

Pierre Auger Project

Progress Report

July 2000

Progress Report Summary

The construction of the fluorescence detector building at Los Leones and the assembly building at the central campus is moving along well. The Los Leones building is a little behind schedule because of the weather and its remote location. Progress on these buildings can be seen in the photos contained in this month's Photo Album.

(http://www.auger.org/admin/Reports/photos_july00.html). The power lines to Los Leones have a small unfinished section along the route because standing water. A portable generator is being used at Los Leones so that construction is not affected. Construction of the communications tower and the associated electronics shelter at the Central Campus has started and should be complete by the third week in September.

Bids have been received for the water purification plant to be located at the central campus. A vendor will be selected by August 25. Raw material for the next 18 Cerenkov tanks has arrived in Rio. The first of these tanks should appear at the site near the first of October.

An extended sunflower test of the fluorescence detector electronics was carried out at Karlsruhe and was reported to be very successful. A 100 channel test is scheduled to start on 9th of September in Rome.

The Fluorescence Detector Group just completed a productive meeting in Liebenzell, near Karlsruhe. Important technical issues were resolved, orphan tasks distributed and plans for commissioning discussed.

Importation and customs remain our most critical problem for the Engineering Array. There is no news on the customs waiver. Only one small shipment, some weather stations, has cleared the donation process. The hope is now that equipment can be imported by way of UNESCO. This mechanism, however, is not yet in place. We are shipping items only essential to starting the Engineering Array and are paying the customs charges.

Plans are being made for a concerted installation effort both for the forty tank array and the first fluorescence beginning in September.

Fluorescence Detector

1.1.3.1.1 Fluorescence Detector Optical Calibration System (John Matthews-University of New Mexico)

The recent work is on the monitoring hardware and software for the optical calibration light source(s) continued. This will be reported at the August FD Workshop in Bad Liebenzell.

The total expenses on WBS 1.1.3.1.1 actually DECREASED this month as one purchase order was canceled.

This will be reported at the August FD Workshop in Bad Liebenzell.

1.1.3.1.1.3 Star Photometry Atmospheric Monitor (Dave Nitz-Michigan Technological University)

CCD lens have been ordered. Lens has arrived; CCD due in 2 weeks. CCD was supposed to be here, but Apogee factory had a production problem.

UBVRI filters are on hand.

Current work, while awaiting the camera, is on web development, data transfer protocols. We've also acquired extensive catalogs of standard stars, and are entering several hundred of appropriate magnitude and angular distribution into excel/digital format. Other software efforts underway include precession, heliocentric correction, for determination of coordinate transformations from RA and Dec to alt/azimuth in the x, y CCD image.

A new PostDoc, Dolores (Marilo) Perez Ramirez arrived at the end of July. She will be spending 1/3 of her time on the Auger star photometry atmospheric monitor.

1.1.3.1.1.3 Atmospheric Monitoring (John Matthews-University of New Mexico)

A second prototype light source was assembled with the interference filters located immediately adjacent to the xenon flash tube light source. Initial measurements of beam parallelism and intensity were encouraging. More detailed and reliable measurements are planned.

1.1.3.2.1.3.3 Horizontal Attenuation Monitors (HAM) (Brian Fick-University of Utah)

HAM number "1" completed and bench tested. Field testing (in Millard Co.) will occur in the coming week. Approximately 80% of the components required for the next two HAMs have been purchased and delivered to Utah. Construction of the remaining HAMs awaits the field test results for HAM-1. The process for donating HAM-1 has begun.

1.1.3.2.1.3.7 Weather Station (Ken Gibbs-University of Chicago)

We are still awaiting the go-ahead to ship.

At this rate I am no longer confident that they will arrive on the site for installation in the latter half of September.

Fluorescence Detector Electronics

1.2.2.1.3 - 1.2.2.1.4 FD Digital Electronics (Matthias Kleifges-Forschungszentrum Karlsruhe)

FD Digital Electronics and Readout System

During the second week in July (11-14 July) D. Camin and S. Argiro from Milan came to FZK to bring the readout of the current monitor (CM) into operation. Despite combined efforts of them, D. Tcherniakhovski, S. Menchikov and myself we could not bring the readout to work. Meanwhile further investigation is under way in Italy, as a first step the communication of the CM ADC with a DSP readout card will be tested.

P. Privitera and Pedro Facal (from Rome) performed together with HEP members the two Sunflower tests at FZK. The tests followed the setup of the first test, but this time more statistics were accumulated. Pedro has developed analysis software which allowed us to get first results online. The results will be presented at Bad Liebenzell.

To be ready for the tests in Rome (September) we:

- a. tested 4 further FLT modules,**
- b. assemble 4 analog test boards containing a pattern generator,**
- c. mounted front panel and stiffener sheets to all FLT and SLT boards**
- d. assembled 2 more subracks (VME crates) including the cabling of the DC-DC converters used as power supply.**

N. Kunka has configured an Eye and Mirror PC with more or less the same hardware components as we intend to use in.

The system runs under Suse 6.3, Linux with kernel 2.2.13. We have found some incompatibility of the PC motherboard and the PCI readout card which have to be solved.

A. Kopmann has developed and implemented a library of subroutines for the hardware near software (under Linux). It defines different interfaces for the readout chain, the monitoring and the configuration. The documentation is written for part of the library.

A. Menchikov has started a graphical user interface to display recorded data, the set and display the configuration and the generation of test pattern. Despite his program is developed in C/C++ with Microsoft NT, it seems to work together with the library of A. Kopmann (under Linux). The program will be used to debug the SLT board, especially to find errors with the pattern recognition and the pixel memory. The program will be ready soon, but further tests are necessary.

For the near future we are going to:

- a. complete the documentation and the tests of the SLT board,**
- b. prepare the test with 100 PMT in Rome,**
- c. decide on changes for the next revision of the FLT and SLT boards (version 2) which will be used in the EA in Malargue.**

Surface Detector

2.1.6.1 Phototube Assemblies (Prototype) (Dave Warner-Colorado State University)

This report summarizes our progress from May 1 through July 31, 2000

PMT window kits for Engineering Array liners 11-20 were produced, tested and shipped to IHEP: 15 kits (5 liners worth) were produced with UVT Acrylic domes ("hard dome kits") and were shipped on May 4; and 15 kits were produced with polyethylene film windows ("floppy dome kits") and were shipped on June 14. The last kits were 2-3 weeks late in shipping to IHEP, mostly due to the decision to ship 250 pounds of Tyvek/LDPE laminate in the same shipment, and the complications with customs taxes and duties this entailed. All of these kits will require Hamamatsu 8" PMTs. PMT windows for liners 21-30 were produced and tested, and will ship to IHEP on August 3 (on schedule). These kits are again, half hard dome and half floppy dome kits. These kits are all designed to be used with Photonis 9" PMTs. Tests with the polyethylene windows revealed that they were too permeable for us to be able to use the Silicone optical coupling fluid we were testing. The domes allowed the oil to penetrate into the detector water volume. We are developing substitute coupling compounds, including a silicone jell and a GE Silicone RTV compound. Initial tests with the RTV look very promising, as the material is easy to work with and transmits light well into the ultraviolet. Work on a heat-sealable fill port is continuing, and we hope to have enough prototypes of these fill ports to allow us to use them for the last 10 EA liners.

Surface Detector Electronics

2.2.3.1.1.2 Trigger ASIC (Dave Nitz-Michigan Technological University)

Note: Added effort in PLD and an additional test chip fabrication run were mandated in March 2000 mini-review. Costs reflect this added effort, but WBS budget was not increased.

PLD prototype:

Work progressed on debugging the first revision of the PLD prototype board. The BGA 600 footprint of the PLD chosen caused quite a bit of grief in getting this the shorts and opens repaired on this board because of the very fine tolerances required. However, the first board is now operational and we expect to start to testing the loading of the PLD code in the next week.

Based upon the experience with the first board, we have designed a second revision which is much simpler. Final checks of the layout are now underway. We expect to submit this board for manufacture in the next week or so. This board uses one of the new APEX series Altera PLDs, type EP20K200RC240, which has a much easier to handle surface mount package. Altera has donated 2 samples, which arrived at the end of July. The design for this PLD has been prepared, and we expect to begin testing this version during August after the 2nd revision boards arrive. This will have equivalent functionality to the phase 1 ASIC.

ASIC version:

A test chip was submitted for the June MOSIS run in the TSMC 0.35 micron process. The wafers have been delivered to MOSIS and are now in the process of being packaged. Delivery is expected before the end of August.

Verilog design and coding for the phase one trigger ASIC is completed. During July we concentrated on testing and bug fixing of the Verilog. Layout of the design and simulation of the extracted circuits is now proceeding. We believe we will be ready to submit the chip for fabrication of prototypes in the September MOSIS run.

Site Development

6.1 - 6.2 Site Task (Jonny Kleinfeller-Forschungszentrum Karlsruhe)

August 10, 2000 - Los Leones building and Central Campus: I have compared the schedule for the FD building with the status I found during my visit last week. The building is about 3 weeks behind schedule, this is not yet worrying, because the delay is entirely due to bad weather conditions not to incompetence or lack of manpower. My first estimate on completion of the concrete work was too optimistic. Taking into account, that the bottom part of the north wall is now also going to be concrete and the fact, that the ground in the back rooms of the building was not prepared for concrete, it is more like 2-3 weeks for completion of the concrete work. Part of that time of course is

recovered in the schedule for the brickwork.

The bricks are really not suitable for secure anchoring the decision to have concrete in the lower part of the north wall is essential to enable safe installation of the shutter and of the aperture system. The shutter will by the way fit in the asymmetric window position. The clearance of the open doors to the concrete pillars is 150 mm for the symmetric case. This covers the 70 mm shift of the windows.

I can't really give an estimate of the delay of the central campus building, because I don't have a detailed schedule of that.

For LL I have arranged to get a photograph of the site every 10 days. In a week or two I can give a more precise estimate on the development, if my new contact in Malargue is reliable.

7.0 Project Management (Paul Mantsch-Fermilab)

Plans are being made for the next Auger Collaboration Meeting to be held in Malargüe, November 13-17. The meeting will feature a follow up PDR for the Data Processing and Analysis Task, final plans for completing the installation of the Engineering Array and planning for commissioning.