

**Pierre Auger Project
Progress Report
April, 2001**

Summary

[Link to photo album \(link\)](#)

First light at Los Leones! The first showers recorded by the fluorescence detector! On May 18 the first fluorescence telescope was exposed to the night sky for the first time as the shutters on bay 4 of the fluorescence building at Los Leones were rolled back. The star images at the focal plane showed the expected resolution. The filter and correct lens are in place. . All but one of the 440 photomultipliers responded when the camera was first powered up. The data system also seems works well. Shake out of the systems is underway as the fluorescence folks wait for the rain to stop.

The installation of photomultiplier tubes, electronics and radios on the 40 tank array is moving forward. Updated versions of the front end board are on the way to the site to be joined with the detector processor boards being readied for installation.

The Auger Comms group has installed and commissioned the site wide voice communications system. With a repeater on the campus tower reliable contact among the deployment crews and the central station is assured. This system will greatly increase the safety and efficiency of work in the field.

The Auger Center building is progressing well as can be seen in the photos. The location and orientation of the Coihueco fluorescence building has been established. The Los Leones building has permanent power and the Detector Assembly Building has heat!

Now that much of the EA work is behind us the time has come to begin planning for construction of the full observatory. A Critical Design Review of some surface detector components is planned for July and another for the fluorescence detectors in August. Other reviews are planned before the end of the year. The Critical Design Reviews will validate observatory component designs for production.

Fluorescence Detector

1.1 Fluorescence Detector Installation (Matthias Kleifges, Jonny Kleinfeller, Sasha Menshikov, Paolo Privitera, Guillermo Sequeiros, Primo Vitale)

STATUS OF COMPONENTS

APERTURE

All the components of the aperture are in place. The shutter was Operated both manually and through slow control.

MIRRORS

All mirrors are in place and aligned. Mirrors were uncovered without damage.

CAMERA

When unpacking the PMTs we found several of them with broken soldering of the wires used for keeping the PCB together. They were repaired. The Camera was mounted by Wednesday 16. After putting HV on we found a PMT with a short between HV and ground at the PMT HE. The final alignment in the bay with respect to the reference point was performed.

HV-LV

It is working. We have setted up a control of the HV from the EyePc.

CALIBRATION

A calibration light fiber is positioned at the centre of the mirror. It was tested that light was coming out of the fiber. The HAM equipment is also there since the Collaboration meeting.

SLOW CONTROL

The hardware work for bay 4 is completed as well as most of bay 5. Software programming is in progress.

INTERNET CONNECTION

An account fdshift on the dpa1 computer has been activated, to be used for interface of fd people on duty to the external world. Soon we should have access to outside world directly from Los Leones.

STATUS OF INTEGRATION

MIRROR-CAMERA

A measurement of the spot size on the focal surface was performed on Friday 18. We observed with a CCD camera (thanks to Brian!) the image of bright Stars on a screen positioned at the focal radius. The image diameter is close to the nominal one (1.5 cm) expected for point source. The measurement was performed with 1.7 m aperture (corrector ring masked out) and filter out.

CAMERA-ELECTRONICS

The commissioning is following closely the Rome test procedure. We have optimized the grounding and noise. The noise is now practically the same as observed in Rome. We have tested the PMT units with the calibration lamp and external trigger. We see nice FADC traces from the light flashes. We found an additional bad channel. The problem is in the Head electronics, most probably the driver. We are also running with Second Level trigger and optimization of threshold. The trigger rate with 100 Hz single pixel trigger and 20 us coincidence is around 1 Hz. We could observe cosmic rays passing through the Camera PMTs triggered by the SLT. Currently we are using the test program for DAQ in Win/NT environment. The integration of final Linux DAQ will start in the next two weeks.

Up to now the commissioning is on schedule, and we expect to open the shutters and have a look at the sky in the forecoming days (if weather is good).

1.1.1.2.1.5 -- FD external shutters (Henryk Wilczynski - Krakow)

The Bay_5 shutter was installed on Los Leones building. The Bay_4 shutter, mechanically installed previously, was connected to the slow control system and can now be operated under software control.

1.1.3.1.3.2 Horizontal Attenuation Monitor (Brian Fick, Paul Sommers - Utah)

During the Malargue meeting and the following two weeks we finished the installation of the first Horizontal Attenuation Monitor (HAM). A solar panel was added to the lamp setup atop Coihueco. The lamp is set to come on for three one-half-hour periods during the course of a night. The lamp intensity, voltage, and temperature are being automatically monitored and stored every minute. At Los Leones we made some modifications to the ccd camera receiving system. We installed a new enclosure for the computer and electronics next to the present camera enclosure. We added bracing to the camera enclosure to eliminate wind induced vibrations. We successfully networked the HAM1

computer. We attempted to calibrate the system using the mobile monitor but were thwarted by bad weather. For the next month, until we visit the site again in June, the lamp will cycle and ccd camera will record data automatically to disk. The data is unreachable from outside the firewall so we will have to wait until our upcoming visit to see how reliably the system has performed.

1.1.3.1.4.1 Vertical Flasher (Brian Fick, Paul Sommers - Utah)

The first vertical flasher has been readied for transport to Malargue. It is a xenon flashlamp with collimating optics and a timer with GPS clock to flash on the GPS second at any prescribed time interval. The plan is to deploy it in the latter part of June. Probably it will NOT be set vertically, but positioned so that it crosses the camera diagonally at nearly constant distance from Los Leones. Selecting a site for the flasher requires consideration of access and permission as well as what is desirable for monitoring the FD. A customs waiver has been obtained for importing the flasher into Argentina.

A hand-held collimated xenon flasher was assembled by Mike Roberts (New Mexico), and we have sent it to Malargue for immediate use in making artificial tracks for the FD prototype.

1.1.3.1.4.2 Laserscope (Brian Fick, Paul Sommers - Utah)

We expect to send the Utah Laserscope to Malargue in early June. It consists of a 7-mJ YAG 355nm laser on an alt/az telescope mount. The system can be moved to any desired location and laser pulses directed to any specified direction with pulses emitted on the GPS second. Each pulse energy is monitored. The purpose of the laserscope is to test the sensitivity of the FD trigger and the precision of track reconstruction. If the first FD prototype is fully operational, laserscope tests can be done in the latter part of June.

1.1.3.2.3.7 Mobile lidar (Brian Fick, Paul Sommers - Utah)

Our mobile lidar system has been reconfigured. It now uses a heavy-duty 12-inch telescope mount and tripod with motorized go-to drives. The laser and lidar receiver are mounted on a common platform, with steering mirrors displacing the laser beam from the receiver axis by nearly one meter. The DAQ is the same as reported in GAP-2001-012. We plan to test the system

thoroughly in Utah before sending it to Malargue, and we expect the tests to be useful for refining lidar analysis techniques.

1.3.4 Star Photometry Atmospheric Monitor (Dave Nitz - MTU)

All major components for the star monitor are in hand. After the recent meeting in Malargue, we explored with John Matthews and Jonny Kleinfeller the options for location and type of mounting of the star monitor and the control computer. The current plan is to mount the star monitor on a free standing mount on the western end of the calibration platform, and situate the control computer at the western end of the computer room.

Fabrication of a mounting pedestal which will bolt to the calibration platform has begun in our machine shop. If possible this will be placed over the cable entry hole. The base of the pedestal will then make a watertight seal, and the cables will run up through the center of the pedestal.

A suitable data cable has been identified, and we will be passing on the necessary hole dimensions shortly.

Surface Detector

2.2.2.2.1 Tube Base Preproduction Run (Tiina Suomijärvi for IPN-Orsay - Torino/INFN)

Base design:

Bases have been designed for the new Hamamatsu and Photonis tubes. The design will be adapted to the new ETL tubes. 4 Hamamatsu R5912 Mod PMTs have been received in Orsay and are ready to be tested with the new bases (2 of them will be shipped to Torino).

HV modules:

Administration procedures for the pre-production and production of the high voltage supplies are in progress (IPN-Orsay). 10 companies have replied to the tender call. Specifications will be sent to these companies for bidding and prototypes.

Test bench :

The specification of the automated test procedures for the production and the associated test equipment is in progress.

2.3.1.1.3 Trigger ASIC (Dave Nitz - MTU)

60 trigger boards with Apex 200K PLDs and external memory have been constructed. Of these 15 are Rev 1 boards and 45 are Rev 2 boards. All but a few have passed preliminary testing at MTU and have been sent to LSU for final testing. This completes our planned production of this configuration of the trigger board.

25 phase 1 trigger are due to arrive at MTU next week. A test rig to make the initial evaluation of the chips has been assembled and the first version of the test rig software is ready.

Work is proceeding on the phase2/3 ASIC coding and layout.

Central Data Acquisition

4.0 CDAS installation (Xavier Bertou)

A demo of the CDAS has been done during the Malargue meeting with a real local station. Currently, we are taking monitoring data from Laura, the tank near the assembly building.

The complete chain from the local station to the mirroring sites has been tested with junk data send by the local station. We are now confident that all our software (Pm - postmaster -, Mo, MoR, MoRI - monitoring stuff -, Ct - central trigger -, Eb - event builder -) is ready for data taking, and that these data can be mirrored in Fermilab.

A copy of the CDAS has been installed in CBPF, Rio de Janeiro, with the help of people from Rio and Campinas. The system is the same as the one we have in Paris and allows for a complete simulation of the CDAS, as well as development. We expect this collaboration with Brazil to allow us to have more CDAS operators soon on the site, and to do part of the development. We expect Laudo to come in Paris 15th of June and to do a CDAS shift in Malargue until end of June, and people from Campinas to come in July or August to help us. The CDAS would therefore have a permanent presence on the site from now on until at least end of August.

As it is impossible to connect from the outside to the private LAN of the CDAS and to Los Leones, people wanting to get things from the inside must have running software locally that exports the data to their labs. A web page giving help in the process is on the web site of the CDAS in Malargue (<http://www.auger.org.ar/CDAS/>).

Site Development

6.0 Site Development (Ingo Allekotte - Instituto Balseiro)

The location and orientation of the Coihueco building and comms tower have been defined at the beginning of May 2001.

A survey of the array around the "Central Eye" has been undertaken on May 5th: good gravel roads crossing the northern central part of the array were found, the location of the central eye was found to be well accessible (although the area might be flooded in July-August).

An "official" map of the full array was created. A file containing the positions of the 1600 tanks (and such that they respect the official border of the array and overlap well with the EA positions) is available under www.cabtep5.cnea.gov.ar/particulas/ingo/surveyindex.htm