

## VATLY NEWSLETTER



The VATLY team  
wishes all their friends a  
very happy, successful  
and healthy  
Year of the Buffalo!

### WORDS OF WISDOM

*Never has a country been so ravaged by war; never has modern science been so largely put to use for destruction. With the return of peace, it will be possible to draw up balance sheet of needs for scientific, technical and industrial development.*

*Henri Van Regemorter (1925-2002)  
Initiator of the scientific relations between France and Vietnam*

### CONTENT

*This eleventh issue of the VATLY NEWSLETTER starts, as usual, with some NEWS FROM THE LABORATORY. Next, tribute is paid to two friends of VATLY who recently passed away, Maurice JACOB and Peter SCHLEIN. An INTERVIEW OF Prof. ANNICK SUZOR-WEINER, in charge of International Relations at Paris Sud-Orsay and a long-standing friend of Vietnam, follows. Finally, Diep and Nhung tell us about the 2009 RENCONTRES DE MORIOND which they recently attended. Following the tradition we close the issue with a PHOTO ALBUM.*

### NEWS FROM THE LABORATORY

*Under this heading we review briefly the progress of the work of the team and the main events in its life. The Têt of the Buffalo is just over and, once again, we are late to deliver this issue of the Newsletter.*

Diep and Nhung are already back in Europe at their respective “cotutelle” laboratories, LPNHE/Jussieu for Nhung and LAL/Orsay for Diep, where they will spend the three coming months. They just returned from La Thuile where they were invited to attend the Rencontres de Moriond, which addressed this year topics of

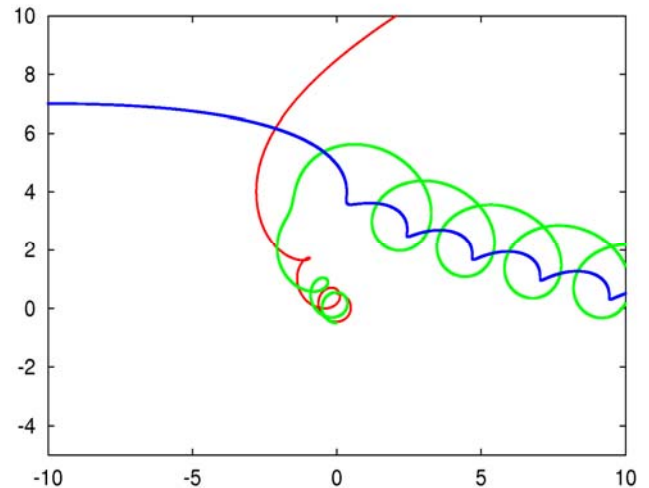
particular interest to cosmic ray physics and astrophysics in general and, therefore, to VATLY.

During his stay in Ha Noi, Diep has completed the work he had started in Orsay on the discrimination between proton and more massive (up to iron) primaries. His findings are reported in a GAP note. The identification of the primary cosmic rays in the UHECR region, moving from galactic to extra-galactic sources, is a very difficult and yet unsettled issue. The Auger collaboration is actively addressing it from several directions – including studies of the longitudinal shower profile, of the sharpness of the shower front, of correlations with known AGNs and of the muon abundance on ground – in the hope to converge to a coherent picture. After an interruption of several months, Diep has now started a new study in this domain, exploring possible correlations between iron-proton discriminators and the proximity of potential celestial sources. He will pursue it in Paris while joining the work of Marcel Urban's group. The few month interruption was dedicated to the completion of a work initiated long ago on the development of electron/photon showers. The study, now completed, is reported in a VATLY internal Note and will serve as a basis for a study of the Landau-Pomeranchuk-Migdal (LPM) effect (see below).

During her stay in Ha Noi, Nhung has continued working on a search for decay electrons from shower muons stopping in the Auger tanks of the Surface Detector. The study concentrates on energies in the  $10^{18.5}$  eV range and is now nearly completed. It will make a major part of Nhung's PhD thesis and the subject of a GAP note. As long as the zenith angle and the tank distance to the shower axis are kept to moderate values,  $<60^\circ$  for the former and between 750 and 1800 m for the latter, decay electrons can be detected and counted with a good efficiency and in low background conditions. The main backgrounds are accidentals, late shower particles and a low level noise. Accidentals are monitored from the time interval preceding the arrival of the shower front, late shower particles concentrate on early times and the low level noise is eliminated by rejecting signals depositing a charge  $<0.08$  VEM in the tank. As decay electrons deposit an average charge of only 0.14 VEM, the study requires a

very good control over low signals; it provides a thorough test of the understanding of the detector response and of the simulation codes used in the description of the shower development.

Both Diep and Nhung have acted as tutors for young students who have joined us for their fourth year dissertation: respectively Lion Alio from the National University of Sciences and Do Thi Hoai from the National University of Education.



*The massive blue star coming from the left captures the green member of the binary leaving the red member alone*

Lion will modify the shower development code mentioned above to introduce the effect of LPM suppression and Hoai is writing a program solving the three-body problem in astronomy. The emphasis is on understanding how a massive star can capture a member of a binary, leaving the other member continue its journey alone, a common event in dense environments such as the centre of the Milky Way. She has already produced very instructive and spectacular results.

In this context we should also mention frequent visits of another fourth year student of the National University of Sciences, Tran Huong Lan, who is doing her dissertation under the supervision of François Le Diberder on the  $\eta_B$  signal observed in Babar. As François has been appointed spokesman of the Babar Collaboration – we take this opportunity to congratulate him – he has less time to spare for Lan and asked us to give her a hand, which we are of course pleased to do.

Dong has spent the autumn at Orsay/IPNO in the group of Tiina Suomijarvi with whom he makes a cotutelle PhD thesis. He worked under the supervision of Bernard Genolini on linearity measurements of prototype divider chains to be used on the SD PMTs of Auger North. The main mission of Auger North is to explore the northern sky, which is inaccessible to Auger South. It provides an opportunity to use the experience of Auger South to possibly improve over its design, in particular by increasing the acceptance but also possibly by increasing the dynamic range and time resolution of the SD. However, in order to keep the price under control, difficult choices need to be made, which the Collaboration is actively getting prepared to. Dong also helped awaking the Orsay Cherenkov tank, which had been kept dormant and unused for a long time, but was found to be still in good operating conditions. Back in Hanoi, Dong is now writing down some of the results obtained in Orsay and will soon resume measurements using the Hanoi test bench and the Hanoi Cherenkov tank.



*The upper part of the muon telescope*

Thao returned from CERN where she had attended the Summer Student courses and wrote down a report on the work she did in ATLAS, an acceptance calculation for the detection of Z decays into muon pairs. She next worked on the tuning, running-in and installation of a hodoscope aimed at triggering on muons the Auger-like Cherenkov counter installed on the roof of the laboratory. The hodoscope is made of two scintillator pairs bracketing the Cherenkov tank,

one above and the other below, in the laboratory. It works properly and the trigger rate is  $\sim 0.5$  Hz.

A new master student, Pham Tuan Anh, joined us last summer. He has been setting-up a radio interferometer with which he will observe the Sun. It was given as a gift more than fourteen years ago by Prof. Nguyen Quang Rieu, an astronomer at the Paris Observatory, to the National University of Sciences on the occasion of the total solar eclipse in October 1995, visible in South Vietnam. But after Rieu had returned to France the interferometer had never been used again and we have been able to recuperate it. It will operate around 610 MHz in a frequency band nearly free of TV pollution. Tuan Anh has summarized the main steps of the measurements to be done in a VATLY internal note and is now setting up the electronics and the data acquisition. He is meeting major problems of electromagnetic pollution resulting from the high density of mobile telephone antenna in town. Hopefully, we shall be able to overcome them; if not we shall transport



*One of the interferometer antennas on the roof of the laboratory*

the equipment, when well run-in, in a quieter place.

The World Laboratory has renewed for the coming year the invaluable support given to the four PhD students and has extended it to Tuan Anh. This adds to private donations and to the support given to the cotutelle students at the occasion of their stays abroad by the CNRS, the Rencontres de Moriond, the Paris XI and VII Universities and the French Embassy in Hanoi.

Moreover, in September last year Nhung, Diep and Dong received an Odon Vallet award, which was given to them in a ceremony at Van Mieu. Awards were also received from VAEC and INST, the hosts of VATLY: by the whole team for their excellent performance and by Diep and Dong for their active participations to the life of the Institute (in particular, Diep is responsible for all sport activities).

Hoang Van Khanh, who had spent four months in South Korea in a School on Nuclear Physics and Applications, has now returned to the Institute and will work with Thieu on electronics.

A new deputy director of the Institute, Dang Hoan Thanh, has been appointed: we wish him great success. Construction work is currently going on at the Institute, including a new canteen where the Têt party was organized and room to host a small General Electrics cyclotron received as a gift from South Korea. We had a chance to see it being assembled and to discuss with the engineer in charge. It is a 10 MeV proton cyclotron, accelerating negative hydrogen ions that get stripped at the end for extraction. The stripping foil can be moved remotely to feed five possible irradiation stations. The field is modulated in four sectors with four wedge dees in between and the source is of the cold cathode type. It will produce radioisotopes to be used at a Hanoi hospital for medical applications.

Pierre attended the 2008 Erice Conference on Planetary Emergencies at the occasion of the annual World Federation of Scientists (WorldLab) meeting where he reported about the work done in VATLY. He kept fighting for better Universities and better support to fundamental research, in particular to astrophysics, with two new articles in Tia Sang (the journal of MOST, the Ministry of Sciences and Technology), with participation to a round table discussion on science policy organized jointly by the French CNRS and the Vietnamese MOST at the occasion of a “Science week” and with opening talks given on the occasion of two LHC related events: the inauguration of a collaboration between the National University of Sciences (Dr Nguyen Mau Chung) and the EPFL-Lausanne (Prof. Tran Minh Tam) on LHCb; and an LHC school organized jointly by the Institute of Physics and the French CNRS with active participation of members of the

Atlas Collaboration. With the help of Nhung and Diep, Pierre gave astrophysics lectures to master students at the National University of Sciences and lectures on accelerators to a new class of VAEC students. He was recently awarded the Lagarrigue Prize and has been invited on this occasion to join the Orsay LAL team for a month, which he will enjoy doing in March.

The LHC School was an occasion to meet our ATLAS and other friends, Daniel Froidevaux, François Le Diberder, Sandrine Laplace and Vu Anh Tuan, who were lecturing at the school, and to have lunch with them. We also enjoyed the visit of Pierre Billoir who spent a week of hard work with us in early January. This gave us a chance to meet again his wife Viviane and to spend some leisure time with them. Yoshida Fujita, from Osaka, spent a few days in Hanoi on invitation of the Institute of Physics; it was a pleasure to see him again and to listen to his presentation of the beautiful nuclear spectroscopy results, which he and his team have obtained at the Osaka cyclotron.

The Osaka University is organizing a four-week school on experimental techniques in February-March and Thao and Tuan Anh, who applied to attend it, have been selected and will receive support for their stay. In fact Thao was selected to act as a tutor and has already reached Osaka two weeks in advance in order to be trained together with her other tutor colleagues.

The “Science week” mentioned earlier was the occasion for another meeting between VAST and CNRS in preparation for the signature of the LIA agreement. This gave us the opportunity to meet again Patrick Aurenche and spend some time with him.

A school on accelerators, their operation and applications – from medical and industrial to fundamental – will take place in Hanoi in October this year, organized jointly by the French CNRS/IN2P3 and the Vietnam Atomic Energy Commission (VAEC). A first meeting, attended by Alex Mueller and Florent Staley on the French side and by Dang Quang Thieu (who will chair the local organizing committee), Trinh Van Giap, Bui Dac Dung and Pierre on the Vietnamese side has put the project on rails. This gave an opportunity to the Vice-director of VAEC to welcome the party and make encouraging statements.

**MAURICE JACOB (1932-2007) and PETER SCHLEIN (1933-2008)**

*In the past few months VATLY has lost two of their supporters: Maurice Jacob and Peter Schlein.*

*Both were enthusiastic lovers of science. As one of their close friends, I have the sad privilege to pay tribute to their outstanding contributions and to take this opportunity to offer their lives as examples for the younger generation.*

*Pierre Darriulat*

**Maurice Jacob**

Maurice, a theorist of international renown, passed away in May, 2007. He had made major contributions to the phenomenology of strong interactions, including the helicity formalism (with G.C. Wick), the parton model (with S. Berman) and important works on diffraction, on scaling, on large transverse momentum hadronic processes and on the quark-gluon plasma state produced in relativistic ion collisions.



He was particularly famous for his outstanding skills in communicating enthusiasm and dynamism to the physics community, encouraging communication between experimentalists and theorists and between specialists of various domains. His leading roles at CERN and in the French and European Physical Societies made him one of the most popular and respected figures of the international physics community, which has lost a very generous servant and friend and misses him sorely.

He dedicated much effort to scientific publishing, in particular as editor of Physics

Letters B and founding editor of Physics Reports. His widow, Lise, has recently taken the decision to donate his collection of Physics Reports to the Library of the Institute. May she accept the expression of our deepest gratitude, together with those who helped her in this matter, including André Martin and Robert Aymar. We shall report on the transfer of the books in the next issue.

**Peter Schlein**

Peter, a highly respected particle physicist and UCLA professor, passed away in February 2008. He dedicated most of his life as a physicist to the study of diffraction, in particular to the partonic structure of the Pomeron, a subject which he was undoubtedly one of the very few experimentalists in the world to master. To this aim, he conceived and successfully run several experiments on hadron colliders including the CERN ISR and proton-antiproton collider where his UA8 experiment was sharing equipment with UA2.



I was leaving for Vietnam when I last met him. He had heard of my looking for second hand equipment which could still be used for physics, even if out of fashion. He gave me twelve large photomultiplier tubes which he had been using at the ISR and which he was keeping in a cupboard. I remember vividly how

happy he was that this equipment could be made use of for a hopefully useful cause and how he was inviting me to also take other equipment of his which, he said, he could no longer make use of. He was not just being generous, but he was really enjoying being generous and I remember having been moved by such a pure and spontaneous kindness. He was a man of outstanding intellectual and moral probity.

**INTERVIEW**



*Professor Annick SUZOR-WEINER is Vice President of Paris-Sud University and in charge of international relations. We knew her already from several visits she had paid to Vietnam. Diep and Nhung took the opportunity of being in Paris to meet her and ask her for an interview.*

**VATLY:** Could you tell us about the heroic time that you witnessed when you were a student of Prof. Henri Van Regemorter?

**A. Suzor-Weiner:** I knew Henri very well, but I did not share with him the heroic time. I met him when I was his student at the Meudon Astrophysics Observatory, in the late seventies. The help to Vietnam started much earlier. When I knew Henri he had already created the *Comité pour la coopération scientifique et technique avec le Viet Nam* and the *Collectif Intersyndical Universitaire d'action Vietnam-Laos-Cambodge*. This is how working for Vietnam attracted me. The war was over by then but the scientific cooperation with Vietnam was not yet official. All scientific actions were going through the Committee. When the Ministry of foreign affairs started to organize cooperation with Vietnamese universities, they asked Henri and the Committee to help because of their relations with, and their knowledge of Vietnam. So the Committee played a major role in a very difficult time and eased official and unofficial cooperation. Now, of course, all universities and ministries have official links with Vietnam: the Committee is more in the background. But it still maintains a network of people who know well Vietnam and Vietnamese science and help in exchanging ideas and news. They are still being asked by the Embassy for help or advice but the cooperation has become very official.

**VATLY:** Which kind of cooperation between France and Vietnam existed at Henri's time?

**A. Suzor-Weiner:** There were students coming to France like today but it was, of course, much more difficult at that time. Henri hosted students who were sent to him. He took care of them, finding places and rooms for them to stay. It was really day-to-day help. Right now, in this only university, we have more than 220 Vietnamese students; of course I don't know all of them personally. It was not the same for Henri, he was close to them and even kind of a father to many of them. He owned a big house where lots of students have stayed for a short time.

**VATLY:** Could you tell us about the birth of the academic relation between France and Vietnam?

**A. Suzor-Weiner:** The relation has grown a lot in the past twenty years from something small, which was mostly on a person-to-person basis, to something very official. Nowadays, we are no longer supposed to provide a kind of humanitarian assistance but to collaborate with Vietnam on equal footing; we call this a win-win process. The old form of collaboration can no longer be used. Historically, a big step forward occurred in 1983 when a cooperation agreement was signed between the French CNRS and VAST (Vietnam Academy of Sciences and Technology, at the time called National Centre for Natural Sciences and Technology). The cooperation between universities is more recent; it was established around years 2000-2002.

**VATLY:** Could you tell us about your experience in cooperating with Vietnam, what should be initiated, improved or corrected?

**A. Suzor-Weiner:** We are hosting a lot of Vietnamese students who are often good, but in some domains insufficiently trained, in particular in biology; in maths and physics it is better. What we want to do now is not only to increase the number of students but also to take into consideration the fact that these students will have to build something when back at home. This is the way in which we are trying to work with Vietnam, both at Paris-Sud and at national level, to help building something in Vietnam and with Vietnam. What we don't want is to take good students away from Vietnam and keep them with us. They need

not only to return home but also to bring back with them experience and knowledge that will contribute to the edification of a modern Vietnamese science. For me, an essential element of a well-working collaboration is the existence of a solid and well-structured organization. One of our best tools for this is the cotutelle, a form of joint supervision for PhD theses. We start at master level to make sure that the students are of the right level; the training at master level must be adequate. We try to train trainers in Vietnam. We try to build a common program with double degrees. It is not easy, in particular because in Vietnam students have to learn subjects of political doctrine in order to get their degree. Right now, we have two master programs, one in Hanoi in nano-technology and telecommunication and one in Ho Chi Minh City in biotechnology. The diplomas delivered to the students are French; it is like having a piece of French University in Vietnam. Our aim is to join with existing Vietnamese master programmes. At present, many French professors are sent to Vietnam with a good support from the French Ministry of Foreign Affairs, but this cannot go on much longer. There should be more and more Vietnamese professors and less and less French professors active in this cooperation and degrees should be awarded from both places, French and Vietnamese. One might even imagine a French student interested in going to Vietnam to study within such a joint programme.

As far as PhD degrees are concerned, one difficulty is related with the fact that Vietnam requires passing entrance tests to access the doctoral school.

**VATLY:** What should be done to motivate Vietnam to introduce serious teaching of astrophysics in Vietnam University?

**A. Suzor-Weiner:** I think that Vietnam will soon have to include astrophysics in the cursus. All branches of science should be accessible to students. I understand that astrophysics is not the first priority but it is a very important subject in terms of training and Vietnamese students should have a chance to become aware of its main features and of the physics it implies. A developing country, in its building-up phase, must

somehow combine applied and fundamental research. Of course, many families encourage their children to study topics leading to positions where they will be able to make money. This is natural and cannot be avoided. In all countries, research, especially fundamental research, is not among the best-paid jobs. But there exists a major difference between countries such as France and countries such as yours. In France, when doing fundamental research, you receive reasonable wages but, more importantly, you find a lot of pleasure in your work. It is a matter of personal choice, how to weigh these two benefits. But in countries like yours, researchers and teachers are so underpaid that such a choice does not even exist; the choice for someone who wants to do research is rather between going abroad and doing good research or staying at home.

It is clearer and clearer in today's global world that for a country to innovate (meaning inventions, patents, new technologies, etc.), it is necessary to do good research. Technology is fed by research and research is fed by higher education, we call this the "magic triangle". Innovation needs research and higher education. A country in which research and higher education are too underpaid will have very little innovation. So, even when you are strongly focusing on what brings money, it is worth investing adequate wages in research and higher education. Presently, I think that Vietnam does not do enough. Students do not join fundamental research because the wages are so unreasonably low. They need to be raised to such a level that a young Vietnamese who wishes to dedicate his life to science can do it and say: Well, I will not become rich but I am able to raise my children and I love what I am doing.

In my opinion, as soon as a developing country has overcome poverty sufficiently to be able to feed its people, education and higher education must become a top priority. It is a long-range endeavour and has to be planned well in advance.

**VATLY:** Thank you very much for the time you gave us.

**44th RENCONTRES DE MORIOND**

The conference series was founded by Prof. Tran Thanh Van in 1966 in Moriond, a small village in the French Alps. Its aim is to bring together physicists of all ages to discuss in a friendly atmosphere and to promote fruitful collaboration between experimentalists and theorists. Taking place continuously during the past 44 years, the Rencontres de Moriond has become a familiar conference to many physicists. Many of them have attended it since they were young and now still do. The Moriond conference's spirit has been transmitted to many other conferences. Among these were six Rencontres du Vietnam, which have been big scientific events: they have attracted attention not only from the Vietnamese community of scientists, in particular of the Physical Society, but also from the press and Government. We were lucky to attend two of these and we still remember the exciting time when we had chances to meet friends from around the world and to listen to frontier-physics talks given by leading scientists from prestigious laboratories. In early February, we attended the Rencontres de Moriond for the first time: that week spent in La Thuile made us enjoy the same kind of excitement as we had enjoyed in Hanoi at the time of the Rencontres du Vietnam.



*Prof. Tran Thanh Van and Diep at the 44th Rencontres de Moriond in La Thuile*

The conference gathered more than 150 scientists from all over the world to discuss on the *Very high energy phenomena in the Universe*, which actually meant the observation of the

Universe with high energy gamma rays, cosmic rays and neutrinos, the current understanding and modelling of high energy cosmic sources and recent suggestions from astrophysical and cosmological observations in favour of new physics. Nearly all large collaborations working on these topics had sent representatives to the conference, such as Fermi (formerly GLAST), HESS, MAGIC, VERITAS, the Pierre Auger Observatory (PAO), HiRes, IceCube, ANTARES, etc. We enjoyed meeting again PAO's colleagues from Germany, France, United States, Italy and Argentina. The conference was really an excellent illustration of the current outstanding attractiveness, dynamism and diversity of astrophysics and astronomy. More and more modern instruments are being used and will be built to explore these fields. There are a lot of important physics questions that need to be answered and new discoveries keep being made. We were impressed by new observational discoveries made by several collaborations, especially by Fermi; while in orbit for only six months, it has got many exciting results: rapidly confirmed many EGRET (Energetic Gamma Ray Experiment Telescope) results, achieved EGRET 1 year source sensitivity by 4 days of sky survey and discovered 7 new pulsars. It was also interesting to listen to reports on the acceleration mechanism and propagation of cosmic rays, in particular recent results from PAO and HiRes collaborations. While both HiRes and PAO confirm the GZK suppression, their energy spectra differ (this can be accommodated by a 10% difference in energy scale). Moreover, with a significantly lower statistics than the PAO, HiRes finds no evidence for correlation between ultra high energy cosmic rays (UHECR) and Active Galactic Nuclei. Also, HiRes finds that the composition of UHECRs is consistent with protons, while the PAO prefers a change in composition to occur in the highest energy region.

During the conference time, we enjoyed making friends and exchanging ideas with both young colleagues and senior physicists. Skiing time was an unforgettable experience. Diep took ski lessons for beginners while Nhung skied freely with friends from Spain and Mexico. Diep is now able to ski the blue piste.



The conference ended with an impressive summary talk given by Arnon Dar from Israel, who has attended the conference for more than forty times. It always longingly remembers when something nice comes to end. It was really a good time for us. We hope to attend it again and let us take this opportunity to thank the organizers for their good work, especially to Prof. Tran Thanh

Van who will now step aside after having initiated and organized the past 44 Rencontres de Moriond. We are grateful for his support and for that of the EU, which made it possible for us to attend such an interesting conference.

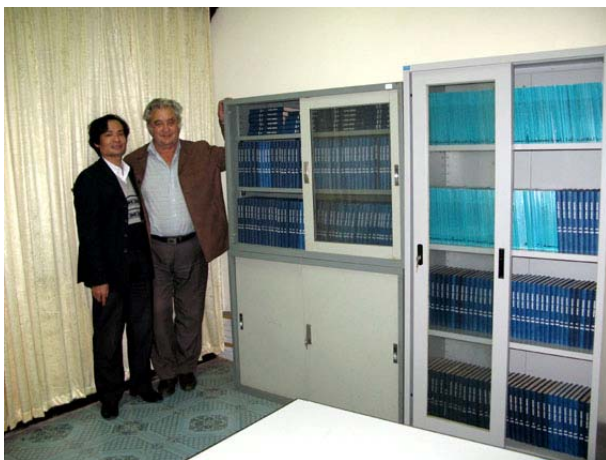
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<http://www.inst.gov.vn/Vatly/Vatly.htm>

**– PHOTO ALBUM –**



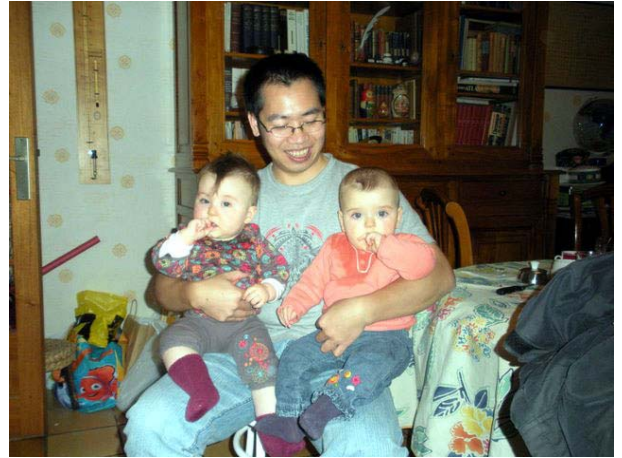
*The collection of Physics Reports donated by Lise Jacob has just arrived to the Institute. Standing next are D Q Thieu and Pierre*



*Prof. JinLin Han (National Astronomical Observatories of China), Nhung and Diep at Rencontres de Moriond 2009*



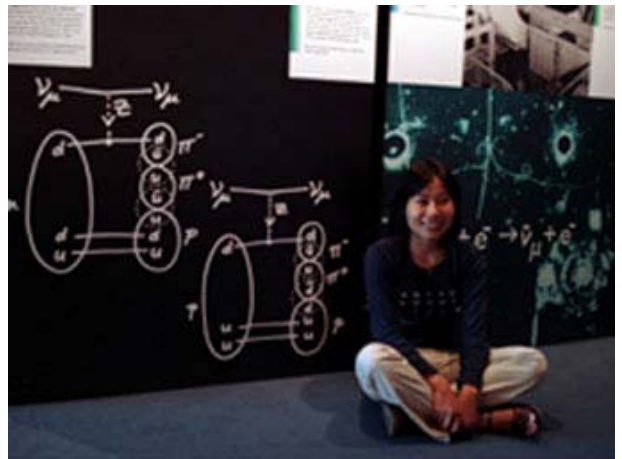
*The VATLY team (front row, left to right, Khanh, Hoai, Pierre, Nhung and Thao; back row, Tuan Anh, Diep, Dong and Thieu)*



*Dong with Clemence (left) and Collins (right) (Pierre Billoir's grand daughters) when he was in Paris last autumn*



*Diep on his skis at La Thuile*



*Thao enjoying her stay at CERN*



*The VATLY team together with colleagues from the Institute*



*Dong discussing with Profs Nguyen Van Giai and Tiina Suomajarvi at IPNO, Orsay (Autumn 2008)*