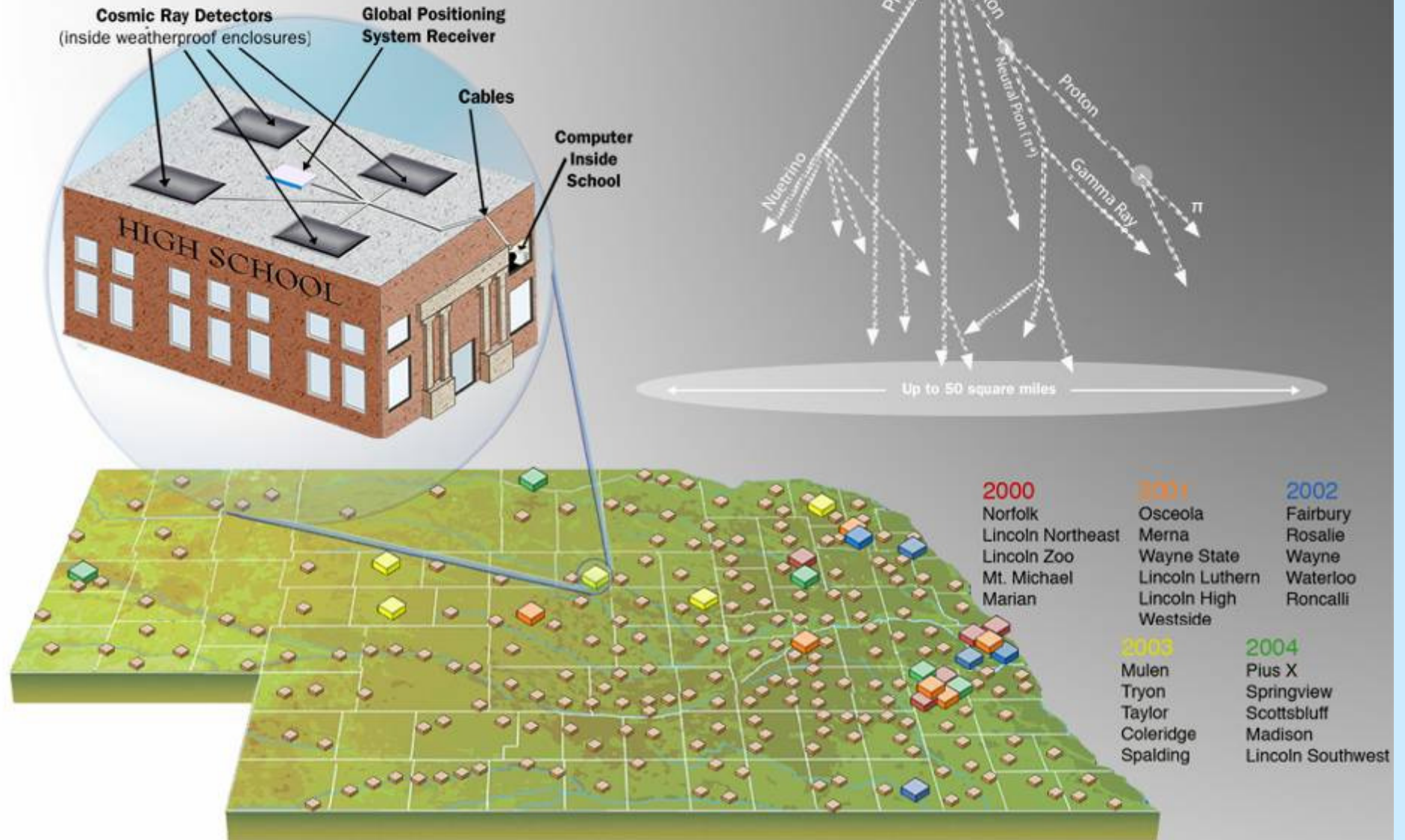
The Cosmic Ray Observatory Project, started by physicists at the University of Nebraska-Lincoln, aims to put cosmic ray detectors on high school rooftops across the state and collect data through a computer network.



## A few facts

- Funded by \$1.34 Million NSF grant, 2000-2007
- Co-PIs Greg Snow and Dan Claes
- **26 Nebraska** and **5 Colorado** schools enlisted and trained in summer workshops of duration 2-4 weeks, about 5 new schools per summer
- Venture into Colorado was a joint effort by **CROP, WALTA, ALTA**
- Hosted 2 one-day meetings each academic year for participants from all years to report results, exchange faulty equipment, receive equipment and software upgrades, refresh training or train new students
- **External evaluation** of this period has shown that CROP has accomplished most of its educational and scientific goals listed in the original proposal
- CROP has also served as a great training ground for staff (undergrad, grad students) at UNL

# Highlighted squares = participating schools





PIERRE  
AUGER  
OBSERVATORY



# The Chicago Air Shower Array



- **CROP uses retired detectors from the Chicago Air Shower Array**
- **1089 boxes each with:**
  - **4 scintillators and photomultiplier tubes (PMT)**
  - **1 high voltage and 1 low voltage power supply**
- **Two removal trips (September 1999, May 2001) yielded over 2000 scintillator panels, 2000 PMTs, 500 low and power supplies**



PIERRE  
AUGER  
OBSERVATORY



## The CROP team at Chicago Air Shower Array (CASA) site



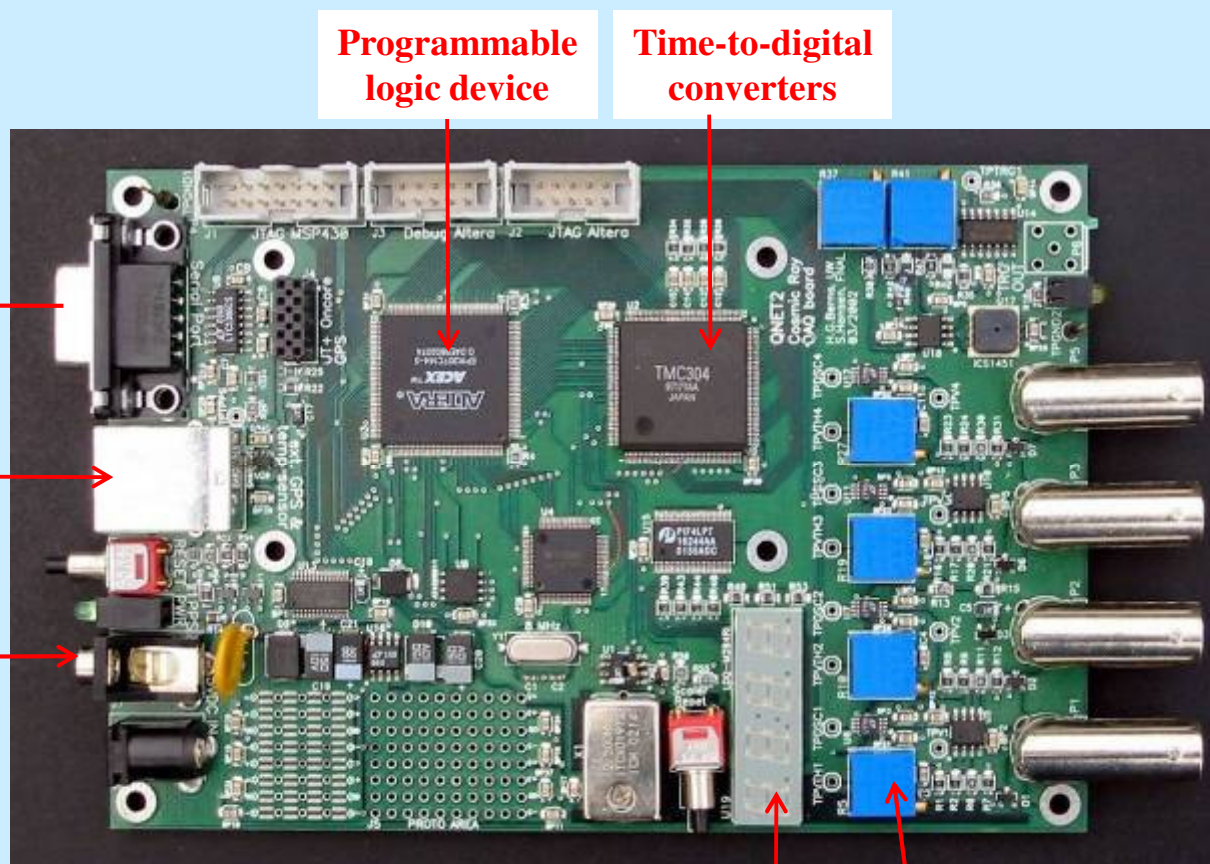
DPF 2009, Detroit, July  
Auger Education and C  
U.S. Army Photo

September 30,  
1999



# CROP data acquisition electronics card

Developed by Univ. Nebraska, Univ. Washington, Fermilab (Quarknet)



Programmable logic device

Time-to-digital converters

To PC serial port

GPS receiver input

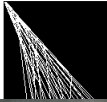
5 Volt DC power

Four analog PMT inputs

Event counter

Discriminator threshold adjust

- 43 Mhz (24 nsec) clock interpolates between 1 pps GPS ticks for trigger time
- TDC's give relative times of 4 inputs with 75 picosecond resolution



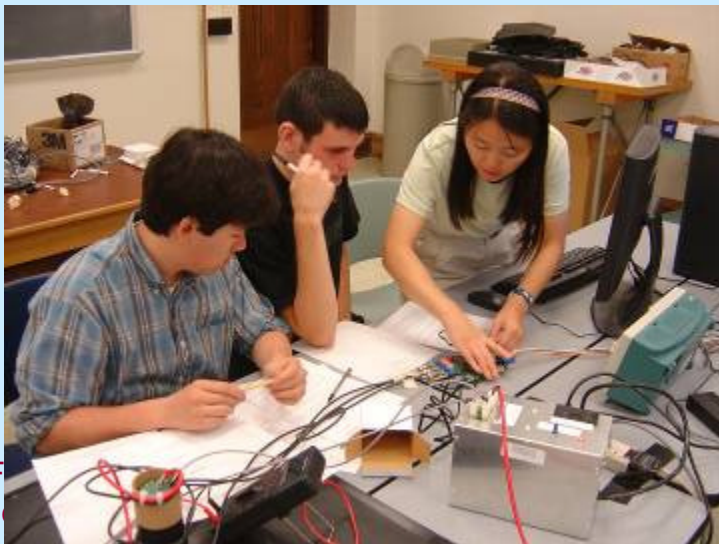
## Summer 2004 Workshop Activities Detector assembly and testing



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## Summer 2004 Workshop Activities Oscilloscope and DAQ card lessons



DPF  
Aug



# Each school made new rooftop enclosures



PI  
AU  
Obs



DPF 2  
Auge

# Excellent extensive air shower data taking run overnight





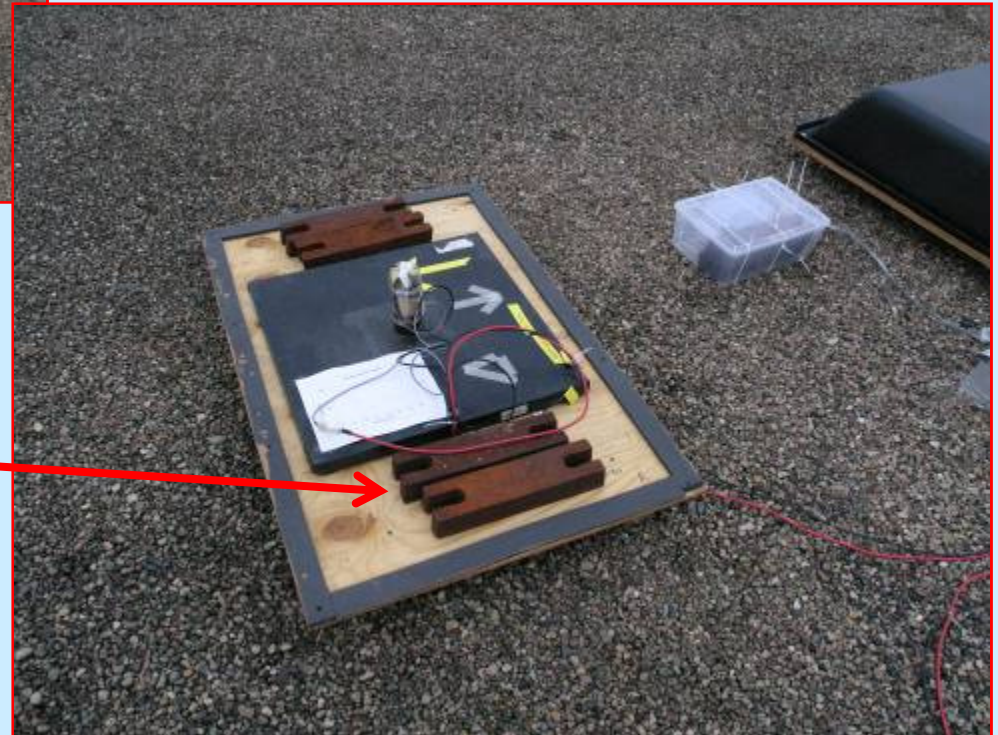
PIERRE  
A  
O

# New enclosures making it to rooftops



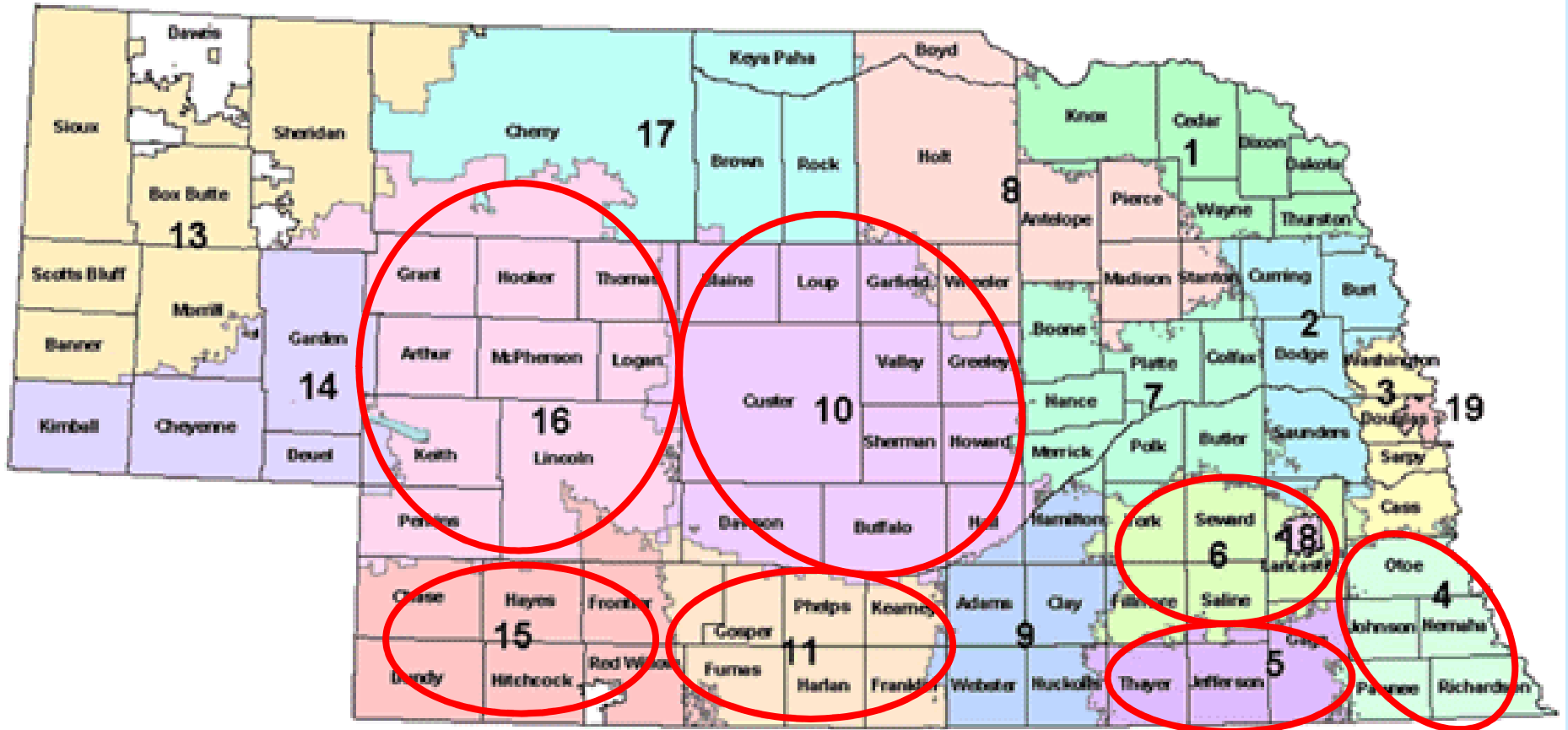
Westside High School  
Omaha, NE

Weights, important !!





## Submitted NSF GK-12 renewal proposal late summer 2009



- Main thrust: statewide growth to ~100 schools + continuous data-taking and analysis
- State schools administered through 19 Educational Service Units
- Present schools serve as “hubs” for expansion in each ESU
- Train through regional workshops, 2-3 per summer



# NALTA

## The North American Large-Scale Time-Coincidence Array



<http://csr.phys.ualberta.ca/nalta/>

- Includes links to individual project Web pages

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## Sites in The Netherlands

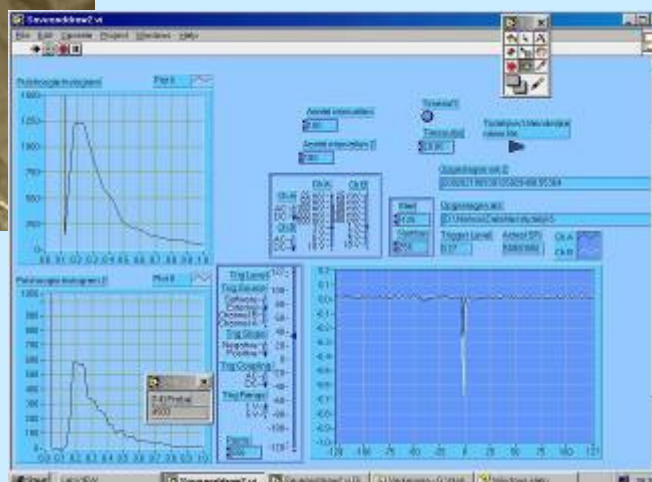


[www.hisparc.nl](http://www.hisparc.nl)



At present: **5 clusters in NL, with national project manager**  
Groningen, Utrecht, Nijmegen, Leiden, Amsterdam  
(each with their own leader)

# Sites in The Netherlands



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# Sites in The Netherlands



## Car top ski racks!

Present price per school:  
6500 Euros  
(20% cost is scintillator)

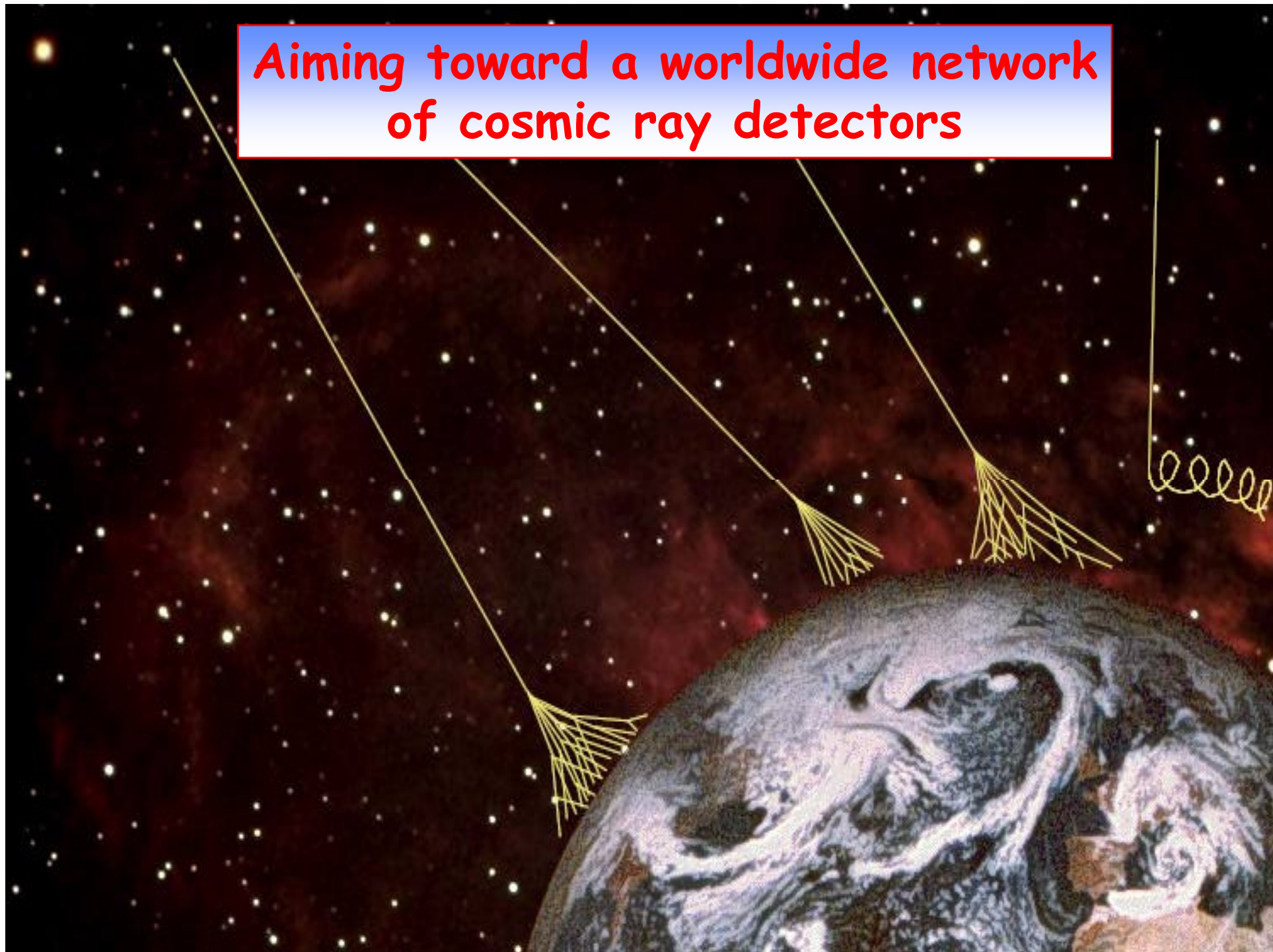
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GPS  
antennas



**Aiming toward a worldwide network  
of cosmic ray detectors**





# Conclusions

- **Outreach in the local community and beyond has been instrumental to the success of the Auger Observatory**
- **Celebrate your science and accomplishments publically !**
- **High school cosmic ray physics adds an extra dimension to science education and complements large experiments**