VATLY NEWSLETTER

The success of PicoDragon has contributed to the advancement of Vietnam's space technology, but more importantly it has encouraged the younger generation to study space science and technology. We have received big cheers from the public, and it is pushing forward the development of our future satellites.

Vu Viet Phuong

HAPPY NEW YEAR OF THE GOAT

CHÚC MỪNG NĂM MỚI ẤT MÙI

PLEASE NOTE OUR NEW COORDINATES

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CONTENT

This twenty-first issue of the ***VATLY NEWSLETTER*** opens with the traditional ***NEWS FROM THE LABORATORY*** and goes on with a series of reports related to our ***TRANSFER FROM INST TO VNSC***: ***Diep*** comments on the context and the advantages that an environment better suited to our work could bring; ***Thao*** on the end of year meeting of the VNSC team, to which we were invited; ***Nhung*** on the farewell meeting and lunch offered to the team by the Head of VINATOM; ***Tuan Anh*** on the farewell seminar given by VATLY to the INST staff; Diep and Nhung on an ***INTERVIEW OF PHAM ANH TUAN***, head of VNSC. Concerning recent scientific results, Phuong reports on ***RECENT MEASUREMENTS USING OUR RADIO TELESCOPE*** and Tuan Anh on our analysis of ***ALMA OBSERVATIONS OF THE RED***

RECTANGLE. We reproduce a contribution of Bac Pierre to a recent Buon Me Thuot Conference, entitled: ***NUCLEAR PHYSICS, PARTICLE PHYSICS AND ASTROPHYSICS: WHICH CHOICE FOR VIET NAM?*** Next, Pierre presents an ***OPEN LETTER TO THE MINISTER OF EDUCATION AND TRAINING*** and how it has been received. Hoai tells us about her ***LAST AUTUMN IN EUROPE***, Diep and Tuan Anh about the ***APRIM MEETING IN DAEJEON*** and Thao about ***THREE WEEKS IN CHIANG MAI***, attending the ISYA school. The issue closes with the traditional ***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 highlight of the period covered by the present issue is undoubtedly our having moved from the Institute of Nuclear Science and Technology (INST) to the Vietnam National Satellite Center (VNSC), of which we became the Department of Astrophysics . The idea of such a move was born on the occasion of the April 2014 colloquium, about which we reported in the preceding issue, when Pham Anh Tuan, Head of VNSC, presented his plans and invited us to join. In spite of our being happily integrated and welcome in the INST family, we thought that VNSC would provide an environment better suited to our work and that our interaction with its staff could be profitable to both us and them. The simple fact that we can now be formally recognized as an astrophysics department illustrates it well. A further potential advantage is to make it easier to collaborate with Japanese research teams, in particular on the exploitation of ALMA observations; the reason being that much of the VNSC budget is within the framework of a broad cooperation agreement on Research and Development between Japan and Vietnam. Our new offices are on the campus of the Vietnam Academy of Science and Technology, of which VNSC is part, just across the street: one small step for us, and let us hope, a giant leap for VATLY... to paraphrase Neil Armstrong, which seems appropriate when moving to a space centre. Details of the context in which the transfer was made are presented elsewhere in this issue by Diep, together with several related events reported by Thao, Nhung and Tuan Anh. The latter include our taking part in the end of year meeting of the VNSC team; an invitation forwarded to us by the Head of VINATOM, Dr. Tran Chi Thanh, to attend a farewell celebration and share a lunch with him and his staff; and a farewell seminar that we organised for the INST staff.

Diep spent time, after the April colloquium, getting familiar with FAST science, the giant radio antenna under construction in nearby China, with emphasis on the detection of pulsars and, particularly, millisecond pulsars. This culminated with the supervision of an excellent Sri Lankan USTH student for a dissertation he had to make in the context of the master Space and Applications of this university. They interacted with the author of PRESTO, a major piece of software in this field, in order to read data from the PARKES telescope and simulated pulsar profiles depending on the configuration of the rotation and magnetic axes. They also evaluated the sensitivity of FAST to their observation. Brilliant teacher, brilliant student, a combination that produced an excellent work that has been rewarded with the highest mark of the class. While in Daejeon, Diep met Di Li and George Hobbs, a pulsar expert from CSIRO (Australia) and later had a video conference with Di Li, George Hobbs and some of their colleagues who are working on pulsars.

Diep and George Hobbs in Daejeon at APRIM2014

Diep, who has now become officially the team leader, has been very busy with the organisation of the INST to VNSC move. He recently joined the team effort on the analysis of the Red Rectangle, taking responsibility for

revealing its kinematics (equatorial rotating torus and polar outflows). Together with Tuan Anh, he attended the 2014 Asia-Pacific regional IAU meeting (APRIM) in Daejeon (Korea). It was for them the occasion to present their work and to meet several astrophysicists working in the region.

Tuan Anh and the jury after his thesis defence

Nhung and Hoai spent much of the time covered by the present issue in Paris, where they worked with Thibaut Le Bertre at the Observatoire. They extended the work done on RS Cnc to other stars of the Asymptotic Giant Branch (AGB), with particular emphasis on HI emission, which poses puzzling questions concerning its low abundance. Hoai was in charge of drafting a general article that has been submitted to RAA on three AGB stars which they have studied in detail. Their Plateau de Bure proposal to observe RS Cnc in CO(2−1) has been accepted and the data should hopefully be available in spring this year. Nhung analysed EP Aquarius observations giving evidence for an arc. Together with Thibaut, Nhung and Hoai are thinking of submitting an ALMA proposal aiming at a better understanding of this structure. They attended a topical conference on AGB stars, held in Vienna in August. They presented their work and wrote it down for the conference proceedings. In addition to learning lots of physics from Thibaut, they have had the opportunity to meet several of his collaborators. Back in Ha Noi, they obviously played an essential role in our analysis of ALMA data, in particular concerning the density and temperature distributions of the Red Rectangle. While in Europe, Hoai spent a week in Poland in a conference organised for young European astronomers. She has already written much of her thesis and will defend it in Ha Noi in December. As last year, Nhung has given a set of astrophysics lectures at the Ha Noi University of Sciences.

Tuan Anh defended his thesis in Ha Noi on November 1st. It was the first opportunity to defend a joint supervision thesis in Viet Nam, preceding defences had all taken place in France. Frederic Boone, Tuan Anh's co-supervisor, and Peter Van Ballmoos, from Toulouse university, came to Ha Noi on this occasion, the jury being co-chaired by Peter and Dinh Van Trung. The referees were Nguyen Quang Rieu and Johan Richard. Unfortunately, none of the two could physically attend the defence, but were present on Skype. Johan had lost his passport on his way from Lyon to Ha Noi and had to stay in Paris. As a result, Tuan Anh could be awarded his French degree but not his Vietnamese degree. He is now taking the steps necessary to cope with Vietnamese regulations and has already gone successfully through a new presentation in front of a Vietnamese jury chaired by Dao Tien Khoa, with Dinh Van Trung and Nguyen Quang Rieu (who stayed in Paris) as referees (other members included Nguyen Mau Chung, Diep, Nhung and Nguyen Quynh Lan). Tuan Anh's success has been happily celebrated in several occasions, in particular a dinner in a famous restaurant on the West Lake, to which his parents invited us and the jury members, and a cosier lunch where we drunk a bottle of great Bordeaux wine to the health of Thibaut le Bertre and his wife Patricia, who had offered it to Tuan Anh for him to drink on the occasion of his thesis defence.

Drinking to Thibaut's and Patricia's health after Tuan Anh's thesis

Tuan Anh has been able to communicate to the whole team his interest for the study of the remote galaxies in the early Universe. As a result, we decided to take steps toward having access to ALMA data, the best current source of observations in this field. However, before contacting potential collaborators, in particular from Japan, we thought that it would be useful to get some familiarity with the instrument and the analysis of its data. Taking advantage from the fact that such data are released to open public access after one year of exclusive use by the proponents, Tuan Anh produced a list of observations to which we might have access and we decided on observations of the CO emission by a particularly spectacular post-AGB star (or proto-planetary nebula), called the Red Rectangle. Tuan Anh has reduced the data to an easily exploitable form and is taking a major part in their analysis.

Phuong (second from right) receiving her prize at the VINATOM young researcher meeting

Thao and Phuong have worked together on collecting and analysing observations made with our radio telescope. Data collection included two campaigns of observation of the Moon, at the limit of sensitivity of the instrument, with the aim to measure it and understand its limitations. The Moon emission at 1.4 GHz is thermal from the rock below some 10 cm of dust (the regolith) and essentially insensitive to its phase. The Moon black body temperature was measured as 207±40 K, in good agreement with other, obviously more precise, measurements. A limit sensitivity of ~300 Jy has been inferred, mostly due to instabilities of the gain and radio frequency interferences rather than noise. Thao and Phuong have also analyzed solar flare data that had been previously collected and compared our observations with simultaneous observations made at Learmonth (Australia). The use of different feeds, a dipole at Learmonth and an helix in Ha Noi, allows for a measurement of the polarization of the flare emission, which was found to be very high (70%) in a particular case. Both the Moon and solar flare analyses have produced publications in Comm. Phys. Vietnam. The flare analysis was an occasion for Thao and Phuong to supervise the work of two USTH master students who were spending their internship with us and obtained very good marks for their dissertations.

Phuong (third from left) at the SEAYAC meeting

Phuong attended the 3rd Southeast Asia Young Astronomers Collaboration meeting in Kuala Lumpur, where she gave a presentation entitled “Four years of operation of the VATLY radio telescope: A summary of main results”, briefly summarized elsewhere in the issue. She also attended a conference organized by VINATOM for the younger members of the staff and obtained a prize awarded for the best presentations. As Phuong has now completed the writing of her master thesis, she will try to obtain a six month reduction of the normal master course duration, which is apparently possible.

Thao attended the 36th International School for Young Astronomers (ISYA) that took place in Chiang Mai (Thailand) from November 26th to December 12th and where she presented her work on solar flares.

We had a brief visit from Yannick Giraud-Héraud, whom we invited for lunch together with Daniel Rouan and his wife, who was teaching at USTH and will be member of Hoai’s jury next

year. Yannick was attending a school in Do Son, in the organization of which VNSC played a major part, on satellite observation of the Earth. It was for him the occasion to become aware of the strong demand coming from the Vietnamese earth science community for training in this field. To which extent, and how, this may have an influence on the identity of the master Space and Applications is a difficult but important matter. It contrasts with the absence of serious demand for training in fundamental astrophysics, for which the whole Vietnamese community, apart from us, consists of Dinh Van Trung in Ha Noi, Phan Bao Ngoc in Saigon, and their students. Time was too short to discuss seriously with Yannick other important matters related with USTH and the level of our participation, in particular questions concerning the very different roles played by France and Viet Nam and the very different perceptions of the university that one has from each of the two countries. Our moving from INST to VNSC will, if anything, bring us closer to USTH, of which Pham Anh Tuan is a member of the faculty, and we shall continue and amplify our contributions to the teaching, tutoring and labwork. In particular, Pierre Lesaffre has asked to have Nhung co-supervise with him the PhD thesis of one of his students in the framework of a cotutelle agreement, a very constructive initiative in this context.

Viet Phuong meets Viet Phuong

Last week, we had the great pleasure to welcome Alain Maestrini among us for a short visit; he was giving lectures at USTH and spent time with us in our new offices. A privileged partner in our contacts with VNSC has been Vu Viet Phuong, the senior engineer in charge of the satellite department, with whom we have an excellent contact. We learned from him that he owes his first name to the former secretary of Prime Minister Pham Van Dong, the poet Tran Viet Phuong, who is a friend of VATLY and whose poems Vu Viet Phuong's mother was fond of. We enjoyed inviting both of them for lunch in a very friendly and pleasant atmosphere where they could meet.

The decoration of one of our offices with photographs of the Nobel laureates in astrophysics and brief captions summarizing their work has now been successfully completed under Nhung's efficient direction and has already been transferred to our new VNSC premises.

Recently, an astronomy club has been created at VNSC, with a meeting every second week. Diep, Phuong and Tuan Anh have already given presentations to them. In parallel, USTH students, both undergraduates and master students, have organised a number of seminars which we attended: "Extrasolar planets: How detecting and characterizing them?" by Daniel Rouan (Paris Observarory), "Extrasolar planets: Adaptive Optics and Exoplanet Direct Imaging" by Gérard Rosset (Paris Observatory), "From galaxies to planets: the universe inside your computer" by Elizabeth Tasker (Hokkaido University) and "The sub-millimetre wave instrument onboard the JUpiter ICy moons Explorer (JUICE)" by Alain Maestrini (Paris Observatory). They also organised a Space Day where Diep presented an introduction to astrophysics. Pierre Lesaffre had a brief visit to Ha Noi and took the opportunity to organise an observation using the 40-cm telescope of the Hanoi University of Education.

Last, a major event in the life of the team was the birth on August 30th of the second son of Diep, Khang, who, as you may see in the photo album, is full of energy. Our congratulations to Diep and Dung!

TRANSFER FROM INST TO VNSC

CONTEXT AND POTENTIAL BENEFITS

In this introduction, Diep describes the general context in which our transfer from INST to VNSC has taken place and the benefits which we hope to be able to obtain from it.

We spent fourteen happy years at VINATOM during which the staff of the Institute for Nuclear Science and Technolgy, our host, made us feel welcome and part of the family. Thank to their hospitality, VATLY could grow up and mature. Yet, from the beginning, we were aware that our work was not really serving the interests and the mission of the Institute. We were hoping that some day Viet Nam could afford to create an Astrophysics Institute in one of its universities, but our community is so small that we could not think of that happening soon. The opportunity came to make our dream become reality when we met Dr. Pham Anh Tuan, who attended our April workshop, where he presented the Vietnam National Satellite Center and the Vietnam Space Center project. We were seduced by his enthusiasm and he invited us to join the effort.

We then looked together more concretely at what such a move would imply and we collected more detailed information about VNSC and the future space centre. We sought advice from our friends who know well the Vietnamese scientific landscape and discussed together, trying to identify pros and cons. A first unofficial meeting took place between some of us, Pham Anh Tuan (VNSC director) and Vu Viet Phuong (VNSC vice director). We then quickly unanimously agreed within the team that the transfer of VATLY from VINATOM to VAST would be a positive move. We wrote down points on which to agree and approached the VINATOM and INST directorates in order to seek their views. While expressing their regret to see us leave, they understood the situation and gave us their support.

The paper work went fast. The team moved to VNSC starting beginning of 2015. Now all former VATLY members have permanent or long-term positions with VNSC. Permanent and long-term contracts are essentially equivalent, the only difference being that only holders of a permanent contract can take up management responsibilities. We were given two large rooms, 50 m^2 in total, sufficient for our needs. We left particle detectors and electronics as a gift to VINATOM, they will be used for the training of the young staff. However, the 2.6 m radio telescope will become VNSC property and be moved to the roof of the USTH building on the VAST campus, some 100 m away from our offices, where it will be used for the training of students. Before leaving we were invited to a very friendly farewell meeting by the director of VINATOM, Dr. Tran Chi Thanh, and we gave a seminar to our INST colleagues, summarizing some of our research work. We have now been working in our new offices for a month, all necessary papers have been signed, we have new email addresses and our website will very soon be transferred to the VNSC website.

Group picture in our new offices

I list below excerpts from the terms of the agreement that was promptly reached in relation with our transfer.

1. The aim of VATLY (Vietnam Astrophysics Training LaboratorY) is to establish in Vietnam a research team in astrophysics of international stature and to promote the teaching and research of astrophysics in the country. By the end of the current year (2014) its staff will include four PhDs, one PhD student and one master student […] In addition, Pr. Pierre Darriulat […] spends full time with the team.

2. VATLY is currently hosted in the premises of INST […] Four, and very soon five, of its six members receive a salary from INST. They occupy four offices and make free use of standard facilities at the same time as they occasionally receive some support for small running expenses and services. […]

3. In addition to VATLY, there exist in Vietnam two active astrophysicists […] the universities of education in Ha Noi and Ho Chi Minh City are providing higher education in astronomy […] while Pr. Dao Tien Khoa at INST trains PhD and

master students in the field of nuclear astrophysics. VATLY considers it crucial for the progress of astrophysics in the country to maintain excellent relations with all of these actors of astrophysics research and to foster initiatives to federate their efforts and encourage collaborations in spite of the different administrations on which they depend.

4. Contemporary research in astrophysics makes use of international facilities, whether ground observatories or satellite missions. In particular, VATLY is currently working in collaboration with Observatoire de Paris on Asymptotic Giant Branch (AGB) stars […] and in collaboration with University Paul Sabatier in Toulouse on high redshift galaxies […]. It is also exploring, in collaboration with the National Observatory of China possibilities to collaborate on observations and discovery of new pulsars using FAST, a giant, 500 m diameter radio antenna in current construction in nearby China. To progress in the pursuit of such research, VATLY needs support to enable its members to contribute usefully to international collaborations, to take part in international schools and conferences, to occasionally invite foreign colleagues for short visits. […]

5. VATLY owns detectors and electronics equipment, including a 2.6 m diameter radio telescope tuned on the 21 cm HI line, which are being used for training students and have been given to the team as a gift. VATLY members are contributing to teaching, tutoring and lab work at HUS, HUE and USTH. This is an important part of their mission which must be continued and developed in the future.

6. Recently Dr. Pham Anh Tuan, head of the Vietnam National Satellite Centre (VNSC, depending on VAST) offered VATLY to join his staff. Such a move would enable the VATLY staff to work in a frame better suited to their research activity and more favourable to their progress. In particular, it would make it possible for the team to increase its staff complement by typically one a year for a few years. The proximity of teams working on fundamental astrophysics and teams working on applications to space technology is a major asset to both, each learning from the other. VNSC would provide VATLY with a material and financial support at least equal to that it currently enjoys in INST and would offer it better perspectives for its future development. VATLY would contribute to the life of VNSC in whatever domain, in particular education and training, where its scientific expertise would be of value.

7. It would then be vital for VATLY to preserve their independence in choosing the research projects in which they take part. They would welcome as a clear message of opening to the international scene the establishment of a VNSC international advisory scientific committee […]. VATLY should take an active part in any decision concerning research and higher education in astrophysics and should be consulted in the context of actions aimed at public outreach and high school education (planetarium, relation with astronomy clubs, etc.).

8. Part of the equipment currently belonging to VATLY could be given to INST as a gift, enabling them to use it for training students and young scientists with particle detection, data acquisition and analysis. The telescope and other related equipment should be moved to VNSC and installed on the roof of a high building for optimal operation. It could be used for training, in particular of USTH students, the presence of VATLY in VNSC being an incentive to establish closer relations with this university, in particular with the master Space and Applications.

9. A significant fraction of the wages allocated to VATLY staff has its source in research projects submitted to NAFOSTED. This should be preserved in case the team would be transferred to VNSC.

10. The Science and Technology cooperation between Japan and Viet Nam, recurrently praised by Minister Nguyen Quan, is an essential element in the development of VNSC. We believe that we could, within the limits of our competence, contribute to its success and, at the same time, take advantage of the possibilities it might offer in terms of closer contacts with Japanese astrophysicists, including possible short visits, common seminars and even collaborations.

11. In summary, the transfer of VATLY from INST to VNSC could be a dynamic factor benefiting both fundamental research in astrophysics and R&D and technology in space applications. It should be understood as a win-win initiative. VNSC should offer VATLY working conditions enabling its progress as detailed in the above paragraphs. VATLY should contribute to VNSC in any domain where its scientific expertise would be of value. […]

END OF YEAR MEETING OF THE VNSC TEAM

Under this heading Thao reports briefly on the end of year VNSC meeting to which we were invited, and which was followed by a visit to the site of the future Space Centre in Hoa Lac and a banquet.

The Vietnam National Satellite Center (VNSC) was created in 2011 under the Vietnam Academy of Science and Technology (VAST) by Prime Minister Nguyen Tan Dung. Its mission is to establish an R&D and industrial hi-tech sector in the domain of space technology of regional and international standard, with the aim to help socio-economic development. It has produced successfully a 1 kg "pico" satellite that was launched in 2013 and flew for about three months during which it could be followed from ground. The team is now preparing for the production of a 50 kg "micro" satellite in collaboration with Japan and is working on a proposal for a "nano" satellite of between 6 and 10 kg. The "micro" satellite will be launched in 2018 and will observe seasonal changes in ocean surface topography, currents, sea surface temperature, etc. in order to evaluate the evolution of the fish population, and establish new fisheries. It will monitor clouds and the aerosol distribution in the atmosphere to contribute to weather forecast. The "nano" satellite would be used to train young engineering students on all processes of satellite development and achieve missions such as monitoring and evaluating agriculture, forest fire detection, etc. The present VNSC staff includes hundred or so technicians and engineers and will grow to some three hundred by 2020. In order to cope with such a rapid development, twenty-two engineers and technicians were sent last year for training to several universities and institutes in Japan where they spend two years. Fourteen more will be sent this September.

The Centre is very happy to welcome our group under its roof as its Department of Astrophysics and we appreciate working for a very new and dynamic organization. Dr. Pham Anh Tuan, director of VNSC, invited the whole group to attend the end of year meeting and hear reports on what had been achieved during the year and what was planned for next year. In 2014, VNSC joined the Group on Earth Observations (GEO) that coordinates international efforts to build a Global Earth Observation System of Systems (GEOSS). Viet Nam is their 96th member. VNSC organized successfully a school on Environmental Monitoring from Space from 8th to 13th of December in Do Son. Progress on preparing for the construction of the future Space Centre in the Hoa Lac high-tech Park has seen the 7.4 ha site being levelled and the pond that it hosted being filled. Construction of the infrastructure will start in 2015. In recognition for the hard work, VNSC has been rewarded by VAST with an appreciation of excellence.

Left to right: Tuan Anh, Pierre, Anh Tuan and Diep at future site of VNSC and the Space centre in Hoa Lac

In 2015, a new branch will be created in Ho Chi Minh City, specialized on applications of space observations; in parallel, a training programme will be implemented in collaboration with the International University in order to train students in space engineering and technology. A similar programme will be set up in Ha Noi.

After the meeting, Pham Anh Tuan guided everybody to a visit of the site of the future Space Centre, after that he invited us to a nearby restaurant where we were treated with a splendid lunch, for which three mountain pigs had been prepared according to various delicious recipes.

We shared a good and memorable day with our future colleagues and we take the opportunity to deeply thank Dr. Anh Tuan for his friendly welcome.

FAREWELL MEETING AT VINATOM

The Head of VINATOM invited the whole team to an informal meeting followed by a lunch. Nhung reports about this token of friendship which touched us very deeply.

Bac Pierre receiving a farewell gift from Dr. Tran Chi Thanh

Our transfer to VNSC has been the occasion for Dr. Tran Chi Thanh, Head of VINATOM, to invite Bac Pierre, together with our whole team, to an informal meeting in the premises of the VINATOM headquarters. He was accompanied by his staff, including vice-directors Nguyen Hao Quang and Cao Dinh Thanh, and our former friend and colleague Pham Ngoc Dong. For over two hours, we exchanged views on past achievements and wishes for future successes. Dr. Thanh expressed his appreciation for our style of team work, saying that it was setting an example for what is needed in the nuclear field. In answer, Bac Pierre expressed his deep gratitude to VINATOM in general and to Dr. Thanh in particular. To VINATOM for the unconditional and friendly support that was given to us during the nearly fifteen years that we have spent in INST and to Dr. Thanh for his constant interest in our progress. He said that we were completely integrated in the INST environment and always felt welcome as members of their family; however, VNSC offered a framework better suited to our work, and we had to listen to our reason rather than to our heart. Dr. Thanh commented on the progress in the nuclear sector and his plans for the future. He mentioned in particular the organisation of a national conference on Nuclear Science and Technology which will be held in Da Nang in August and the creation of a nuclear centre in the neighbourhood of Hô Chí Minh City where various skills would be brought together, including in particular those acquired by the Da Lat Institute and their thirty year experience with the operation of the research reactor. He asked Bac Pierre to continue helping him with supporting comments, as he had done in the past; to which Bac Pierre answered that he will always be happy to help within the limits of his modest competence and expressed his satisfaction to see that the Da Lat experience will be made good use of. Before closing the meeting, Dr. Thanh presented Bac Pierre with a beautiful silkwork displaying orchid flowers, to which Bac Pierre answered by saying that he was deeply moved by this token of friendship. We then moved to one of the best restaurants in town, *Le Tonkin*, where we were offered a splendid lunch. The weather being particularly mild on that winter day, the table could be set outside. We all have been very touched by this expression of appreciation and support of our efforts, and are happy to have here the opportunity to thank wholeheartedly Dr. Thanh and his staff for his initiative.

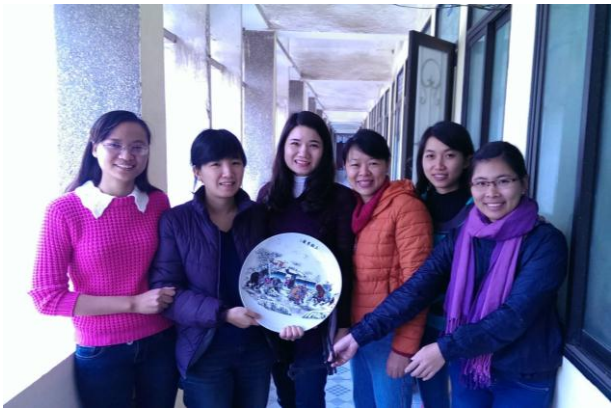
Farewell lunch with Dr. Tran Chi Thanh and his staff

FAREWELL SEMINAR AT INST

Tuan Anh reports on a seminar, followed by a buffet, which we offered to the INST staff to bid them farewell

Having been members of INST staff for nearly fifteen years, we felt that before leaving we should express our gratitude to our colleagues and organize a farewell meeting where we would

summarize our main activities, comment about the move and the future in front of us. The Institute kindly approved the initiative and organized a special seminar. Dr. Nguyen Tuan Khai, Vice-director of INST, said some kind words on behalf of the Institute, briefly recalling what we had achieved in the past fifteen years and thanking us. He wished us much success and expressed the hope that we would keep close contact and collaborate with them on training tasks. Diep, on behalf of the team, thanked the Institute for having made us feel welcome and having given us support, and our colleagues for the friendly and kind relation they maintained with us. He then went on recalling the early days of the laboratory, its main activities and its membership over the years. It started with cosmic ray work in collaboration with the Pierre Auger Observatory, which obtained many important results to which we significantly contributed.



Phuong, Nhung and Hoai with INST colleagues after the farewell seminar

Next Nhung commented on the transition from Vietnam Auger Training LaboratorY to Vietnam Astrophysics Training LaboratorY. She reported about our current studies, concentrating on radio astronomy, and what has been done at the Institute using our 2.6 m radio-telescope. She presented the main results which Hoai and herself have obtained on AGB stars in collaboration with Observatoire de Paris, and commented on their plan to extend such studies using new observations. I was next to speak and summarized the work on a gravitationally lensed high-redshift galaxy in collaboration with Toulouse University (IRAP). The study of high red-shift galaxies, a very promising field at the forefront of modern astrophysics, is a research direction that we want to pursue. The ALMA interferometer in Chile is the best tool for this kind of observations at submm/mm wavelength and we hope very much that after having moved to VNSC we shall be able to access its data by collaborating with Japanese research teams. To prepare for such collaboration, as a first step, we used ALMA public data on the CO emission from the Red Rectangle which we have now analysed. Diep then closed the presentation with a summary of our training activities and commented on our motivation for moving to VNSC before wishing the Institute to play an important role toward the success of the Nuclear Power Plant project.

After the seminar, we invited all participants to a great buffet that we had prepared under Nhung's guidance and with much friendly help from colleagues in other groups. It made us feel very happy to see so many friends enjoying the event and sharing with us wishes for a successful future.

AN INTERVIEW OF PHAM ANH TUAN, HEAD OF VNSC

Under this heading Nhung and Diep report on an interview which they made of the head of VNSC, Dr. Pham Anh Tuan.

Dr. Pham Anh Tuan

VATLY: Dr. Pham Anh Tuan, could you kindly summarize what is your long-term vision of the mission of VNSC and what are your short-term plans?

Dr. Pham Anh Tuan: In 2002, in order to promote research and application activities in space

technology, with the aim of fostering industrialization, modernization and sustainable socio-economic development in Vietnam, the Government assigned Vietnam Academy of Science and Technology (VAST) an important task: the task of defining the strategy and development plan for space technology in coordination with the Ministry of Science and Technology (MOST) and other relevant ministries and offices.

As a result, in June 2006, the Prime Minister approved "The Strategy for Research and Application of Space Technology until 2020" which identifies the objectives and approaches for space technology applications aimed at the socio-economic development of the country. The overall concept of the Strategic plan is to develop sectors concerned with natural resources management, environment and natural disaster monitoring and national security, in order to enhance our international status and skills in science and technology. By 2020, Vietnam will have the capacity to design, manufacture, test and control Earth observation satellites serving such purpose.

The Strategic plan concretized in May 2013 with the successful launch of VNREDSat-1, an 120 kg Earth observation optical-sensor satellite manufactured and launched by France, the first to be dedicated to the monitoring of natural resources, environment and risks in Vietnam. It has been acquiring images of the Earth, with a passage over Vietnam every three days, which are being received and processed by the Space Technology Institute and National Remote Sensing Centre.

Vietnam is also using two geostationary communication satellites VINASAT-1 (launched in April 2008) and VINASAT-2 (launched in May 2012). Several Vietnamese engineers were trained on this occasion and are now able to master the operation and exploitation of VINASAT communication satellites, the data of which are being processed by the Vietnam Post and Telecommunication Group (VNPT), Ministry of Information and Communication.

Immediately after approval of the Strategic plan, I have been involved in managing a young research group working on the design and manufacture of small satellites as the Vice Director of the Space Technology Institute (VAST). I then proposed the idea of creating a Space Centre with the purpose of building a solid base for the development of space technology on three main pillars: human resource, infrastructure and technology. In September 2011, the Vietnam National Satellite Centre was established in VAST by decision of the Prime Minister and in November of the same year, Vietnam and Japan signed a loan agreement for the Vietnam Space Centre (VSC) Project. Preparing for the efficient operation and exploitation of this centre is an essential mission of VNSC.

A recent success of VNSC is the construction of a small satellite, PicoDragon launched into space from the ISS on November 19th 2013 with the help of Japan. With a weight of 1 kg and a cubic volume of 1 litre, it had a lifetime of three months during which its signals were received by VNSC. The challenge of constructing in Vietnam a satellite that could pass acceptance tests for being launched into space was enormous. In the wake of this success, VNSC is now preparing for the production of two larger satellites to be launched before the end of the decade.

In my opinion, capacity development is the most important strategic task for the development of space technology of Vietnam. As director of VNSC, my main concern is the development of a qualified workforce that will become the main workforce of space technology in Vietnam in the future. Currently 60% of VNSC staff members are under 30 years old. VNSC has both a short term and a long term training plan: 18 staff members have been sent to a course on project management; in the next three years, 54 engineers will be trained in satellite technology, 36 of which will attend Master courses in five Japanese universities. In addition, 32 more will attend satellite technology applications courses abroad. After having received such training, this workforce will have opportunities to work abroad in space centres and private companies and become familiar with the technology of designing, integrating and testing satellites. Along with sending qualified staff to study abroad, VNSC has signed a MOU with the University of Science and Technology of Hanoi (USTH) for graduate courses in space technology and application and is collaborating with the University of Technology (VNU, Hanoi) to train students on the design and manufacture of space equipment, the operation of

ground stations, space technology applications, space propulsion devices, etc. VNSC has also signed a similar MOU with the International University (VNU) at Ho Chi Minh City for Space Engineering & Science.

In the long run, VAST will submit a training program for capacity development in space technology to the Government for approval.

VATLY: Could you tell us a little more about the future Space Centre?

Dr. Pham Anh Tuan: VAST has been appointed by the Government to establish the Vietnam Space Centre (VSC) in Hoa Lac with Japan support for design and construction. On this occasion, the Prime Minister stated: "This is a key investment project, creating the core basis for the implementation of Space technology R & D, education, applications and international cooperation, and for the implementation of our Strategic plan until 2020." As I already said, an essential task of VNSC is to manage and implement this project.

VSC is funded at the level of about 54 billion yen with the mission of mastering the technology of small Earth observation satellites being able to observe the whole territory of Vietnam in any weather condition with modern radar technology. It will acquire the skills required for the design and manufacture of satellites and exploit their images to the benefit of the socio-economic development of the country. VSC is responsible for developing and manufacturing satellites and for processing data for the early warning and monitoring of natural disasters, early forecasting of agricultural products, marine resources, updating digital mapping system for land management and planning, global climate change research and adaptation. VSC will develop a professional workforce having the skills and know-how required for the efficient exploitation of space technology and its applications. VNSC will send nearly a hundred engineers and managers to Japan to participate in training courses in Satellite Technology and Applications, and Management and Operation of VSC.

VSC premises include a Satellite Control Centre, Satellite Assembly, Integration and Test (AIT) Centre, facilities for small satellites, an administration building, a planetarium and Public Education Centre, a laboratory for the reception and processing of satellite images.

On the front of technology transfer, VSC will be home to the exploitation of two satellites: LOTUSat1, manufactured in Japan with the participation of Vietnamese engineers, and LOTUSat2, designed and manufactured in parallel with the construction of satellite testing and assembly infrastructure in Vietnam. After completion, there will be on-the-job training in satellite integration, assembly and testing at VSC. Skills in ground station exploitation and satellite operation technologies will be transferred after the launch.

In the long run, VSC will become a centre for research and manufacture of small satellites aimed at satisfying the demand of the country in terms of weather forecasting, monitoring, exploration, radio and television broadcasting, search and rescue, climate change and natural disaster impact mitigation, natural resource management and environmental monitoring.

Upon completion of the VSC project in 2020, Vietnam will have the most state-of-the-art centre for R&D, education and training in Space technology of its kind in Southeast Asia; and by 2020, Vietnam will master the manufacturing of small Earth observation satellites.

VATLY: We are convinced that our transfer from INST to VNSC has been a good move from our part, providing an environment better suited for our progress. We also hope that it will make it easier for us to collaborate with Japanese astrophysics teams, implying access to facilities at the forefront of current research, such as ALMA. Could you comment on these points?

Dr. Pham Anh Tuan: I am also convinced that the establishment of the Department of astrophysics at VNSC will be beneficial to all of us. We are sharing the same interest in space science and technology, the same aspiration for excellence and rigour in our work, the same ambition to lift up the position of the country on the international scene. Having close contacts between fundamental and applied research is recognized worldwide as a major asset, which has proven to be particularly true in our fields.

I am a strong believer in international collaboration as an essential part of the

development of space technology in Vietnam. I have always actively promoted international cooperation with partners from Japan, United States, Europe, Russia, India as well as with ASEAN members and other countries. Our ties with Japan are particularly strong in view of the privileged role that they are playing, in particular in the framework of the VSC project. I would therefore be very happy to see closer links being tightened between your group and the Japanese astrophysics community. As you know, Professor Masahiko Hayashi, head of National Astronomical Observatory of Japan (NAOJ), will visit VAST in April this year and this will be an excellent opportunity for you to discuss the issue with him. More generally, I know that you are having a fruitful collaboration with the Observatoire de Paris on the study of AGB stars and contacts with Chinese scientists preparing for the giant antenna, FAST, under construction in nearby China. I can only encourage you to pursue and intensify such very beneficial relations.

VATLY: You are holding a leading position in the management of the Master "Space and Applications" at USTH. As you know, we maintain close relations with this university. Would you encourage us to strengthen them?

Dr. Pham Anh Tuan: In answering your questions, in many occasions, I've emphasized the importance that I attach to the training of a competent workforce in the field of space technology. As I said, I consider it the top priority and the most challenging part of my mission. In particular, establishing strong links between VNSC and universities is essential. Needless to say, you are in a position to play an important role in this respect and I encourage you to have close contacts with the academic community in Vietnam. USTH plays a privilege role in this context, with a master on Space and applications, together with the University of Technology, which is also developing training specialized in this domain. I am therefore particularly pleased to see you contributing actively to the teaching, tutoring and labwork at USTH. The need for university training in space technologies and applications is immense and new developments should be welcome at any other university as well. As I already had a chance to tell you, VAST itself is considering to play a central role in such training and VNSC, with its current Satellite Basic Course sending students abroad, in particular to Japan, is concretely giving evidence for its determination in this respect.

VATLY: A last question concerning the adhesion of the country to the International Astronomer Union (IAU). As you know Vietnam has been an "interim" member from 2009 to 2010, meaning paying half the fee but having no right to vote. The adhering organization, meant to serve as a link between IAU and the country, was at the time the Vietnam Society of Astronomy and the Department of Physics of Ha Noi University of Education. As they failed to pay the fee in 2010 and 2011, Vietnam was downgraded to the status of "prospective country", meaning having no right at all. With VAST hosting VNSC and the Institute of Physics, the latter being the place where Prof. Dinh Van Trung works, it seems to us that it could become the adhering organization and, at the same occasion, Vietnam could become a full IAU member, thereby restoring the good image that the country should hold on the international scene. Are you supportive of the idea?

Dr. Pham Anh Tuan: Yes, I am very supportive of the idea. I attach much importance to our maintaining good international relations, and I know that the benefits we obtain from IAU by far surpass the fee that has to be paid. I have read the IAU Strategic Plan 2010-2020 for "Astronomy for Development", which matches very well the needs of a country in the state of development in which we are. I also understand that you maintain good relations with IAU members in Japan, Korea, Thailand and France, and that you recently obtained, in several occasions, support to travel to regional conferences in spite of Vietnam having been downgraded to the status of prospective member. I am therefore prepared to plead the case to the VAST directorate if you and your colleagues officially ask me to do so.

RECENT MEASUREMENTS USING OUR RADIO TELESCOPE

Under this heading, Phuong gives a very brief summary of the main results obtained using our radio telescope over the past four years.

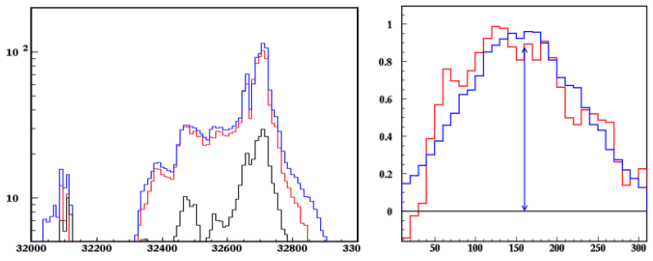
Four years ago, for less than ten thousand dollars paid from money given to us as a private gift, we acquired a 2.6 m diameter radio telescope, which we installed on the roof of the laboratory. It is remotely steerable and its parabolic antenna (the "dish") collects radio waves having frequencies around 1420 MHz, which are incident on it within some 2^o from the axis. Every 8 seconds, accurate frequency spectra are produced and stored in a desktop for further analysis. They display very clearly the 21 cm line produced by atomic hydrogen, reaching distances of over hundred thousand light years, allowing for the detection of astronomical objects beyond the limits of our own galaxy. The precise measurement of the line frequency gives, by Doppler effect, the velocity at which the source moves away from us (red shift) or toward us (blue shift). This feature has been used to map the disk of our galaxy, the Milky Way, providing evidence for its known arm structure and for the radial dependence of its rotation velocity, an indicator of the existence of dark matter.

Emission at frequencies above and below the hydrogen line (the "continuum") reveals the presence of warm matter or of ionized gas. We dedicated several campaigns of observation to study the Sun, which happened to cross the maximum of its 11 year cycle of activity during the recent years. Main results cover the observation of several solar flares, reaching amplitudes over an order of magnitude above quiet Sun emission, and the detection of tiny oscillations, at the level of a few permil, with periods of some six minutes. In both cases, the comparison of our observations with those simultaneously made by an Australian observatory, the Learmonth Solar Observatory, located at the same longitude but opposite latitude as Ha Noi, offered us – as a gift – unexpected surprises.

In the flare case, the use of different sensors (the "feeds") collecting power at the focus of the dishes, a dipole in Learmonth and a helix in Ha Noi, revealed the presence of a very strong polarization (~70%) of the emission of an after-flare following a large flare that erupted on October 25th, 2013.

In the case of oscillations, we had been puzzled by a strong correlation between the periods of oscillations observed in Ha Noi and that of similar oscillations simultaneously observed in Learmonth. Such correlation between two distant telescopes seemed to exclude instrumental effects and, consulted experts having failed to find an explanation, we published our findings in *Solar Physics*. Determined to find out what was going on, we devoted a new campaign of observations to the issue and finally understood that the oscillations were caused by interferences between the direct wave collected in the main antenna lobe and its reflection on ground detected in a side lobe (so-called "multipathing"). The correlation was simply due to the fact that the Earth rotates at the same speed in Viet Nam and in Australia! This made another publication in the journal of the Australian Astronomy and Astrophysics Society, *PASA*.

We also spent much time with the telescope pointed to the Moon, a radio source at the limit of the ability of our telescope, therefore a convenient target for the study of its sensitivity. The radio emission of the Moon is thermal and arises from below the surface, underneath a layer of dust (the "regolith"), where the rock is heated by conduction. We were able this way to measure the black body temperature of the Moon as 207±40 K and the limit sensitivity of the telescope as ~300 Jy, not caused by noise but by time variations of the gain, partly associated with its dependence on ambient temperature, and by the presence of radio frequency interferences (RFIs) of human origin.



Left: solar flux measured during the eruption of a flare in Learmonth (red), San Vito dei Normani (blue) and Ha Noi (black) giving evidence for a 70% polarization. Right: the observed (red) emission of the Moon as it transits across the beam of our telescope compared with a model (blue)

In addition to having provided material for two master theses, six publications in refereed international journals and several presentations at

conferences and schools, the instrument, more importantly, has made us familiar with basic methods of radio astronomy and has given us the opportunity to be introduced to several very interesting chapters of astrophysics. We are very grateful to radio astronomers from abroad, Nguyen Quang Rieu (France), Alan Rogers (United States) and Owen Giersch (Australia), who have very kindly helped us by answering many of our questions. The telescope will now be moved to the roof of the USTH building, close to our new VNSC offices, and will be used for the training of students.

ALMA OBSERVATIONS OF THE RED RECTANGLE

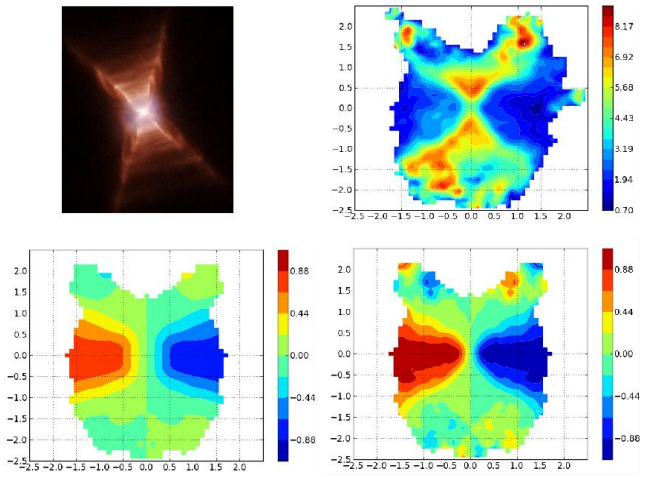
Under this heading Tuan Anh sketches the main results obtained from the analysis of ALMA observations of a proto-planetary nebula called the Red Rectangle.

Having spent the three years of my PhD thesis on the study of a remote galaxy, at a redshift of nearly 3, I have naturally become interested in this fascinating chapter of astrophysics, which explores the early Universe at a time when the formation of new stars was at its maximum. This interest being shared by the rest of the team in Ha Noi, we decided to select this topic as one of our preferred lines of research (others being AGB and post AGB stars in collaboration with Thibaut Le Bertre at Observatoire de Paris and, later, millisecond pulsars in collaboration with Di Li at the FAST antenna under construction in nearby China). The recent start in Chile of the world most powerful radio interferometer, the Altacama Large Millimetre/submillimetre Array (ALMA), points to it as the best place for such studies. However, the competition to obtain observation time is very harsh: a proposal that I had submitted together with my thesis co-director in Toulouse had not been retained. Moreover, Viet Nam not being part of the ALMA partnership, we are not allowed to submit proposals on our own. Our new affiliation with VNSC, which is at the heart of the Japan-Vietnam R&D cooperation agreement, takes us closer to the Japanese scientific community, very active on ALMA, and may make it easier for us to have access to ALMA observations by collaborating with Japanese teams. Before taking concrete steps in this direction, the team felt that it would be advisable to get some familiarity with the instrument by taking advantage of its open access policy: one year after the end of the observing period, data are made available to the public. I selected, among the 200 or so data sets that have been opened to public access in November 2013, a short list of five from which the team decided on observations of the CO emission of the Red Rectangle. We have now completed the analysis of the data and submitted the outcome for publication.

ALMA is the world largest and most sensitive instrument at millimetre and submillimetre wavelengths, located in the Atacama desert of northern Chile, on a plateau at 5,000 m altitude. It consists of sixty-six 12-metre and 7-metre diameter radio telescopes observing in all atmospheric windows between 350 μm and 10 mm, in configurations from approximately 150 m to 14 km. It is an international partnership among Europe, the United States, Canada, East Asia and the Republic of Chile. Costing about 1.4 billion US$, it started operation in the second half of 2011 and the first images were released in October of the same year. The array has been fully operational since March 2013. The spatial resolution of 10 milliarcseconds is an order of magnitude better than that of the VLA and 5 times better than that of the HST. The velocity resolution is under 50 m/s.

The Red Rectangle is a dying star in the process of getting diluted in the interstellar space and become what is called a Planetary Nebula. It owes its name to its appearance in the visible, caused by a biconical structure having its axis perpendicular to the line of sight. The star in the centre is a binary made of the dying star itself and a secondary star accreting the wind of the former in a disk perpendicular to the star axis and therefore to the sky plane. The secondary star is usually considered to be a low mass main sequence star but some authors argue in favour of a white dwarf. The general idea is that a fast jet normal to the accretion disk has dug a conical cavity in the slow wind of the dying star. The appearance at visible wavelengths is complicated by the fact that the light observed is the light emitted by the star and diffused on the walls of the conical cavities, direct light being prevented to reach the Earth by the presence of a dense dust torus around the star. Radio and millimetre

wavelength observations are not affected by this problem and provide undistorted images of the gas envelope. Until recently, the only millimetre image available was a Plateau de Bure observation of CO emission, with a resolution of ~1". The recent availability of ALMA observations in CO(6-5) and CO(3-2) with an order of magnitude better resolution was therefore an excellent opportunity to obtain important new information on the morphology and kinematics of the gas envelope surrounding the Red Rectangle.



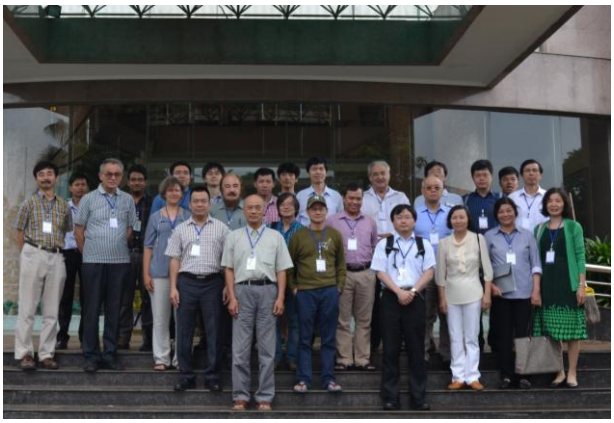
Top left: the Red Rectangle as seen by the Hubble Space telescope; Top right: ratio of CO(6-5) to CO(3-2) data showing the temperature distribution dominated by the biconical outflow; Bottom: evidence for rotation of the equatorial torus in CO(3-2) (left) and CO(6-5) (right)

Our analysis has revealed the presence of two sharply separated gas volumes: a broad equatorial torus in rotation around the star axis, with velocity decreasing in inverse proportion to the distance from the central star, and a bipolar outflow, with an expansion velocity on the order of 6 km/s. Comparison of the CO(6-5) with the CO(3-2) data allows for a measurement of the gas temperature, which is found much cooler in the equatorial torus than in the bipolar outflow. The main features of the gas dynamics have been measured to distances up to ~2" from the central star and described by simple models. The continuum data reveal the dust morphology, which is observed to be elongated along the equatorial plane of the star, in contrast with the gas, elongated along the star axis.

NUCLEAR PHYSICS, PARTICLE PHYSICS AND ASTROPHYSICS: WHICH CHOICE FOR VIET NAM?

The 39th National Conference on Theoretical Physics was organised in July in Buon Me Thuot by the Viet Nam Theoretical Physics Society in parallel with an International Workshop on latest results in nuclear physics, particle physics and astrophysics. We reproduce below the presentation that Bac Pierre gave on this occasion.

The conference, covering three major fields of contemporary physics, nuclear physics, particle physics and astrophysics, is a good opportunity to ask how much effort Viêt Nam can afford to devote to each. Ideally, we would like to be able to answer that such a question is out of place, that we must obviously spend resources on each of these fields and on fundamental research in general, a prerequisite for good universities and successful applied research, R&D and industry. However, the real world in which we live is very far from such ideal. The constraints imposed on fundamental research require the enforcement of a very rigorous scientific policy aimed at making optimal use of the limited resources that the country can afford to devote to fundamental science. This simple fact motivates the present comments, which, however, have no pretension at contributing much wisdom but are simply meant to trigger discussion.



Bac Pierre attended the 39th National Conference on Theoretical Physics in Buon Me Thuot

A few general remarks

Physics is the result of a constant dialogue between theory on one side and experimentation and observation on the other. They feed each

other, the progress of each being fuelled by the achievements of the other. It is a common disease of less developed countries to ignore this fact and teach their students that they should become theorists if they are bright, experimenters otherwise. Fifteen years of being in close contact with Vietnamese students have shown me that the country does not make exception to the rule. It is bad practice, not so much for the selection which it implies – which turns out fortunately to be nearly irrelevant – than for the wrong idea that it imprints in the brains of young students of what physics really is.

We must avoid training students, either at home or abroad, in fields that are not given proper support at home. A better way to say the same thing: we must give proper support to fields in which we choose to train students. Not doing so is irresponsible: it is wasting their skills and talents. Proper support means supporting teams that exceed some critical mass and giving them means to compete on the international scene. Praising team work does not mean at all depreciating individual achievements. The recent awards of the Ta Quang Buu Prize are a bright illustration of such successes. But a scientific policy can not pretend making clever individuals, indeed it is not its role; it can only help them making the best of their talents. We need to support teams that exceed the critical mass beyond which a sustainable effort becomes possible.

Which criteria should we use to select such teams? as physicists, we must have a judgement of the chances of the fields in which they work to bear fruits on a reasonably short time scale at the frontiers of present knowledge. Physics keeps evolving, domains that were in the forefront a few decades ago may have lost much of their interest today. A more practical criterion is the presence in the country of team(s) having the competence and motivation to succeed and having the potential to become the seed for a successful presence on the international scene. Other arguments that have some weight in the decision are a realistic assessment of the means required on a long range in terms of financial and manpower resources and of the training opportunities offered by the field with respect to the needs of the country in applied research, R&D and development of its industry.

The amount of resources that need to be devoted to experimental physics in each of the three fields deserves some comments. They are part of what one calls big science and make exclusive use for their research of expensive equipment that is operated and maintained on an international scale. Supporting those implies, in priority, making it possible for their teams to use major international facilities which Viêt Nam cannot afford to have at home (e.g. LHC, VLA, RIKEN, etc). In addition they need some cheap and simple tools at home that are good for training (e.g. small radio telescope, radiation analysis and spectrometry instruments, cosmic ray detectors, etc.) but the resources devoted to such instruments can and must be kept to a minimum. We need to invest in brains, not in instruments. Decisions to buy expensive equipment should never be taken top-down but be in response to pressing and justified bottom-up requests.

For both experimental and theoretical physics, adequate computing means must be accessible. Here again, it does not necessarily mean having them at home. There exist today many opportunities to make use of large computing and data handling networks that are managed at international level.

Nuclear physics

Nuclear structure theory has its tool, Hartree-Fock-Bogolioubov mean field and quasi-particles, since the early sixties and its theory, QCD, since the late seventies. Yet, nuclear physics has still a place in the foreground of contemporary science for at least three reasons: one is the central role played by nuclear physics in modern astrophysics, in particular in the description of supernovae collapses, another is the revival given to experimental nuclear structure studies with the availability of radioactive beams giving access to studies of nuclei far from stability. The third reason, possibly the most important, is the need to train nuclear physicists in a world where nuclear applications are ubiquitous, whether in industry, medicine and biology, material sciences, military applications and energy production.

The latter is particularly important in Viêt Nam, now committed to the construction of nuclear power plants in Ninh Thuân in the frame of agreements signed with Russia and Japan. As is well known, and repeatedly declared by competent Vietnamese scientists having

experience with the Da Lat reactor, we are unprepared for the event and, for now fifteen years, we have proven unable to train the team of engineers and scientists required for the task. It has already caused a six year delay to the project, a huge waste of money. The United States had Argonne and Oak Ridge, Soviet Union had Obninsk, the United Kingdom had Harwell, France had Saclay, we have no institute centralizing the effort. The United States had Fermi and Walter Zinn, Soviet Union had Kurchatov, the United Kingdom had Cockcroft, France had Joliot-Curie, we have a committee but no one in charge. We, as scientists, must feel responsible for the success of the project. The day the Government and the population will realize that Viêt Nam is loosing its independence in terms of energy or the day there will be a major nuclear accident, they will rightly turn to us and blame us for not having prevented it when we could have done it. It is time to make the Government conscious of the pressing need to change style. At the occasion of the celebration of the 30th anniversary of the Da Lat research institute, in the name of the Minister of Sciences and Technologies, his deputy Lê Dinh Tiên praised the Da Lat Nuclear Research Institute for its achievements during the past thirty years and for the asset represented by its staff *"in view of a successful implementation of the nuclear power development program"*. He added that *"in order to implement it the Ministry has been given the important task to establish a large Centre aimed at enhancing the national nuclear infrastructure [...] and at training a staff having the ability [...] to build, operate and maintain safely and efficiently nuclear power plants."* He concluded by asking the Vietnamese nuclear community *"to devote more manpower, brainpower and time [...] to speeding up the implementation of the project"*. It is clear that the Government, starting from the level of the Prime Minister, expects the nuclear physics community to play a major role in this endeavour. It would be irresponsible to be deaf to such a message.

Particle physics

We are still under the excitement of the discovery of the Higgs particle, two years ago. It was the triumphal reward of nearly thirty years of effort to search for the last missing piece of the Standard Model. However, a frightening scenario is threatening us, which we all hope will not materialize: one in which no other major discovery would be accessible to LHC. For now more than three decades, experimental particle physics has kept confirming the predictions of the Standard Model with always better accuracy without finding hints of what happens beyond it. In particular, no evidence has been found for the existence of supersymmetric partners of known particles in spite of the extreme beauty and attractiveness of SUSY. The future of experimental particle physics would look very gloomy, by lack of arguments setting a scale for future explorations (other than the GUT/Planck scale!), if no sign of new physics could be revealed at LHC. It would make the case for a new (linear) accelerator very weak, at strong variance with the cases of LEP and LHC, each of which enjoyed extremely strong and convincing arguments for the defence of its proposal.

For Viêt Nam to contribute efficiently to experimental particle physics, it needs building a team with proper expertise. Today, it is very far from it by lack of adequate support. It is time to decide whether we wish or not to support experimental particle physics in the country. If yes, we should give it proper support. If no, we should stop sending students abroad to be trained in a field for which there is no future in Viêt Nam.

Astrophysics

Astrophysics is by far the most dynamic of the three fields. Three decades ago, many astrophysicists did not believe in black holes! We now know that there is one at the centre of essentially each large galaxy. High precision studies of the Cosmic Microwave Background observe the Universe only half a megayear after the Big Bang and also learn about the re-ionization period when the first stars and galaxies formed. Observation of high redshift galaxies (up to z=10!) brings detailed information on the early formation of structures in the Universe. [...] Spectacular progress has been made in the understanding of how stars form, live and die.

Astrophysics is the domain of three of the most puzzling questions of contemporary physics, dark energy, inflation and dark matter. The park of observatories at all wave lengths, both ground based and in space, keeps growing and improving

performance in terms of both sensitivity and angular resolution. In East Asia, Japan, with a very rich ground and space programme, China, in particular with the construction of a giant radio antenna not far from Ha Noi, Korea and Taiwan play a major role. Access to data from all large observatories is possible by association with international collaborations.

Expertise exists in Viêt Nam in radio astronomy (legacy of Nguyen Quang Rieu), at Hô Chi Minh City and Ha Noi. The development of space applications, with important resources allocated to the Viêt Nam National Satellite Centre, in particular for the observation of the Earth, is the sign that the Government means to strongly support this effort.

Summary

Given the limited resources available for fundamental research in the country, we should consider it our duty to select the topics on which to work with extreme care. In particular we should make sure that students are trained on topics that are likely to receive significant support in order not to waste talents and skills. A better balance between theory and experiment/observation must become a priority in order to progress. A few arguments of likely relevance have been tentatively presented. They have no pretension to carry special wisdom but are simply meant to provoke discussion and, hopefully, action in the near future. Vietnamese outstanding competences exist abroad, they should be invited to contribute to such discussions.

OPEN LETTER TO THE MINISTER OF EDUCATION AND TRAINING

Pierre reports on an open letter that he sent to the Minister of Education and Training concerning the regulations attached to the award of a Vietnamese PhD degree and on how it has been received.

Having tried, for years, without success, to enforce the joint supervision (cotutelle) agreements that had been signed in relation to the PhD theses of Nhung, Diep and Dong, and concerned about the future, in particular in the context of USTH cotutelle theses, I wrote an open letter to the Minister of Education and Training, of which I reproduce below large excerpts.

[...] During all these years, I have witnessed a number of such flaws in our system that tend to be source of paralysis and sclerosis and prevent progress, mostly associated with bureaucracy, less often with insufficient morality. It seems to me that a few of these could be corrected without too much effort. After all these years, I feel naturally concerned by the country giving abroad a bad image of itself, probably as much as Vietnamese do.

Emblematic of such dysfunctions is the regulation that governs the award of a PhD degree to young postgraduate students. I should like to take it as an example to illustrate my point. My direct experience [...]

[...] In spite of what had been agreed in very clear written agreements signed at high level in the participating universities, none of the three joint-supervision students has obtained his PhD degree in Viet Nam. The defence of their theses has taken place in France, obeying scrupulously the terms of the joint-supervision agreement, in particular concerning language and balance of the jury members. They obtained their French degree immediately after the defence, years ago, with very laudatory assessments of the jury.

The doctor who obtained her degree from Viet Nam (no joint supervision) had to wait one full year between the time when the thesis was printed and approved by the first jury and the final award.

Concerning the two PhD students under joint-supervision who are now in the mill, I decided to have their defence take place in Ha Noi, in the hope that it would make the procedure smoother. However, it does not seem to be the case.

As you well know, the main steps to get over in order to obtain the Vietnamese degree are

1) *Presentation to a jury of 3 members of six subjects related to the thesis either directly (for three of them) or indirectly (for the other three).*
2) *Presentation to an evaluation jury of 7 members, which must recommend the thesis for evaluation at institute level for proceeding to next step.*
3) *Double blind peer review by two experts who must give a positive assessment for proceeding to next step.*

4) *An evaluation jury of 7 members including 3 referees will finally evaluate the thesis by ballot.*
5) *In addition, the candidate must prepare some 50 copies of a short version of the thesis for distribution to a list of experts out of which at least 15 positive assessments must be collected.*

In the case of radio astronomy, on which we are working, there exist only two experts in Viet Nam, Professors Dinh Van Trung in Ha Noi and Phan Bao Ngoc in TPHCM, both internationally renowned. It makes the idea of blind refereeing somewhat funny, not to comment on the 50 experts. Of the above list, in the case of joint supervision, step 2 alone is necessary and sufficient in the foreign country. Over all these years, I have wondered why Viet Nam is following such a complicated procedure. It cannot be in the hope to do better than so many other universities around the world that are so much higher in the Shanghai ranking than Vietnamese universities are. A possibility is the need to prevent frauds; as Dr. Bui Anh Tuan, Director of the Department of Higher Education in your Ministry, said in a recent interview, there exist indeed a few frauds. But I am sure that Vietnamese professors, in their vast majority, are honest people and, in any case, the way to fight against fraud is to severely punish its authors, not to make the life of the honest people more miserable. Having spent most of my scientific career in an international research centre, I have had numerous opportunities to supervise and assess PhD theses in many European and American countries. Never have I met regulations nearing those of Viet Nam in complexity; and never have I felt to enjoy as little confidence from academic authorities as I do in Viet Nam.

In the interview to which I already alluded, Dr. Bui Anh Tuan commented on the need to reach 20'000 PhDs by 2020; he endorsed the views of Deputy Prime Minister Vu Duc Dam that "in order to renovate the national education system, it would be necessary for the MoET to renovate itself". A simplification of the above regulations seems to me an obvious step in the right direction; it costs nothing; it will greatly improve the image that the country gives of itself abroad; it will help freeing academics from the dictatorship of administration which should be at their service rather than controlling them; it will make the honest supervisors, the immense majority of them, feel better trusted by their authorities than they currently do.

This motivated my letter, in the hope that it might bring to your attention a problem that seems to me easy to solve and that would help your Ministry in reaching its goal of 20000 PhDs by 2020. [...]

Be sure that my only motivation in expressing these views is to serve Vietnamese science and higher education and to give better chances to the younger generation. [...]

Dong, Thao, Diep and other four new doctors, their suppervisors and representatives of IOP after the degree award ceremony

In answer to the letter, I was invited to attend a meeting chaired by vice-Minister Bui Van Ga, who is responsible for universities. Diep and Nhung, together with representatives of the IOP, HUS and VNU doctoral schools, also attended the meeting. The vice-Minister received the letter very positively and declared his intention to support its terms. I made it clear that my motivation in writing the letter was to look forward for a better future, not backward to the past, but the representatives of the doctoral schools took a very narrow-minded approach, their main aim being to show that they could not be blamed for anything, but to blame instead either the PhD students themselves or the former directors of the doctoral schools who, according to them, had signed the cotutelle agreements while they should have known that their terms could not be obeyed within the framework of Vietnamese regulations. Fortunately, the vice-Minister took a much broader standpoint and resisted their

arguments, giving proper directives for Nhung, Diep and Dong to soon obtain their Vietnamese degrees. It has now been done. Nhung received her from HUS very soon after the meeting and Diep, Dong and Thao from IOP on the occasion of an official ceremony that had been organized for this purpose. The Minister also said that he was well aware of the need to edict new regulations for future theses under joint supervision with foreign universities and that his staff was working on it.

LAST AUTUMN IN EUROPE

Hoai reports on her stay in Paris and other places in Europe, together with Nhung, during the past autumn months

Hoai giving her presentation at the YERAC conferrence in Toruń

We started our stay in Europe by attending an international conference on AGB stars that took place in Vienna. The AGB community is not very large, they get together every fourth year in such a topical conference. It was the third in the series. It was nice to be able to put faces on the names of authors of articles with which we were familiar. The theme was: "Why galaxies care about AGB stars". The idea behind it being that AGB stars, as they die, recycle their elements in the interstellar matter, which is later on used to fuel the genesis of new stars. The conference covered all kinds of issues: spatial and kinematical structure, chemical abundance, magnetic field, binarity, etc. It was an excellent opportunity for us to get a clear overview of the field in which we are working. We presented two posters on RS Cnc which received attention from several experts in the field.

In September, I attended the Young European Radio Astronomer Conference (YERAC) in Toruń, a Polish medieval town where Nikolaus Copernicus was born 540 years ago. The story of this series of conference is quite interesting. It was initiated by Emile Blum, Peter Mezger and Harry van der Laan in June 1967, all three invited as guest scientists in the US. A year later the first YERAC was hosted in Meudon. The idea is to bring together young radio astronomers working in Europe in order to provide them with early opportunities for transborder interactions with peers, to foster scientific and technical collaborations, exchanges of ideas, working visits and crossborder appointments. The founding fathers edicted the following rules, which could be used as a model in many other instances...: *YERAC shall take place once a year, [...] the next one always in another institute and preferably in another country. The director of the host institute for YERAC #n assures that the host for YERAC #n+1 is designated and that this role is accepted. So there is no secretariat, no budget, no administration. The host institute is responsible for the entire programme, scientific and social, and for all expenses necessary for its execution [...]. The participating organizations compose a delegation for each YERAC, submit their names and area of current research to the host and provide the travel funds, each for its own delegation. The participants shall normally be thirty years old or younger, shall have a doctorate- or be working as research students in astronomy.*

From left to right: Hoai, Thibaut, Patricia (Thibaut's wife) and Nhung in Étretat

The conference brought together some forty PhD students and post-docs, mostly from European laboratories and universities, but also from other countries such as South Africa, Nigeria and Japan. Each participant had a chance to present his or her current work and I presented our work on RS Cnc. The young age of the participants gave the conference a unique flavour of enthusiasm and dynamism. One afternoon was dedicated to a visit of the Astronomy Centre. Together with friends I made at the conference, I could also tour across the old town of Toruń and the city of Warsaw, which had been completely destroyed during World War II and partially rebuilt as it was before.

During my stay in Paris, I spent much time on the writing of my thesis under Thibaut's guidance and I completed the writing of an article on HI emission which has been submitted for publication in MNRAS. Nhung analysed PdBI data of EP Aqr and found evidence for features that suggest submitting a proposal to ALMA for exploring their detailed nature. She also studied the kinematical morphology of other stars by using the model which was developed for RS Cnc. Thanks to Thibaut, we met several of his collaborators who made useful comments on our work. In September, we visited the Nançay Observatory with Eric Gérard as a guide. He is a long-time collaborator of Thibaut and an astronomer whose major part of the scientific career is attached to Nançay.

Eric and Hoai under the reflected plane of the Nançay radio telescope

We also met USTH students spending their six month internship in France and we attended the defence of their master theses in the "Astroparticule et Cosmologie" laboratory of University Diderot. We enjoyed meeting again close friends, in particular Nguyen Quang Rieu and Michèle Gerbaldi, who cheered us up with warm encouragements. Early in August, Thibaut and his family took us to Dieppe and Étretat and, on another occasion, to an old city south of Paris, Chartres, famous for its cathedral and its stained glasses. We watched there at night a magnificent sound-and-light show which will long remain in our memories.

APRIM MEETING IN DAEJEON

Diep and Tuan Anh report about their participation in the Asian Pacific regional IAU meeting in Daejeon

Diep in front of a member of the fourth generation of Newton's apple tree on KAIST (Korean Advance Institute of Science and Technology) campus

In April last year we organized a radio astronomy workshop in Hanoi that brought together all Vietnamese astrophysicists presently active in Vietnam. On this occasion, we had the great pleasure to welcome foreign experts in the field, in particular Professor Young Chol Minh, president of the Korean Astronomical Society, and Professor Kaz Sekiguchi from the National Astronomical Observatory of Japan (NAOJ), who told us about the Asia-Pacific IAU Regional Meeting (APRIM2014) which took place in Daejeon, Korea from August 18th to 22nd. Thanks to their strong support, we got financial support from the Korean Astronomical Society and NAOJ to attend the meeting. Four other Vietnamese also attended, two working abroad (Nguyen Trong

Hien from NASA and Nguyen Luong Quang from CITA in Canada), Phan Bao Ngoc from Ho Chi Minh International University and Nguyen Quynh Lan from the Hanoi University of Education. It was the first time we visited Korea, but we already knew quite a bit about Korea and Korean culture from Korean movies, which are very popular in Vietnam. At the meeting, Diep gave an oral presentation on *"Correlated multipath effects between distant radio telescopes"* and Tuan Anh a poster presentation entitled *"Resolving the molecular gas around the lensed quasar RXJ0911.4+055"*.

From left to right: Nguyen Trong Hien, Nguyen Luong Quang, Tuan Anh and Huynh Anh in a Korean bar

APRIM2014 was an important IAU-organized event centred on the Asia-Pacific region, promoting collaboration on a spectrum of astronomy and astrophysics related activities and bringing together researchers, among which major figures of the Asia-Pacific astronomy and astrophysics community. Professor Kaz Sekiguchi introduced us to Professors Norio Kaifu and Thierry Montmerle, respectively president and vice president of IAU, Masahiko Hayashi, Director General of NAOJ, and Inwoo Han, director of KASI (Korean Astronomy and Space Institute). They all said that they are welcoming collaboration with Vietnam and encouraged the country to become full IAU member. After the meeting, we paid a short visit to KASI, where we could see the correlation and control rooms of the Korean VLBI Network (KVN). We were guided by Dr. Soojoong Kim, head of the radio department, who had first been trained as a theorist; then, in the early days of the development of modern astronomy in Korea, about forty years ago, he spent a lot of time and effort to develop a super computing system which is now used for the calculation and control of the KVN. We were deeply impressed by the amount of work that had been done for the development of astronomy and how quickly Korea had been able to reach a high level in the field.

The Vietnamese participants at the conference had a meeting with Professor Inwoo Han, the idea being to establish a first contact and understand better about each other communities in Korea and Vietnam. Each of us introduced himself and briefly described his research work in astronomy and astrophysics. We agreed to maintain contact between us and the possibility for Vietnamese students to spend time in KASI was mentioned. APRIM2014 was for us an opportunity to make new friends with whom we keep contact now that we are back in Ha Noi. It was indeed a very nice experience of having had a chance to attend the meeting.

THREE WEEKS IN CHIANG MAI

Thao attended the International School for young astronomers in Chiang Mai and reports about her experience.

Thao together with Profs. Boonrucksar Soonthornthun (NARIT director) and Michèle Gerbaldi at the 36th IAU school in Chiang Mai

In December 2014, I had the good fortune to take part in the 36th International School for Young Astronomers organized in Chiang Mai, Thailand, by IAU, NARIT and Yunnan Observatory. The school lasted three weeks, namely the first two weeks dedicated to lectures and the last week to observation. Most lectures were about observation and instrumentation in the visible. Both lecturers

and organizers were very good, kind and helpful. Students coming from farthest away were from Argentina and students closest to home were, of course, from Chiang Mai. Others came from India, Nepal, Indonesia, Malaysia, Philippines, Sri Lanka, Cambodia, China… and Vietnam (together with me was a master student of the Ha Noi University of Technology who studies material sciences and is fond of astronomy). In the school, I had the opportunity to report on my work on polarized solar flare emission detected simultaneously in Learmonth and Hanoi using our small radio telescope.

Thao (second from left) together with IAU school participants

I have many good memories about the school. Once, after the lectures, students went together to watch a recent science-fiction movie, *Interstellar*, with lots of Black Holes... The following day, Charles Bailyn, a lecturer at the school, told us what the movie got wrong from an astrophysics standpoint. It added a lot to the fun, and we kept elaborating about it for the whole day.

We visited an observatory on top of the highest mountain in Thailand, Doi Inthanon, 2500 metres above sea level. I was particularly impressed by the clean and smooth surface of the big 2.4 m telescope mirror; I had never seen such a thing before.

A great moment that we spent together was attending the 87th anniversary of the king, with a beautiful firework and everybody wearing yellow tee-shirts, the royal colour, also present in all kinds of decorations downtown. It was impressive to see the respect that the population have for their king. One year ago, I had come to Chiang Mai to attend a Winter School and, at that time, there had been much unrest in Thailand and several students and lecturers from abroad had cancelled their participation to the school. We could see on television demonstrations opposing people dressed in red to people dressed in yellow. It was impressive, this year, to see a single colour for at least one day…

I also learned from professors and friends that Thailand will acquire a 4.5 m single dish radio telescope this year and soon after a 40 m dish that will be part of the Korean Very Large Baseline Interferometer Network. They are busy getting prepared for the event.

A clear sign of my having moved from cosmic rays to astrophysics, which I noticed after the school, is the presence of many new names in my Facebook friends list, of astronomers posting there.

I thank wholeheartedly the lecturers and organizers who gave me the chance to attend the school and learn many new skills.

Distribution: Elie Aslanides, Patrick Aurenche, Jim Beatty, Cristoforo Benvenuti, Jean Pierre Bibring, Pierre Billoir, Frederic Boone, Bui Duy Cam, Ludwik Celnikier, Catherine Cesarsky, Ngo Bao Chau, Nguyen Duc Chien, Nguyen Mau Chung, Françoise Combes, Alain Cordier, Jim W. Cronin, Nguyen Nhu Dat, Manoel Dialinas, Luigi Di Lella, Giap Van Duong, John Ellis, Pierre Encrenaz, Alberto Etchegoyen, Roger Eychenne, Jerome Friedmann, Daniel Froidevaux, Yoshitaka Fujita, Jose Gabriel Funes, Michèle Gerbaldi, Nguyen Van Giai, Sheldon Glashow, Yannick Giraud-Héraud, Stéphane Guilloteau, Edward Guinan, Jacques Haïssinski, Chu Hao, John Hearnshaw, Pham Duy Hien, Nguyen Van Hieu, Emmanuel Hinglais, Pham Quoc Hung, Nguyen Dai Hung, Nguyen Huu Viêt Hung, Fadi Ibrahim, Antonio Insolia, Stavros Katsanevas, Le Hong Khiem, Dao Tien Khoa, Marc Lachièze-Rey, Nguyen Quynh Lan, Pham Tran Le, Thibaut Le Bertre, Pierre Lesaffre, Di Li, Nguyen Van Lien, Alain Maestrini, Grant Mathews, Giorgio Matthiae, Jean-Christophe Mauduit, Michel Mayor, Peter Mazur, Young Chol Minh, Phan Bao Ngoc, Wayne Orchiston, Etienne Parizot, Denis Perret-Gallix, Minh Ha Pham-Delègue, Tran Viet Phuong, Vu Viêt Phuong, Philippe Quentin, Burton Richter, Nguyen Quang Rieu, Jean-Michel Rieubland, Carlo Rubbia, Pierre Sebban, Sally Seidel, Kaz Sekiguchi, Rogel Mari Sese, Greg Snow, Paul Sommers, Phan Hong Son, Michel Spiro, Jack Steinberger, Tiina Suomijarvi, Christine Sutton, Annick Suzor-Weiner, Tran Minh Tam, Charling Tao, Dick Taylor, Tran Chi Thanh, Samuel C.C. Ting, Tran The Trung, Dinh Van Trung, Hiroshi Tsunemi, Nguyen Van Tuan, Pham Anh Tuan, Hoang Tuy, Marcel Urban, Odon Vallet, Jean Tran Thanh Van, Suzy Vascotto, Sylvie Vauclair, Tini Veltman, Nguyen Ai Viet, Dang Van Viêt, Alan Watson, Joël Weisberg, Atsushi Yoshida, Antonino Zichichi.

–PHOTO ALBUM –

Farewell party at INST

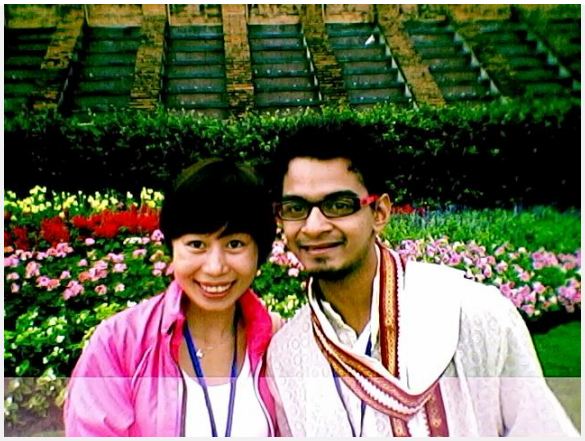
Tuan Anh with his family, the jury and colleagues after the thesis defence

At INST with Dr. Nguyen Trong Hien having Phuong, Tuan Anh and Diep on his right and Pierre, Thanh and Tuan (two USTH students spending their internship with us) on his left

Phuong, Diep and Alain Maestrini (third, forth and fifth from right) with USTH students

Thao and Sulis at the IAU school

Thao in an orchid garden in Chiang Mai



Thao and Kuma in Chiang Mai's Royal garden

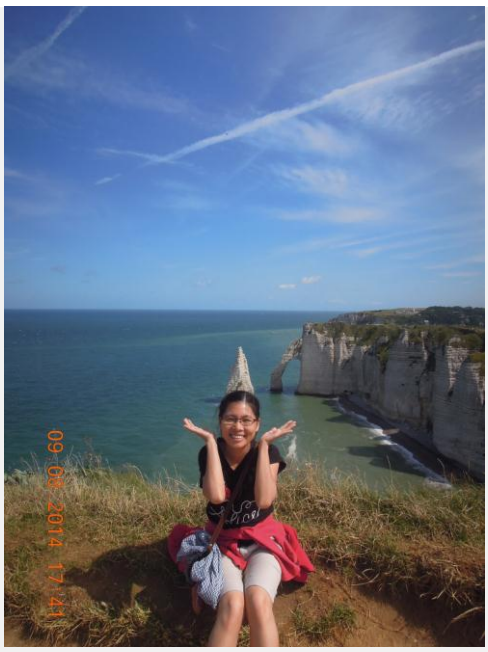
Tuan Anh and Diep visiting Seoul

Nhung and Patricia (Thibaut's wife) at Thibaut's house in Dieppe

Nhung and Camilla (Thibaut's daughter) on top of one of the cliffs in Étretat

Phuong and her friends having dinner at SEAYAC

Thibaut and Hoai in Dieppe

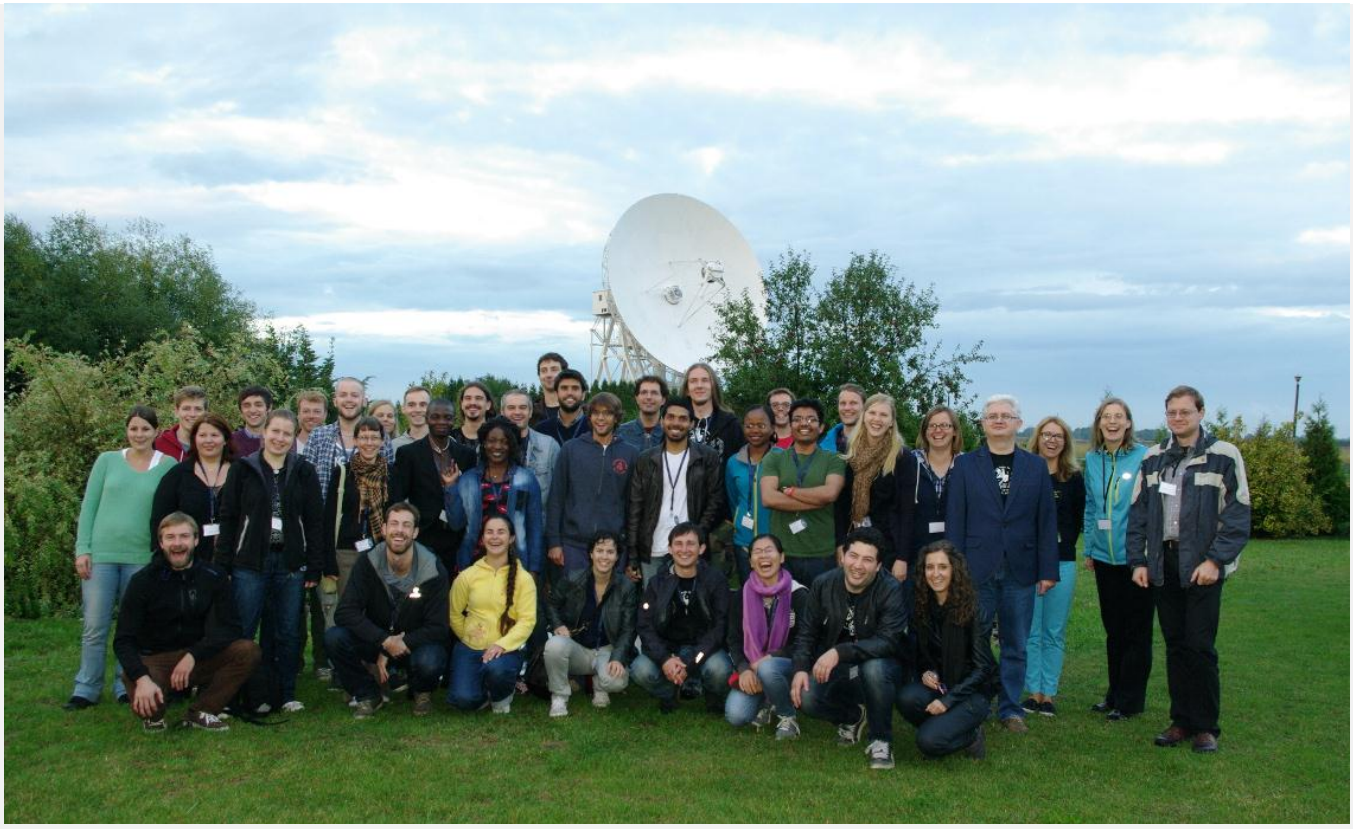


The Etretat rock used as a Vietnamese hat by Hoai

Hoai (second from right) together with some of the YERAC participants in front of the Toruń RT4 32 m radio telescope

Thao after having watched an elephant show

Khang and Khoi (Diep's sons)



YERAC group picture on the campus of the Toruń Astronomy Centre in front of a 15 m diameter radio telescope

VNSC staff visiting the Hoa Lac site after the end-of-year meeting. Bac Pierre, Diep and Thao can be seen near the centre and Tuan Anh near the right end