VATLY NEWSLETTER

WORDS OF HOPE

"It is vital to establish a policy that makes Science and Education a priority of the Nation in order to pave the way toward major successes in these domains that are the motor of development."

General Vo Nguyen Giap,
March 7th 2004
on the occasion of the 50th anniversary of Dien Bien Phu

CONTENT

This third issue of the **VATLY Newsletter** *starts as usual with some* **news from the laboratory**. *Pierre, who spent* **a week in Malargüe** *at the March Auger Collaboration meeting reports briefly about it. Diep gives us his impressions of* **the RDV astrophysics conference** *that took place in Hanoi in August. Finally Thieu, together with Phuc whom he has interviewed, tell us about* **Electronics at the Institute**.

NEWS FROM THE LABORATORY

Two new members have joined VATLY this summer, Pham Ngoc Dong and Dinh Lam Anh Huyen. Dong graduated from Hanoi University of Technology in 2002 and joined the Institute where he has been measuring the gamma radioactivity of soil and other samples.

Dong and Huyen in the lab.

As he was wishing to devote his time to fundamental rather than applied research he decided to join VATLY. Huyen graduated from National University in June this year and made her diplom work with us. She is spending some time in VATLY before deciding whether she wants to continue in research or follow some other route.

Thanks to funds obtained from our funding authorities (Ministry for Science and Technology) we have been able to upgrade our data acquisition and analysis environment. A new room has been allocated to us, equipped with four terminals connected to internet via the server of the institute. Downloading data and software from Auger used to be a very long and painful enterprise. Thanks to the availability of a new faster link (100 Mbps) it has now become an easy task. This major progress is particularly welcome at a time when more and more of our studies imply the use of Auger events.

Using funds allocated to us by the Natural Science Council of Vietnam we have acquired two 3000 liter tanks that have been installed on the roof of the laboratory in the vicinity of our Auger tank. They will soon be filled with water and equipped with phototubes in order to be used as Cherenkov counters. We shall have this way a total of three additional Cherenkov counters that will be operated simultaneously with the Auger tank and give us an opportunity to record coincidences and get some familiarity with low energy showers. It will also provide a source of master thesis work for forthcoming students. However, the group is so tight with higher priority tasks for the moment that it will take some time before we can devote serious effort to this project.

The detection of muon decays in the Auger tank and in the scintillator hodoscope revealed a problem of afterpulsing that Dong and Huyen have undertaken to study. This turned out to be more subtle than anticipated and to take more time than expected but has been an excellent training ground in experimental physics. The study is now nearing completion and the results will be written down in an internal note. After this Dong and Huyen will work on a toy Monte Carlo program meant at understanding possible sources of systematic errors in the measurement of the shower energy using the Auger surface detector (or other sampling arrays). They will also study and hopefully understand the distribution of reconstructed shower impacts in Auger with respect to the three closest tanks.

Nhung has now completed her study of the Cherenkov response to muons and is writing it down as an internal note. A pair of scintillators will be installed on top of the Auger Cherenkov counter, on its axis, in order to ease the selection of vertical muons (in particular those that stop in water). She is currently starting to study flash ADC traces from the Auger surface detector. In a first stage she will learn how to classify and summarize the available information in only a few numbers. Later, the idea is to undertake a study of the time structure of the shower front. In parallel with this she is also writing a short program that is supposed to construct electromagnetic showers in a self-consistent way.

Diep has played a leading role in upgrading our computing environment and in easing the access to Auger data. He is now writing a toy Monte Carlo shower simulation meant at understanding the main effects of fluctuations on the energy measurement. He will also help Thao and provide her with some guidance in a study of possible sources of systematic errors in the measurement of the shower energy using the Auger fluorescence detectors.

Diep, Nhung and Dong have successfully passed examinations counting for their master studies. Thieu is now running the last straight line before the presentation, early next year, of his PhD work to the board of examiners in the Vietnam Atomic Energy Commission (VAEC).

The paper that had been submitted to Communications in Physics toward the end of last year has now appeared (Comm. Phys. Vietnam 14 (2004) 57) and a new paper summarizing our work on atmospheric muons has been submitted to the same journal.

After completion of the cycle of lectures on nuclear structure theory by Dao Tien Khoa, the group followed another cycle of lectures by Pierre on particle physics (at the Institute of Physics) and on an elementary introduction to astrophysics and cosmology (at INST). Nhung spent one week in Japan on the RIKEN campus, where she attended a Summer School on nuclear physics in the Centre for Nuclear Study. Between Christmas and New Year the 11th VSOP (Vietnam School of Physics) will take place in Da Nang and the whole group will attend.

Etienne Parizot, an astrophysicist from IPN Orsay and member of the Auger collaboration, visited VATLY on the occasion of the Conference.

Two major physics conferences took place in Hanoi in August, one on particle physics and the other on astrophysics. The whole group attended the latter and helped with its organization. The conferences were an initiative of Tran Thanh Van and Nguyen Van Hieu in the framework of the Rencontres du Vietnam. Thieu presented our work in a parallel session. A visit to VATLY had been organized that attracted many of the participants in the conferences. It was for us an opportunity to meet a few friends. In particular we found the time to have lunch with Patrick Aurenche and Paul Sommers in the small restaurant where we usually go for group lunches. Paul then spent the afternoon with us at the laboratory and got a good feel of what our working conditions are like while we took advantage of his presence to ask many questions.

Shortly after the conferences Odon Vallet came to Ha Noi and distributed fellowships to a large number of high school students among the most brilliant. A small number were also reserved

for young deserving research students and we had the good fortune to have three of these awarded to group members: Nhung, Diep and Dong. These awards are not only rewarding their motivation and successes but also easing the material conditions under which they are working and studying, an extremely helpful and welcome support.

Paul Sommers with (left to right) Nhung, Diep, Thieu and Thao in our new terminal room.

We are getting prepared to take part in the 9th Asian Pacific Physics Conference that will take place in Hanoi in October. The scope is very broad – all branches of physics – and the attendance is dominated by condensed matter and material physicists. Diep will present VATLY results on atmospheric muons in a parallel session. Two plenary invited talks have been scheduled from Viet Nam, both from the Institute: one by Pierre on cosmic rays and one by Khoa on nuclei.

In July the Auger Collaboration had their summer meeting in Leeds, this time coupled with the "Alan's fest" in the honor of Alan Watson, the spokesman of the Collaboration. We were unable to attend but sent Alan our thankful and friendly wishes with an image of Vietnam. We reiterate them!

As some of our electronics hardware was getting dangerously old – most members of the group are younger than our NIM and CAMAC units, the printed board contacts with the crates are often worn out and need to be re-silvered, some phototubes are loosing their vacuum, etc – we asked for some help, in particular from CERN and RIKEN that kindly answered positively to our request. Shortly after the conferences we also learned from Bernard Peyaud that DAPNIA, the Department in Saclay where they study particle, nuclear and astro-physics, was prepared to send us a number of 2" phototubes, of which we are in great need. We are very thankful for all this support.

We also received private donations from individuals wishing to help us, on their own initiative. Such generous gestures are both extremely moving and of invaluable help in easing the working conditions of the group members. As you undoubtedly know these conditions are extremely precarious in Vietnam and often prevent the establishment of a healthy research environment. It is therefore from the deepest of our hearts that we express our gratitude to these generous donators.

A WEEK IN MALARGÜE

In March this year Pierre attended the Auger Collaboration meeting in Malargüe. He reports about it.

This week was for me an invaluable experience which I shared with VATLY once having returned to Hanoi.

To study the Auger Technical Report on paper in Hanoi is one thing, to see the tanks deployed in the pampa with the Andas in the background is another. I had a chance to look around the main building with the CDAS data acquisition centre, the tank assembly hall, the water purification system; to listen with admiration to Tiina showing me around the assembly chain of the tank electronics; to pay a visit to Los Leones and look at one of its eyes...with my own eyes. Everywhere I was impressed by the quality of what I saw and by the mixture of professionalism, necessary in an enterprise of such an industrial size, and of ingenuity and good taste in the design, the sign of excellence in experimental physics.

To be frank, one of the greatest shocks was to look from the terrace of Los Leones toward the site with my ageing eyes and have difficulty to spot more than the nearest tank, the tank area being only one part in hundred thousand of that of the triangular mesh. This makes quite a difference with the usual artist views of the array!

I learned a lot from the presentations given at the meeting, enough to dissipate some misconceptions I might have had and to grasp a few important points I might have missed. Enough

to take a measure of how much we still have to learn before mastering it all. Enough to start having some ideas of a few topics that would be suitable for VATLY to tackle and study, not too difficult to start with, yet of reasonably central interest; not in the main line of the action, yet not in a dead-end either. Enough also to have clearer views on how our group should proceed to become familiar with the experiment. When I look today at the progress we have been making along this route, I see how useful this Malargüe week has been to us. Most impressive were the first reports on hybrid events, offering such a shining evidence of the superiority of Auger with respect to its predecessors.

Of course I met many old friends, this is always a great pleasure, but also many young and enthusiastic physicists who patiently educated me in answering my questions and kindly told me about what they were doing. I could this way make new friends whom I may now bother by e-mail with more questions... which I do not hesitate to do. Much of the time, but not all, was spent in the auditorium. There was also time for a walk in the nearby hills, for a gorgeous lunch in a trout breeding place and for having a few quiet chats in the peaceful pampa evenings.

Finally I also had a chance to express my gratitude, on behalf of the VATLY group, to the whole Collaboration for all what they do for us: to start with, by giving us a frame in which we can work and a goal at which we can aim. Today, we still are doing virtually nothing for Auger but I hope very much that tomorrow we shall be able to contribute to this great adventure. When I see the progress accomplished in our understanding of the experiment in particular, and of the underlying physics in general, I am very optimistic. A possibly more impressive change is the difference of attitude of the group towards Auger. Two years ago Auger was still a kind of abstract concept about which most of us were quite ignorant. Today the group is well aware of the experiment and of its rapid progress and, even if we do not belong to it yet, not only our minds but also our hearts are getting closer and closer to Malargüe... and to me this may be the best indication that we are on the right road.

Thank you again to the Auger collaboration, to all the friends I met in Malargue and to the Auger members who have had a chance to pass by Hanoi and spend some time with us. Thank you to Jim, to Alan, to Paul, to Murat, to Etienne, to Tiina, to Pierre, to Xavier... in one word to all of you.

THE RDV CONFERENCE

Together with the whole VATLY group, Diep attended the Rencontres du Vietnam Conference that took place in Hanoi in August and helped with the organization. He reports about his experience.

The recent August conference in Hanoi was a big event in Vietnam. The media talked a lot about it. It has been an occasion for people to discuss about education and training, a hot problem in today's Vietnam. It was the first conference which I attended as a registered participant.

On behalf of the group, Thieu, our group leader, presented our measurements of the flux of atmospheric muons in Ha Noi. In preparation for the conference, Pierre had taught us a short course on basic astrophysics and cosmology in order to give us sufficient bases to understand what would be discussed at the conference. It was our responsibility to set up a terminal room in the conference settings, that could be used by the participants. We took care of it during the conference, making sure that it was operating correctly and providing help to the users whenever necessary.

The conference was good for Viet Nam. It brought physics in the limelight and contributed to make our government more sensitive to the need for better support to fundamental research. In fact President Tran Duc Luong invited Vietnamese scientists presently studying or working abroad to discuss about what they could possibly do to help in boosting the development of science and technology in Vietnam.

Attending the conference gave me a chance to learn a lot of things. I could see with my own eyes what is being done in the world. It was a good experience to get acquainted with the tense atmosphere of such an international conference, with dense talks given at a high speed of speech and succeeding each other at a high rate.

There were many young scientists attending the conference, coming from all over the world. They presented their work with a lot of self-confidence. That was a good lesson for young people like us. It has shown us how we should present our work to a public audience.

During the conference, I had opportunities to meet and have interesting discussions with many Vietnamese scientists working abroad. Although they have been away from Vietnam for a long time, some even left when they were children, they still maintain deep and sincere feelings toward the fatherland. I happen to know a few interesting anecdotes about some of them. Nguyen Trong Hien, who is now working in NASA, went to the South Pole for his research work. He asked his family in Vietnam to send him a Vietnamese flag, so he could have it stand there. However, his folks were afraid that this might somehow create difficulties and prefered not to do so. But he had made up his mind and took on him to sew the flag by himself. It was the first Vietnamese flag to stand on the South Pole. Another story is about Duong Long from University of Minnesota. Once a friend of his was saying bad things about Ho Chi Minh, to teach him a lesson Long hit him hard…

Another view of our new PC room

I was awaiting the opening of the conference with much excitement. But at 8 am on the fifth of August, when the conference was due to start, there were still two VATLY students, Dong and I, waiting at the Noi Bai airport to pick up the late conference participants. While everyone else was listening to the new achievements, results and discoveries in two fascinating fields of science, particle physics and astrophysics, we had to burry our feet there. All we had to do was to say some simple sentences like: Good morning Sir or Madam, Welcome to Vietnam, we are from the conference, we have reserved a cab for you, you have to pay 12$ for the fee, please follow the taxi driver… People came a bit at random from the morning to the evening, so we had to spend the whole day overthere. It was a very simple job, but we were happy to see that these latecomers felt welcome and taken care of, also we could make ourselves useful by helping some of them with visa problems. After all, it was not such a bad day even if we felt frustrated to have missed the first sessions!

Other unforgettable experiences were with two foreign professors. The first one was professor Celnikier from Meudon. Aunt Kim, as we call her in vietnamese, Tran Thanh Van's wife, had asked me to meet him in the conference's secretariat and help him with some computer problem. I did so. He explained that the day after he would have to take part in an important meeting with some of his french colleagues via radio and video. He needed my help to communicate with them. He had a device with a camera, I had not seen such a thing before, but, I thought, it must be something similar to the stuff I am used to when I go chatting in the "cafe internet". So I asked him whether we could try to connect. Yes, he said, and he plugged it in the PC. Do you have the driver for it? I asked. Yes, he did, it was in his computer. All that remained to be done was to switch it on… and it seemed to be working well. I could see his image on the PC screen. He looked like an actor, apparently very happy. Everything was working fine, I hadn't done anything special except to watch him doing the job… but from that moment, each time I came across him, he would thank me warmly for having helped him.

The second professor was Marilena Streit-Bianchi, an italian woman from CERN. During the conference, whenever she was coming across one of us, VATLY students, she would smile in such a nice and friendly way that we were touched by her kindness. One day, she told me that the day after she would have a gift for us. Indeed, before saying good bye, she gave me and another member of the group a souvenir from her country and encouraged us to learn and work hard. I was deeply moved and didn't know how to thank her. Perhaps, I'll send her this article to let her know.

I often sensed, being a young Vietnamese student, how friendly the world's scientists feel towards Vietnam in general and towards the youth in particular. These are very precious and unusual feelings. Thank you very much to the organizers, the professors whom I met in the conference, and to all of my friends.

ELECTRONICS AT INST

While there is no mechanics workshop at INST, there has been for a long time an Electronics Department. Diep and Dong have interviewed one of its founding fathers, Professor Nguyen Phuc and its present leader, Dang Quang Thieu who is at the same time group leader of the VATLY group. They report here on what they have learned.

The Electronics Department of the Institute was created in 1990 with the task to design, assemble, maintain and repair electronics equipment used by INST staff for pure and applied research. Today, it has a staff of nine.

Training in nuclear electronics has been provided in Ha Noi by the National University and the Polytechnic Institute as early as 1960. For more than two decades, despite a long war and its disastrous consequences for the country, nuclear electronics could survive and even develop in Vietnam with foreign support, mostly from the former USSR and from DUBNA. A staff of ten or so PhD nuclear electronics engineers, who had been trained abroad, returned home in the eighties, working in research institutes and giving lectures at academic level in the National University, at the Institute of Physics and at the Polytechnic Institute. It was in this period that an electronics laboratory equipped with modern instruments was created in Dalat with the help of the International Atomic Energy Agency (IAEA). It has been for many years a privileged training ground for the best nuclear electronics engineers and scientists of Vietnam. It has now become of lesser importance in spite of the ongoing operation of the low power reactor. Another, much smaller, IAEA support has been given to the INST on the occasion of the creation of the electronics department. Today it consists only of some occasional training (lectures or seminars) given episodically by visiting experts.

The INST electronics lab maintains close relations with the Nuclear Physics Department of the National University and, to a lesser extent, with that of the Polytechnic Institute. Students joining the lab for their diplom work (at the end of the four year university cursus) have been trained in general and nuclear physics and have been given a five month course in nuclear electronics by Thieu or Phuc. There are currently two master students working in the lab on design projects (one on the control of a gamma spectrometer, the other on a portable dosimeter device). The staff of the lab includes in addition four young engineers, two who graduated from the National University in 2001 and two others who moved recently from Dalat and work on the assembly of a CsI detector for nuclear spectroscopy. Two engineers work full time on maintenance work, and two on design work. Phuc and Thieu, both at PhD level, provide the necessary supervision, Phuc having in addition a position as a Professor in INST. Finally the lab staff includes a single electronics technician.

In addition to the support given to the VATLY group, the maintenance and design work is oriented toward two kinds of customers: INST staff working on government projects and outsiders such as hospitals and private companies. In both cases the instruments are mostly radiation detectors used either to monitor natural radioactivity (as for example in prospecting for gold mines) or using radioactive sources (as, again for example, in non-destructive density measurements performed on bridges, pipelines, etc.). The numbers of man×years devoted to the service given to each of the two families are nearly equal. The staff of the laboratory receives, in addition to their low regular salary, allocations taken on the material budgets associated with the project they are working on.

The laboratory has recently moved into a new building of the Institute. The equipment includes basic instruments such as oscilloscopes (but not digital), frequency meters, precision dual pulse generators, digital voltmeters, power supplies... To develop into a modern laboratory a long range investment project with a clear view into the future would be necessary but it has not yet been possible to get this kind of attention and support from the funding authorities of the Institute. For example, new design technologies currently available, such as field programmable gate arrays (FPGA), could be developed in the institute and find many useful applications.

While hardware support is expensive and difficult to obtain, software support is easily available and the lab staff is experienced in designing circuits and PCB layouts using CAD tools such as ORCAD or PROTEL.

In general, the skills of the staff are well above the level of the tools and means that are made available to them. It would obviously be an excellent investment to develop modern electronics at the INST and in similar institutions. It is now

possible to overcome the enormous handicap that has resulted from having lost, in this domain like in many others, a full generation of scientists. From the mid-eighties to the end of the last century no PhD nuclear electronician position has been open in Hanoi. In the past few years three new positions have been made available. If this trend continues and is accompanied with sufficient investment in modern tools, one might hope for a real renaissance. It would then become easier to attract good students, to better respond to the demands of the Vietnamese industry and to restore in their community a stronger confidence in the skills of their countrymen. Such actions require not only financial support but also, may be more importantly, a well prepared and determined line of action with a long term plan and a clear definition of the objectives being pursued.

Distribution: *Patrick Aurenche, Ha Huy Bang, Jean Pierre Bibring, Murat Boratav, Georges Charpak, Nguyen Chau, Bach Thanh Cong, Jim W. Cronin, Minh Ha Pham-Delègue, Luigi Di Lella, Phan Van Dong, Toshikazu Ebisuzaki, John Ellis, Alberto Etchegoyen, Daniel Froidevaux, Bernard Frois, Marcelo Gilardoni, Dao Tien Khoa, Jacques Haïssinski, Nguyen Van Hieu, Morihiro Honda, Pham Quoc Hung, Stavros Katsanevas, Marc Lachièze-Rey, Akira Masaike, Peter Mazur, Bruno Paing, Etienne Parizot, Eliane Perret, Bernaard Peyaud, Nguyen Phuc, Philippe Quentin, Jean-Michel Rieubland, Dieter Schlatter, Peter Schlein, Paul Sommers, Michel Spiro, Jack Steinberger, Christine Sutton, Tran Minh Tam, Isao Tanihata, Dick Taylor, Samuel C.C. Ting, Nguyen Trung Tinh, Odon Vallet, Jean Tran Thanh Van, Jean-Pierre Vanuxem ,Suzy Vascotto, Sylvie Vauclair, Alan Watson, Atsushi Yoshida.*

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