

VATLY NEWSLETTER

*Modern science is fast-moving,
and no laboratory can exist for long with a program based on old facilities.
Innovation and renewal are required to keep a laboratory at the frontier of Science.*

Burton Richter

CONTENT

This twenty-eighth issue of the VATLY NEWSLETTER opens with the traditional NEWS FROM THE LABORATORY, followed by a brief account of our recent work on EP AQUARII, A DYING STAR. Phuong came back in August from having spent FOUR MONTHS IN BORDEAUX and reports about it next. Nhung tells us about the state of THE OUTREACH VNSC EFFORT, including 50 cm telescopes and planetariums in Nha Trang and Hoa Lac, as well as a Space Museum in Hoa Lac. The whole team attended the COSMIC CYCLE CONFERENCE IN QUY NHON and an ITCA NARIT COLLOQUIUM IN NHA TRANG, about which Diep and Thai report. Two new members of the team, Loc and Thai, tell us how they spent their summer, Loc in A SUMMER JOURNEY IN SCIENCE and Thai in A STUDIOUS SUMMER. In recognition of the support given to us by the World Federation of Scientists in the form of fellowships, we wrote a report on PLANETARY EMERGENCIES IN VIETNAM as a contribution to the work of the 2018 International Seminars on Planetary Emergencies in the framework of "A Project for Mankind". The report is available on the web and we copy here part of its conclusions. Pierre and Diep comment about PRIVATE VS PUBLIC RESEARCH, a topic of current interest among academic and ministerial circles. Finally Hoai and Diep report on AN INTERVIEW OF TRAN DINH PHONG, a young physico-chemist who was recently awarded the Ta Quang Buu prize and came back to Viet Nam after a long stay abroad. 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.

Much of the past six months have seen us busy with analyses of observations of the proto-star GG Tau (Diep and Phuong together with Anne Dutrey and collaborators) and of the AGB star EP Aqr. Both have resulted in several publications. We comment on the latter below while Phuong says a few words about the former in her presentation. Diep, together with the whole team, spent much time co-organizing with Anne a conference on *The Cosmic Cycle of Dust and Gas in the Galaxy: from Old to Young Stars*, which took place in Quy Nhon from 9 to 13 July in the framework of the XIVth Rencontres du Vietnam.



Cosmic Cycle conference. Left to right: Thibaut Le Bertre, Edwige Chapillon, Anne Dutrey, Pierre, Diep, Tran Thanh Van and Paul Ho cutting the cake at the banquet

He reports about it below. We all attended. It was for us an opportunity to witness the very

successful achievement of our friend Jean Tran Thanh Van in developing ICISE, the International Centre for Interdisciplinary Science and Education, which has come of age. He has now the ambition to establish a research institute in the Centre, starting with two particle theorists working on physics “beyond the Standard Model” and a small team of experimenters, headed by our friend Nguyen Hong Van, working on long-baseline neutrino beams at RIKEN, in collaboration with Japanese physicists and with their support; they were holding a summer school on neutrino physics in ICISE at the same time as we were attending the conference. We wish both Van’s much success.

After the conference, most of the team moved to Nha Trang to prepare for the workshop of the International Training Centre for Astronomy, which we were co-organising together with the National Astronomical Research Institute of Thailand, and which took place the week after. Again, we all attended and enjoyed it. Thai reports below. In August, Loc attended a summer school on astrophysics in Quy Nhon.

We have welcomed several young students in our VNESC office during the past six months: Rishi Vignan, a student in engineering from India, spent two months with us to get acquainted with astrophysics research; he had found out about us while browsing through the web; he made some simulations of the dynamics of gas in a binary system and wrote a short report about it; he joined us in Nha Trang and enjoyed very much meeting young colleagues from all over South East Asia on this occasion. Le Minh Nhat, a second year bachelor student, joined us for a bit over a month, again to find out about what we are doing and what it means to do research. The same motivation led Tran Thi Minh Hanh, a first year bachelor student at USTH, to spend some of her free time with us; she thinks of becoming an astrophysicist but she wants to learn about what it means before deciding.

In August, Paul Ho, from Taiwan, paid us a visit on his way to a conference on *Windows on the Universe*, which was taking place in Quy Nhon. He gave a seminar on his experience in developing astronomy and astrophysics in Taiwan and about the East Asian Observatory (EAO).



Rishi (third from right) and Nhat (third from left) on their last day at DAP

As we reported in the preceding Newsletter, an agreement has been signed between EAO and VNU HCMC on behalf of all Vietnamese astrophysicists. Vietnam is only an observer in EAO and Paul would like us to participate more actively, for example by using the opportunity of having one of us spend some weeks in Mauna Kea, and become full members. Diep invited him to introduce EAO to ASEAN astronomers next December on the occasion of the SEAN meeting that will take place in Lampung (Indonesia). We very much appreciate the attention and interest that Paul Ho shows for our progress, as well as his friendly attitude: he understands well the difficulties we have to face and the obstacles we have to overcome and we listen to his wise advice with utmost respect.



Paul Ho and Pham Anh Tuan at VNESC

Changes have recently occurred in the lives of close colleagues and friends: Dinh Van Trung has become head of the Institute of Physics

in Ha Noi and Nguyen Quynh Lan has moved to the United States: we wish both of them happiness and success in their new positions. Dam Thanh Son was awarded the prestigious Dirac Medal for his contribution to the quantum many body problem and passed by Ha Noi in August where he gave a seminar on the similarities and differences between methods and goals of particle and condensed matter physics. The room was packed with many of our friends, such as Chu Hao and Pham Duy Hien, who came to congratulate Son. We are proud to count him among our friends and we offer him our warmest congratulations.

Pierre attended the meetings of the jury of the Ta Quang Buu Prize; on this occasion, he pleaded in favour of the creation of more such prizes to encourage and reward young home-based Vietnamese scientists active, in particular, in physics and astrophysics. He also attended a round table discussion organised by Tia Sang with representatives of MOST on public vs private research. Together with Diep, who attended the opening ceremony of a private research institute in Ha Noi, they comment about these events below.



Dinner at Erice. From right to left: Shammy Puri, General Secretary of the International Association of Hydrologists, Jan Szyszko, former Minister of Environment of Poland, and his wife, Antonino Zichichi, Pierre and his wife.

Pierre went to Erice (Sicily) in August to report to the World Federation of Scientists about the use made of the fellowships that they give us and about our study of Planetary Emergencies in Viet Nam.

Mid-August a team from VTC10 Netviet visited our office to shoot a short film and record some of our views for a TV show.

We had opportunities to listen to various seminars; among these, in the wake of a High Tech exhibition in Ha Noi, was Hiroyuki Tagano, a Toshiba engineer, talking on superconducting cryogenic radio receivers, the kind of talks that should encourage VNESC to start some research in modern electronics.



Burton Richter

We learned with deep sadness that our friend Burton Richter, 1976 Nobel laureate, who had been following our progress with a friendly interest, passed away on July 18th. Jim Cronin, Dick Wilson, Burt Richter, a generation of particle physics giants is disappearing. We offer Burt's family our sincere condolences.

EP AQUARII, A DYING STAR

Much of our work in the past year has concentrated on the study of a proto-star, GG Tau and of a dying star, EP Aqr. With the aim of giving the reader of our Newsletter who is not familiar with astrophysics and radio astronomy some idea of what our work consists of, we draw a brief sketch of the kind of information that we can extract from radio observations and what it can tell us about the way stars are formed and die. For purpose of illustration, we use the case of EP Aqr.

While working often alone using archived data from ALMA (66 antennas, 12 m and 7 m in diameter, at 5000 m altitude in Chile), we also work in collaboration with Observatoire de Paris (Thibaut Le Bertre) on evolved stars and with

Bordeaux University (Anne Dutrey) on proto-stars using IRAM instruments (a 30 m telescope in Andalusia and interferometer NOEMA in the French Alps). EP Aqr is no exception, with observations available from all three sites.

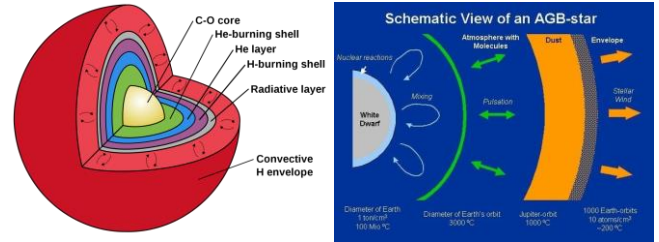


The observations are available in the form of so-called “data cubes”, meaning that for each pixel of the sky-plane image a frequency distribution is available. Such a distribution is equivalent to a Doppler velocity spectrum measured along the line of sight for this particular pixel. Reconstruction in space (so-called “de-projection”) of the position and velocity of the sources is strongly under-constrained (only three out of six coordinates are measured); we have gained much experience and expertise in handling this problem, using in particular constraints from the approximate axi-symmetry of the observed stars.

Sun-size stars that have burned enough of their hydrogen into helium grow a core deprived of hydrogen that becomes hot enough for its electrons to disconnect from the nuclei to which they were bound and form a Fermi gas, leaving the helium nuclei fuse into carbon and oxygen. In parallel, the stellar envelope around the core blows up to gigantic sizes, at the scale of thousands of astronomical units, cooling down to temperatures in the ten to few hundred K range.

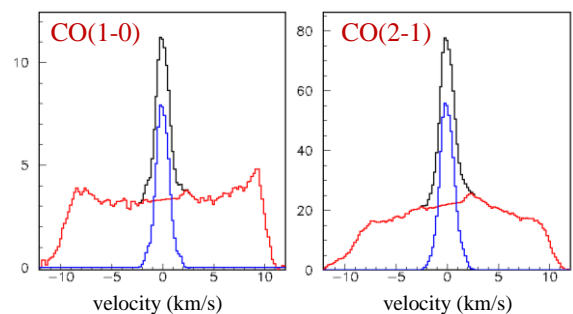
Carbon and oxygen are dredged up from inner layers and combine in CO molecules.

Depending on what remains, one speaks of carbon or oxygen stars. Dust grains form, respectively carbonaceous or silicates. Radiation pressure from the star ejects the dust grains in outer space, dragging with them the gas. We study the radio/microwave emission of the gas in the circumstellar envelope of the targeted stars, in particular from rotating CO molecules.



EP Aqr is an oxygen star that has been losing mass for some 10^4 to 10^5 years. It is close to us, only ~ 100 pc away (1 pc or parsec is the distance at which 1 arcsec – second of arc – subtends 1 au – astronomical unit, equal to the radius of the Earth orbit). Typical fields of view are a fraction of minute of arc and typical resolutions a fraction of arcsec. In the case of EP Aqr, we observe two CO molecular lines, at millimetre wavelength, CO(1-0) and CO(2-1).

A particularity of EP Aqr is its Doppler velocity spectrum, which displays two components: broad, $\pm \sim 11$ km/s, and narrow, $\pm \sim 2$ km/s.

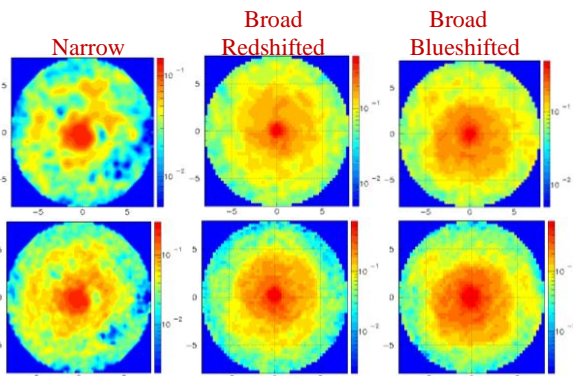


Doppler velocity distributions of EP Aqr CO emission

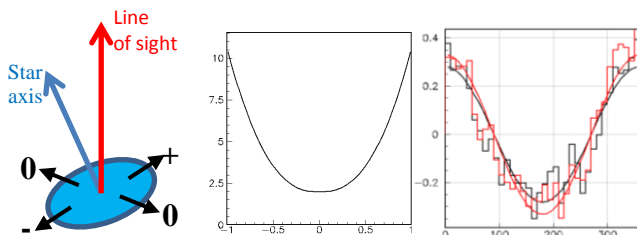
We split the data cubes into narrow and broad components by linear interpolation below the central peak of the spectrum, in each pixel separately. From a detailed study of the symmetries of the data cubes, we show that the star is approximately axi-symmetric, with its axis making an angle of $\sim 10^\circ$ with the line of sight and projecting $\sim 20^\circ$ west of north on the sky plane.

We also show that the narrow component is equatorial and expands at low velocity, typically 2 km/s, the broad component being polar and expanding at higher velocity, up to ~11 km/s.

From the measured line width, ~1.2 km/s FWHM, accounted for by thermal broadening and instrumental resolution, we place an upper limit of $\pm 17^\circ$ on the flaring of the equatorial region and from a comparison between broad and narrow components (mean Doppler velocity vs polar angle on the sky plane) an upper limit of 38% on the ratio between a possible rotation and the expansion velocity.



Sky plane images of the intensity summed over Doppler velocity for CO(1-0) (upper panels) and CO(2-1) (lower panels)

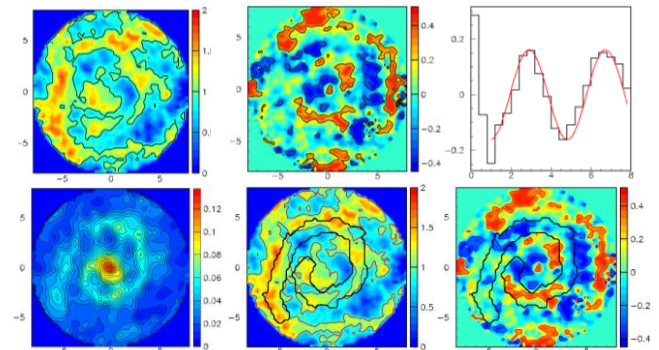


Left: sketch showing the dependence of the Doppler velocity of the narrow component on the polar angle on the sky plane Middle: wind velocity (km/s) vs the sine of the stellar latitude. Right: mean Doppler velocity of the narrow component vs the polar angle on the sky plane.

Correcting for global trends (dependence of the intensity on the distance from the star, dependence of the Doppler velocity on polar angle due to the inclination of the star axis with respect to the line of sight), we study the inhomogeneity of the brightness and Doppler velocity distributions, in order to learn about the mass loss

history at the scale of ~2500 yr (8 arcsec covered at 2 km/s).

Combining CO(1-0) and CO(2-1) observations, we find that the Doppler velocity displays a radial oscillation of amplitude ± 0.16 km/s and period 5.2 arcsec while the intensity displays apparently uncorrelated arcs, with a spiral-like enhancement particularly well seen at zero Doppler velocity in CO(2-1) emission. If it were due to rotating emission, the period would be ~850 years and if this were caused by the presence of a companion star, it would be at a distance of ~1 arcsec.

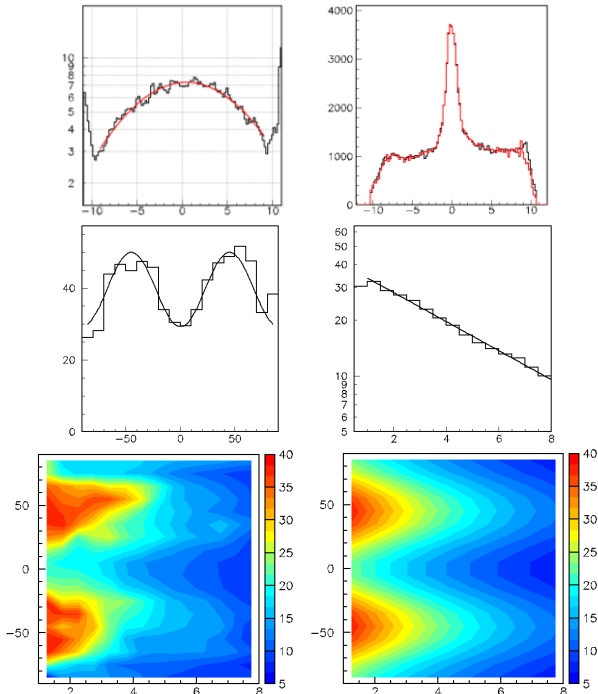


Upper panels: sky maps of the inhomogeneity of the intensity (left) and of the Doppler velocity (middle); the right panel shows the radial oscillation of the latter. Lower panels: the spiral as seen at zero Doppler velocity in CO(2-1) emission and its superposition on the inhomogeneity maps.

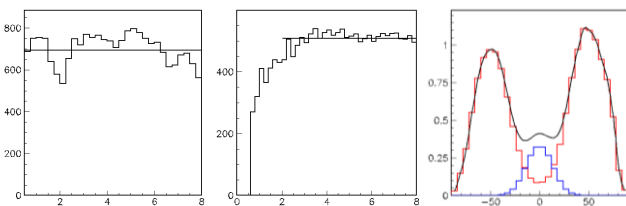
The ratio R_T between the CO(2-1) and CO(1-0) data cubes measures the temperature T (K) $= -11.1 / \ln(R_T / 16)$ in each pixel as a function of Doppler velocity, which can be de-projected in space: the temperature is measured to decrease exponentially with the distance r from the star and to be maximal at intermediate stellar latitudes, well described by a form $T = 40(1 - 0.25 \cos 4\alpha) \exp(-r/5.52)$ with T in Kelvin and r in arcsec. We calculate the effect of absorption at the mean level of 20% with little incidence on the conclusions obtained from our analysis.

The flux of matter, equal to the density multiplied by the wind velocity and by r^2 , is observed to be approximately constant for both the narrow and broad components beyond a distance of ~2 arcsec where they merge. Assuming a CO abundance of $2.5 \cdot 10^{-4}$, this

implies a mean mass loss rate of $\sim 1.9 \cdot 10^{-7}$ solar masses/year over the past 25 to 30 centuries, with fluctuations at the $\sim \pm 10\%$ level, the narrow component contributing only $\sim 10\%$ of the total.



Upper panels: left, ratio between the CO(2-1) and CO(1-0) Doppler velocity distributions; right: temperature corrected Doppler velocity distributions of CO(1-0) (black) and CO(2-1) (red). Middle panels: dependence of the temperature on stellar latitude (left) and on distance r (arcsec) from the star (right). Lower panels: measured (left) and parameterized (right) temperature in the latitude vs distance plane.



Flux of matter vs distance from the star for the narrow (left) and broad (middle) components and vs stellar latitude for both (right)

Mass loss is strongly enhanced at intermediate stellar latitudes, meaning a biconical outflow significantly depressed near the poles.

While giving a significant contribution to our understanding of stellar evolution, such a study needs still to address many open questions, such as the relative roles of magnetic field,

binarity, core rotation, etc. before being described reliably in terms of the underlying physics mechanisms at play.

FOUR MONTHS IN BORDEAUX

Phuong returned to Ha Noi in August after having spent four months in Bordeaux for her PhD. She reports below.

From March to July, I spent my second four-month stay in Bordeaux, working with Anne Dutrey and Stéphane Guillaudeau in the framework of my PhD thesis. In addition to explore the beautiful city of Bordeaux, I had a chance to visit other places with friends, such as Paris and Andorra, on my free time.

I arrived in Bordeaux at the end of February and immediately joined a school on astrobiology that was taking place in a bird reserve on Bassin d’Arcachon, some 30 miles east of town. The school lasted a week with many useful introductory lectures covering fields of astronomy, biology and chemistry as well as techniques such as ^{14}C dating. I met there Sebastian Wolf, an astronomer from Kiel University working on dust properties in protoplanetary discs; we discussed a possible collaboration on grain chemistry using the Nautilus chemical model developed by Valentine Wakelam from the Bordeaux team.

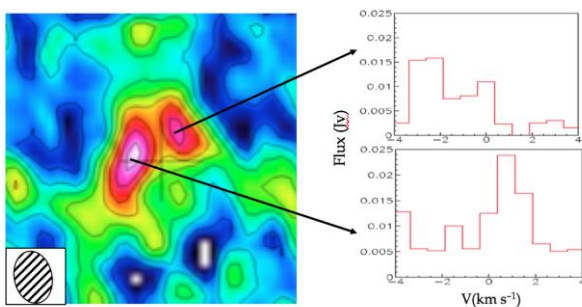


Phuong and friends at the astrobiology school

I presented a poster at the doctoral day of Bordeaux University in mid-March and gave a talk at the doctoral day of the Laboratory of Astrophysics of Bordeaux (LAB) in mid-May. For

a good month, I worked on ALMA proposals, of which I submitted three to observe CO(6-5), CS(5-4) and H₂S 1(1,0)-1(0,1) emission from GG Tau A, a triple proto-planetary disc. I was PI of the former and played the main role in the preparation of the latter, together with Otoniel Denis-Alpizar from Universidad Autonoma de Chile and Edwige Chapillon from Grenoble. In July, we got the good news that one of the proposals was accepted for observation in Cycle 6. For the remaining two-and-a-half months, I shared my time working with Anne Dutrey, Stéphane Guilloteau, Edwige Chapillon and Valentine Wakelam. I also worked with Liton Majumdar from the Jet Propulsion Laboratory to analyse NOEMA observations of S-bearing and C-bearing species in the dense ring of GG Tau A.

Observing and understanding the physics and chemistry of GG Tau is a favourite topic of study in Bordeaux and I shall spend the remaining of this brief article sketching one of the most recent results to which I contributed: the first detection of H₂S in a proto-planetary disc. GG Tau, at a distance of ~140 pc, is a hierarchical system with the GG Tau A triple star surrounded by a disc made of a dense dusty ring at radii between 180 and 260 au and extending as a gas disc out to 800 au. The total mass of the disc is ~0.15 solar masses and the dust and gas temperatures reach respectively 14 K and 20 K at 200 au with little or no vertical gradient in the molecular layer. The large size, low temperature, and large mass make the GG Tau A disc an ideal laboratory to study cold molecular chemistry. As shown in the figure H₂S is clearly detected in two blobs revealing the disc rotation.



Left: H₂S integrated intensity map; the scale is given by the beam in the lower left corner, 360×270 au². Right: Doppler velocity spectra integrated over the west (upper) and east (lower) emissions.

Last winter, we submitted a proposal to look for S-bearing species (H₂S, CCS, SO, SO₂) in the disc of GG Tau A using NOEMA. The observations were made in December. SO₂ and SO emissions remain elusive but H₂S 1(1,0)-1(0,1) emission is unambiguously detected from the dense ring (see figure). Also detected were HCO⁺(1-0) and its isotopologues H¹³CO⁺ and DCO⁺(3-2) emission, providing precious information on the chemistry at play and on physical conditions. The results have been published in Phuong et al., 2018, A&A, 616L, 5P.

THE OUTREACH VNSC EFFORT

Nhung tells us about the state of the outreach VNSC effort, including 50 cm telescopes and planetariums in Nha Trang and Hoa Lac, as well as a space museum in Hoa Lac.

Public outreach and training activities are one of the main tasks of VNSC since its inception. This task is further boosted with the completion of the construction of two observatories, each including a 50-cm telescope and a planetarium, in Nha Trang and Hoa Lac. These facilities will soon be officially open to the public; meanwhile on-going outreach activities are regularly undertaken. We present below some of the most recent and review the status of our preparation for an efficient exploitation of the new equipment.



Children watching a movie projected on a hemispherical screen at Hanoi's Space Day

On the occasion of the Vietnamese Science Day, May 18th, VNSC held events in both Hanoi and Ho Chi Minh City. The event in Hanoi

addressed pupils from primary and secondary schools. More than 200 people participated to acquire basic knowledge about the universe, space exploration technologies and applications of satellite technology to daily life. In addition, they had opportunities to practice with small experiments on gravitational force, to assemble robots, to make holograms from special movies accessible from their smartphones, and to play games on space exploration.



Cosmonaut Pham Tuan (in uniform) encouraging young people to learn about space science and technology

The Space Day in Ho Chi Minh City is organised for university and high school students with a series of public talks on the development of space science all over the world and in Vietnam, GPS technology and its applications, Earth observation satellites and remote sensing databases. On this occasion, participants met Pham Tuan, the first Vietnamese cosmonaut and the first Asian in space in a Russian spacecraft in 1980, and were inspired by the stories he told them. Besides, they also had hand-on experience with flying drones and with launching model rockets.

Recently, STEM education has gained popularity in Vietnam. STEM stands for Science, Technology, Engineering, and Mathematics. VNSC was invited by some nearby schools to join their STEM day. A team of young VNSC members, including Loc and Thao, was formed to be in charge of organising STEM activities for children to learn about the Universe and space science and technology.

The yearly CanSat competition for students from technology universities and high schools took place in March. Students had been trained and had gained experience in making small satellites, starting from concept designing, manufacturing, launching with model rockets, and collecting data from ground. The theme of this year's competition was "Monitoring Air Quality" aimed at raising public awareness on environmental protection and at stimulating the creativity of young people in using satellite technology to improve the quality of life.



Hoai showing planet models to kids on STEM day at Olympia school

Since its inception in August 2017, Nha Trang observatory has welcomed several groups of high school teachers, university lecturers and scientists for short visits. It also provided practical tools to train the Vietnam high school team preparing for the International Olympiads on Astronomy and Astrophysics. Last month, it hosted over 60 people for hand-on sessions of the workshop of the International Training Centre for Astronomy. However, we are still waiting for the permission to open it to public.

In Hoa Lac, the construction of the observatory, with a 50-cm telescope and a 100-seat planetarium is now completed. The Space museum is in its detailed design phase. The telescope has been operating since July. Some first test observations have been made in order to check the total throughput of the telescope-camera system, atmosphere extinction and sky-level in Hoa Lac. Together with the facility in Nha Trang, they will play an important role in the education and public outreach programme of VNSC to foster

interest for astronomy and space sciences in the population. The programme is now taking shape, which includes short training courses on basic astrophysics, practical classes on using optical telescopes for university and high school students, shows in the planetarium and related group activities, etc. Recently, VNSC has signed a Memorandum of Understanding with USTH, Quy Nhon University and Nha Trang University aimed at promoting collaborative activities on training students and conducting research in astrophysics and space science. Currently, our group, DAP, and the STEM team are taking an active part in preparing for launching the programme at Hoa Lac. We hope very much that the two observatories will soon be able to welcome students and be open to the general public.

COSMIC CYCLE CONFERENCE IN QUY NHON

Diep reports about a conference in Quy Nhon that he organised together with Anne Dutrey and with the help of the whole DAP team.

From the early days of our laboratory (fifteen years ago) we have always been aiming at excellence in science. One way to achieve this goal is to work hard to give a good training to young researchers; another way is to maintain good “international relations” with our foreign colleagues. The latter is vital to the development of our laboratory. Keeping that in mind, over two years ago, when being asked by Anne Dutrey from Laboratoire d’Astrophysique de Bordeaux (LAB) to co-organise an international conference, I quickly got interested in the idea as it was a way for us to expand our international collaboration.

The idea of organising the conference came from our common friend, Pierre Lesaffre (Laboratoire de Radioastronomie ENS-LERMA) who was organising another conference entitled “Blowing In the Wind” addressing the dynamical aspects of star formation at the International Centre for Interdisciplinary Science and Education (ICISE) in Quy Nhon, Vietnam, in 2016. In 2017, another conference about “Star Formation in Different Environments”, organised by Nguyen Luong Quang at the same place, focused on how stars form. These conferences belong to a series

called Rencontres du Vietnam initiated by Professor Tran Thanh Van. They follow the spirit of Rencontres de Moriond, which is to facilitate dialogues between theorists and experimentalists and to encourage young scientists to present their work and to discuss with senior scientists. We thought that a third conference, following the other two, dedicated to the physico-chemistry and evolution of gas and dust, should be useful. The demand to have such a conference was timely, with the availability of high-resolution spectroscopy measurements providing detailed information on chemical and physical conditions, and on the dynamics of different environments around old and young stars. In addition, the new Atacama Large Millimetre/sub-Millimetre Array, with its unprecedented sensitivity and resolving power, allows for following the evolution of matter along the cosmic cycle in our Galaxy.



Members of the Quy Nhon conference’s SOC and LOC together with representatives of the Binh Dinh peoples’ committee. Anne, Diep and Van are number 2, 5, and 7 from left.

Soon after the first agreement, we had a kick-off Skype meeting of the original Science Organising Committee (SOC) members which consisted of Anne Dutrey (LAB), Thibaut Le Bertre (Paris Observatory), Pierre Lesaffre (Paris Observatory), Pierre Gratier (LAB), Edwige Chapillon (Institut de Radioastronomie Millimétrique) and myself. We quickly reached the consensus that one more conference bringing together astronomers working on circumstellar envelopes of evolved stars or on star and planet forming regions and planetologists working on the origin of the solar system should provide a better

understanding of the cycle of gas and dust from old to young stars, in particular for our young Sun and its planetary system. We intended to review the gas and dust content of the shells around SuperNovae, AGB stars and planetary nebulae as well as of diffuse, cold and giant molecular clouds. Following the Rencontres du Vietnam's spirit, special emphasis would be placed on active participation of young researchers and post-docs. Since the scope of the conference was very broad, we intended to have a large fraction of the time of the conference dedicated to review talks.

Other supporting reasons for the conference to be organised in Vietnam were that most active Vietnamese astronomers are using millimetre astronomy facilities for their work, and that ICISE appeared as an excellent meeting point to bring together astronomers from all over the world to discuss this rapidly evolving field.



Phuong receiving the first prize for her poster from the hands of Edwige Chapillon

After the kick-off meeting we had defined a tentative title for the conference, its date (July 9th to 13th), the venue (ICISE), etc. We also had a to-do list and agenda: setting up the SOC, LOC (Local Organising Committee), and a website for the conference; looking for financial support to help participants in need, inviting review and invited speakers, etc. Then it was the responsibility of Anne and me, the co-chairs, to realise what had been decided. We then first invited well-known scientists proposed by the original SOC members from different domains addressed by the conference to join the SOC, asking them to recommend review and invited speakers. A lot of time was spent for inviting

them: time for them to answer (some never did) after having identified financial sources, time to arrange their schedules, and time to obtain permission from their institutions. We often spent time discussing with them the detailed content of their talks, or helping with the solution of complex financial problems. A difficulty that we met was to find a date that would not overlap with other conferences and fix it well in advance. Then, it took some time to define a sensible and well-balanced programme. The coordination between Bordeaux and Hanoi went very well and the work was well shared between us. We held tens of Skype sessions, once every two to three weeks.

Finally, we had 22 review and invited speakers and there were in total 65 registered participants (20 women and 45 men) who came from 16 countries of three different continents: Europe, Asia, and America, the farthest away coming from Chile. Two invited speakers could not make it, one for family reason and the other because of a typhoon, but they smoothly gave their talks via Skype. During the weekend preceding the conference, a two-day booth-camp was organised by Tuan-Anh for PhD students and young postdocs on subjects related to the topics of the conference. The booth-camp was attended by about twenty participants including four lecturers.



Stéphane Guilloteau lecturing at the bootcamp

The conference also had poster prizes which were given to the three best posters through a voting process. The first prize was given to Phuong for her poster presentation on the first detection of H₂S in a protoplanetary disk using NOEMA data.

ICISE is a beautiful conference centre, away from downtown Quy Nhon, with a nice beach, a lot of green trees, and hills around. Participants enjoyed their time in Quy Nhon. They sent us very positive feedback saying that they liked the talks, the numerous discussions and the conference site. We are deeply grateful to the SOC and LOC for having made the conference a success. It gave a chance to our DAP team to meet many old friends and to make new ones. Many participants were visiting Vietnam for the first time. We took the opportunity to initiate new collaborations such as with Professor Hideko Nomura from Tokyo Institute of Technology who was introduced to us by Anne. She agreed to welcome young members of our team to work with her at Tokyo Tech for a few months on proto-planetary discs. Several participants expressed interest in giving us a hand to solve the problems that we may meet in developing astronomy in Vietnam. Some declared their willingness to collaborate with us, in particular for projects requiring the participation of multi-parties. Deep in our heart, the help and moral support which our foreign friends offered make us feel really warm.

Astronomy and astrophysics bring people from different cultures and geographical locations closer together, “the sky belongs to all of us, we are all made of the same star dust”.

ITCA NARIT COLLOQUIUM IN NHA TRANG

Thai reports about a colloquium that we organised in Nha Trang, aimed at training university lecturers in astronomy and astrophysics.

There exists a real and strong desire to develop astrophysics in the Southeast Asian region in general and in Vietnam in particular. From July 23rd to 27th, 2018, one week after the conference organised by Diep and Anne, we co-organised an international workshop entitled “ITCA Colloquium 2018: NARIT-VNSC Astronomy and Astrophysics Workshop” at Nha Trang Observatory and Nha Trang University. The event was organised in collaboration between VNSC, the National Research Institute of Thailand

(NARIT) and the International Training Centre in Astronomy (ITCA) under the auspices of UNESCO. In the opening ceremony, we had the pleasure to listen to opening remarks by Boonrucksar Soonthornthum, the former NARIT executive director. Vu Viet Phuong, from VNSC and a member of the Royal Thai Embassy in Hanoi said a few welcoming words.



Group picture of the participants at the ITCA Meeting

The colloquium was attended by over 50 participants from nine different countries. The aim is to equip young university teachers with up-to-date knowledge and skills in astronomy and astrophysics, allowing them to deliver introductory lectures. The program of the colloquium was divided into two sections: morning sessions were dedicated to lectures on hot topics in astronomy and astrophysics while afternoon and night sessions were kept for hands-on, practice and observations. Participants had opportunities to learn and practice with the VNSC planetarium and 0.5 m optical telescope of the observatory. They held an open discussion session on how to develop astro-education in the SEA region and neighbouring countries. From DAP, Pierre gave a talk on Frontiers of Today’s science, Diep on Astronomical Instrumentation, Tuan-Anh on Galaxy Evolution. Loc and Thao run sessions on hands-on, a planetarium show and night observation. Lectures given by other lecturers of the workshop were on cosmology, origins of elements in the Universe, observational techniques, the interstellar medium, the solar system and exoplanets.

VNSC and NARIT were co-hosting such a workshop for the first time and it was also the first

time that we organised such a workshop. Preparation had started early, all DAP members joining effort to prepare for the lectures, to send announcements and invitation letters, to arrange accommodation for the participants, to prepare the meeting room and to arrange for the excursion. Some of us reached Nha Trang immediately after the Quy Nhon conference, a week in advance. At first, things were messy but later everything went fine. At the end, most participants were happy with the workshop. Some of them even said that it was the best they had ever attended. As Loc describes elsewhere, some participants stayed with us on the last night to observe a total lunar eclipse that only very few Vietnamese were able to watch.



ITCA Colloquium: an open discussion session

The first ITCA colloquium had been organised in Bangkok in 2017. The next will take place in 2019 in Chiang Mai, where ITCA is located.

A SUMMER JOURNEY IN SCIENCE

Loc reports on conferences and schools that he attended during the summer.

My 2018 summer has just ended with plenty of acquisitions from continuous scientific events during a month spent away from Hanoi.

First, I went to Nha Trang for the ITCA Colloquium which is presented elsewhere in the Newsletter. Besides, a lunar eclipse occurred during the night right after the closing of the school. Despite of the exhaustion of two hard-working weeks, we still found the courage to get

up at 2 am and grasp a narrow opportunity to gaze at the reddening moon, before a strong wind brought clouds that swallowed it. We spent two more hours under the dew of the cold night waiting for the clouds to go. Then the “crescent full moon” reappeared, bringing with it the joy to overcome drowsiness. We immediately attached the camera to the telescope and took several pictures of the Moon, such as shown below. The Moon set after it exited from the Earth’s shadow while the Sun raised from the sea and a new day began. It had been a long, tiring but fruitful observation night. Together with us were some Indonesian and Malaysian friends who left Vietnam on the same day. They were very excited and told that it was an unforgettable memory of their stay in Vietnam.



Group picture at the Vietnam School of Astrophysics; Loc is on the extreme right

I left Nha Trang for Quy Nhon in the afternoon to attend the Vietnam School of Astrophysics. The subject of this year was Cosmology, taught by three foreign lecturers: Misao Sasaki (Yukawa Institute for Theoretical Physics, Kyoto University, Japan), Jason Gallicchio (Department of Physics, Harvey Mudd College, USA), and Guillaume Patanchon (Astroparticle and Cosmology Laboratory, Paris Diderot University, France). Apart from a student from Bandung, Indonesia, the participants were selected from several universities throughout the country. The school lasted one week and covered several topics in cosmology, including: General Relativity, Inflation, Nucleosynthesis, etc. The school also welcomed an unlisted “student”, Tạ Quang Bửu prize winner, Dr. Đỗ Quốc Tuấn.

Last, I headed back to Nha Trang to attend the 9th Vietnam Mathematics Congress and meet Professor Alexei Volkov, a long-time researcher of the history of Vietnamese mathematics and science. We spent much time discussing and exchanging documents. On this occasion, I also had a chance to meet Ngô Bảo Châu, 2010 Field Medalist, as well as other mathematicians who attended the Congress, and to show them around Nha Trang Observatory. The show in the planetarium was highly appreciated.

After two visits at Nha Trang Observatory this year, I will return there for a the third time in October to train the Vietnamese team of the International Olympiad on Astronomy and Astrophysics (IOAA) 2018.

A STUDIOUS SUMMER

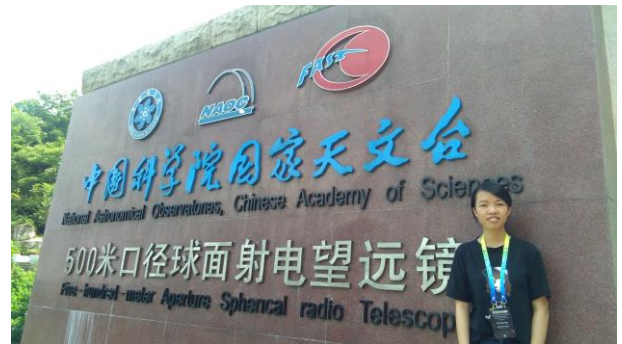
Thai reports on what she did this summer

I passed the entrance examination for a master course at the Graduate University of Science and Technology of the Vietnam Academy of Science and Technology (VAST) in June 2018. There was no choice for astrophysics: I had to register in atomic physics major as my DAP colleagues had done earlier. I have finished learning two subjects on nuclear signal processing (advanced radiation detection instruments, basic matters of nuclear signal processing). I will have more soon and my master course will end in summer 2020.

In July 2018, I attended 3 international workshops in astronomy and astrophysics. It has been a really interesting experience and a good chance for me to communicate with international experts and make friends in the field. From July 6th to 13th, together with all DAP members, I joined the conference on Cosmic Cycle of Gas and Dust in our Galaxy, which Diep and Anne organised in Quy Nhon. It was the first international conference in which I was taking part. It was a good opportunity for me to be exposed to such a scientific environment, helping me to accumulate knowledge and skills for my future career.

Right after the Quy Nhon, I participated in a workshop on “Astrostatistics and R language”, which was held in Guizhou Pedagogic University,

in China. The workshop was organised by the National Astronomical Observatories of China and the Chinese Academy of Sciences. Professor Eric Feigelson from Penn State University was the main lecturer. There were 60 graduate students,



Thai at the entrance of the FAST site

young scientists and teachers from different Chinese universities and institutes attending. I was the only non-Chinese participant. There were also some Chinese participants who came back to China from abroad to attend the workshop. The main purpose was to provide an opportunity for all participants to learn analysis and evaluation techniques of modern astronomical data. We spent three days learning about statistics and R language. We also spent one-day at FAST (the Five-hundred-meter Aperture Spherical radio Telescope), the world’s largest filled-aperture radio telescope, located in Guizhou Province, southwest China. After the workshop, I had gained some knowledge of statistics, which helped me to make a poster to be exposed in Hoa Lac, in the area used for education and training.

The last workshop that I attended was the ITCA Colloquium about which I reported above.



Odon Vallet fellowship ceremony; Thai is in the first row, 4th from left

On August 24th, at the Ha Noi Temple of Literature, I was very honoured to receive the Odon Vallet fellowship together with 130 other students. This is an annual fellowship which is offered to excellent master and PhD students by the Odon Vallet Foundation. Being awarded this fellowship meant for me a strong motivation for making more efforts in my studies and research work.

PLANETARY EMERGENCIES IN VIETNAM

We spent time collecting data and writing a report related to planetary emergencies in Vietnam, with the aim to contribute our part to the work of the 2018 International Seminars on Planetary Emergencies in the framework of "A Project for Mankind". The report addresses issues of natural disasters and environment, energy and pollution.

It is available at

https://dap.vnsc.org.vn/files/ericeseminars_vn.pdf.

A few words taken from its conclusion are copied below.

“In writing this report and compiling the data that it contains, we were motivated by helping Vietnam progress on the road toward what its motto yearns for: Independence, Freedom and Happiness. Our modest contribution to the Erice Seminars is to shed a new light on the obstacles that Viet Nam is meeting on the way. New in the sense that it offers a point of view that sometimes differs from that adopted by developed countries. Viet Nam is often the target of strong criticism from the West, because of its bad ranking on issues such as freedom of expression (175/180), pollution (94/98), health system (160/190), environmental performance (136/178) or corruption (107/180). While these are indeed major concerns, the vision that developed countries have of such issues in the Vietnamese context is often over simplistic and lacks a deep enough understanding of the realities of the country. Viet Nam has switched from a feudal regime to a modern republic in a bit less than a century, half of which was under the colonial yoke of France and the other half marked by wars, pains, starvation and poverty. The scars of these years of suffering are far from having healed and

understanding the country requires accounting for their legacy. It is still difficult to do it objectively, these issues being both strongly emotionally loaded and politically sensitive. We have tried, as much as we could, to adopt as realistic, objective, pragmatic and constructive an approach in our analysis.

An example of a difference of views between Viet Nam and most developed countries on Planetary Emergencies issues relates to climate change and global warming. Viet Nam's emissions per capita of carbon dioxide and more generally greenhouse gases are nearly an order of magnitude lower than those of developed countries. The urgency of mitigating the effect of increasingly frequent floods in the Mekong delta is not the result of the rising sea level but of the subsidence of the delta that is sinking an order of magnitude faster than the sea level is rising. The cause is in large part excessive pumping of underground water required by a rapidly expanding agriculture. The emergency is obviously to act on the cause at the same time as adapting to the new situation, not to reduce carbon dioxide emissions. While the government considers essential to sensitize the population to the importance of preserving and protecting our planet and its resources, its official adherence to the global green dogma is clearly more motivated by the need to be politically correct in order to attract foreign investments than by ideological considerations.

Many of the present difficulties that Viet Nam is facing on the way to progress are part of the legacy of the pains it endured during the past century. The recurrent complaint that authorities lack competence, in particular at local level, of which we met numerous examples in the report, has been for a long time the effect of the lack of opportunity for those in such positions to have enjoyed a proper education. The situation is now changing with the younger generation acceding positions of responsibility. Yet, tertiary education is still at a very low level in Viet Nam, with no university in the top 500 Shanghai ranking list; the reason is largely the lack of respect for knowledge, due in part to the disappearance of an important fraction of the intellectual elite, many of whom emigrated to Europe and the United States

in the second half of the past century, and in part to parents and teachers wishing for their children what they missed most: food and wealth; when one has no rice to eat, one does not dream of reading books. As a result the professions that attract most the young generation today are banking, marketing, communication and management, which obviously do not match well the needs of the country. Moreover, Viet Nam suffers a catastrophic brain drain that has not yet shown signs of decreasing.

Another difficulty that Viet Nam is meeting and which can be traced back to its recent history is related to its style of governance. In war time, and in particular under strong Soviet and Chinese pressure, a priority was to protect the country against subversive foreign influences, implying merciless repression and a general suspicion toward anyone who might potentially act against the interest of the nation. On the contrary, in peace time, an atmosphere of trust and confidence is more propitious to progress. Such a transition implied a clarification of the relative roles of the Party and the normal executive chain in order to guarantee coherence; it also implied avoiding corruption and bureaucratic and excessively conservative drifts in the process. Similarly, Doi Moi, a major milestone in the post-war history of the country, has revealed contradictions and incompatibilities in the practical implementation of a market driven economy. We saw many examples in the report, such as the roles played by institutions such as EVN, PVN and Vinacomin, which significantly hinder the inflow of foreign investments to the energy sector.

But, while Viet Nam meets many obstacles on the way to development and progress, it can also be proud of remarkable achievements, such as a literacy rate of 95%, over 99% of the population having access to electricity, a poverty rate that has decreased from 60% in the early 1990's to less than 10% today, a strong economic growth, with a GDP per capita that increased on average by 6.4%/year in the past seventeen years. More than 40 million people escaped poverty over the course of two decades. The contrast with the poor rankings that we mentioned above may sound puzzling. In fact, it simply reminds us that

the reality of a country is more complex than what a few numbers can convey. While some changes can be done overnight, others take years or decades. Changing mentalities, traditions and practices often takes generations. One thing is to boost up the GDP per capita, another is to train a qualified workforce to avoid being caught in the middle-income trap. One thing is to decrease poverty, another is to prevent the gap between rich and poor to become increasingly deeper. One thing is to eradicate illiteracy, another thing is to promote respect for knowledge and intellectual and moral rigour.

Planetary Emergencies in Viet Nam need therefore to be seen in a broad context and we should not be surprised if we often find that before addressing such emergencies we need to address others that reside upstream, such as establishing values of competence, integrity, courage and generosity, and instilling a deep sense of civic responsibility in the population. In any case, we must keep a positive and constructive stand and be confident in the ability of the country to overcome the obstacles that it is currently facing and to reach the high level of development that it deserves enjoying. [...]

This brief review of planetary emergencies in Viet Nam has shown how important environmental issues are in the economic development of the country and, with the recent sensitization of the population to such problems, in its societal and political landscape. Some of the major emergencies, such as floods and landslides, are the result of the harsh weather conditions that prevail in tropical regions and fighting them has been a major concern of the Vietnamese people for centuries. But a majority of these emergencies are the result of the rapid growth of the population and of the recent urbanisation and industrialisation of the country. To face the challenges that they incur requires a strong and efficient system of governance together with important financial resources. The recent history of Viet Nam, which spent the past century half under colonial yoke and half in wars bringing with them long periods of pain and starvation, is a serious handicap in this respect. The legacy of these years of suffering is still visible and many of their scars have not yet healed. The government is well aware of the

problems that the country is facing and is determined to find solutions. But there is a long way between writing down master plans covering the next two decades and equipping the country with the tools that can make their implementation possible. The gap between what one is aiming at and what is actually achieved is still very deep. Developed countries usually fail to understand the difficulties and obstacles that Viet Nam needs to overcome in order to progress and the judgement that they express is often unduly severe. To a large extent the case of Viet Nam is not an exception: together with many other developing countries, Viet Nam is lagging behind developed countries in terms of wealth and quality of life. Such disparities between the various nations of the globalised planet are now seen as injustices by the less privileged. Restoring a better balance and more justice is likely to dominate the geopolitics of the decades to come and signs of it are already apparent with important migrations and a rise of populism in developed countries. But rising walls around borderlines is not a solution on the long range. As scientists dedicated to the promotion of a science for peace and without borders, it is our duty to help, as much as we can, with making the transition to a new distribution of wealth and opportunities around the planet as smooth as possible and free of new conflicts”.

PRIVATE VS PUBLIC RESEARCH

This has become a trendy topic in Vietnamese academic and ministerial circles, following encouragements by the Government to manage research as a private business. Facing the failure of the public sector, any serious initiative from the private sector should be supported and encouraged. Such is the case of TIAS, the Thanh Tay Institute for Advanced Studies, a research institute created ab nihilo in the premises of a private university in Ha Noi under the auspices of the Phenikaa group. Pierre attended a round table discussion and Diep attended the opening ceremony, where the head of the new institute, Do Van Nam, whom Pierre had known as a student when he was giving lectures at the University of Education, spoke. Diep and Pierre are reporting and commenting.

Recently (27 January 2016), the Prime Minister issued decision 171 that charts the Vietnamese sector of science and technology up to 2020, defines orientations up to 2030 and takes stock of current flaws: duplication and overlap of tasks, incoherence of action, inefficiency, lack of proper evaluation and management of human resources, scientific and technological level below regional and international standard. It urges a serious restructuring and re-organisation of the sector, encouraging in particular research institutes to evolve to some financial autonomy and to a management style copied on private business enterprises. This triggers concerns on the opportunity of such a move: the Vietnamese economy is based on cheap labour and needs to switch to knowledge based, there is a long way to go. For this, science and technology need full, competent and strong support of the Government, rather than being effectively told that they must manage themselves and fight for their own survival.



Head of Thanh Tay Institute of Advanced Studies speaking at the opening ceremony

It would indeed be shameful if those in charge of higher education and scientific research in Viet Nam, facing so many challenging difficulties in helping the country to take off from its current too low level, were abdicating their authority and responsibility to the private sector, whether private universities or private research institutes. The reasons for the present failure are deep and call for a change of style, stricter intellectual and moral rigour, respect for knowledge more than for money, professionalism and hard work.

On the contrary, it would be praiseworthy if they were making the best possible use of all potential forces that might contribute positively to the phase transition that is required. One of these is the young generation, who must be encouraged to speak up, recognizing that the future of the nation is in their hands. Another is the use that may be made of the private sector in the domain of scientific research. But can the private sector create successful research institutions in Viet Nam? And, in case of a positive answer, why and how?

Before addressing the question, we need to recall the factors that prevent scientific research to progress as it should in the country; they are well known and are often commented upon:

- lack of respect for knowledge and competence, as opposed to respect for money. A result is the very low level of salaries and wages, and by consequence of dignity, offered to scientists as opposed to that offered to so-called managers or project managers;

- lack of vision and of a scientific policy taking in due account the needs of the country in terms of science and technology and the state of the art in terms of current frontiers of research. A consequence is the inadequacy of the higher education system, with too many students being trained in management, marketing, communication and the like and not enough being trained in domains where competence can only be obtained after years of hard training. Another consequence is the mismatch between the curriculum/syllabus adopted by Vietnamese universities and what the country needs. Astrophysics, at the frontier of modern science, is not taught at doctoral level and recent attempts at creating a doctoral school in astrophysics have been discouraged by those in charge of the present system;

- lack of familiarity with basic scientific culture, including a lack of respect for experimentation, instrumentation and observation as compared with theory; lack of understanding of the implications of owning a scientific instrument in terms of running and maintenance budgets required for an efficient exploitation; lack of understanding that the acquisition of a scientific instrument must be the result of a well-documented and justified

request from the community that intends to use it rather than a top-down decision by people who lack the competence: users must ask for an instrument, instruments must not need to ask for users;

- lack of proper adhesion to the rigorous principles of morality inherent to science: we just learned about a new fraud scandal in university examinations, plagiarism is insufficiently fought against, promotions and recruitments are not handled with the neutrality and objectivity that they require. Corruption and nepotism must be kept out of universities and scientific institutes;

- lack of proper participation of scientists, in particular young post-docs, in the decision making processes that shape scientific research in the country; lack of scientific advisory committees, including some participation of prestigious foreign members of undisputable objectivity and morality, that can make openly available recommendations. When such committees have been convened, usually as the result of foreign initiatives, their recommendations have been mostly ignored in spite of the remarkable coherence of their substance;

- lack of encouragement to progress and to fight the heavy bureaucracy and extreme conservatism that characterize official procedures; emblematic is the shameful way in which the award of PhD degrees is handled in case of joint supervision with prestigious foreign universities.

Such is the context in which we need to rephrase our question: would private research institutes be able to overcome some of the obstacles in this list and do better than what the public sector is currently able to achieve?

One thing is clear: if such an institute were to succeed, it could only be with the strong support of a powerful organization that could back its effort. One cannot think of a small university, simply eager to improve its image by attaching the words “scientific research” to its showcase, having any chance to succeed. It takes indeed a very strong and powerful organization to enforce the change of style that is required in terms of ethics, of scientific culture and of practices in decision making. It takes a strong and powerful organization to warrant wages and working

conditions that can be sufficiently attractive to talented scientists.

Yet, these comments should not be taken as a discouragement to the private sector to support scientific research in Viet Nam. On the contrary, as long as it is realistic in its ambitions and familiar with the scientific, socio-economic and political landscape, any initiative aimed at serving the interests of science and of the country should be encouraged and supported.

One such initiative has recently materialized with the creation of the Thanh Tay Institute of Advanced Studies (TIAS), under the auspices of the strong Phenikaa group, in the premises of the Thanh Tay university, a young private university with no serious experience in science other than social sciences. TIAS will start working in material sciences, a field that has the double advantage of federating several branches of modern sciences and of being in close relation with possible applications. A round table discussion was organised by Tia Sang with representatives of Ministries attending, together with many people holding or having held responsibilities in Science and Technology, such as former Minister Nguyen Quan or former Da Lat director Pham Duy Hien. The president of Phenikaa/Viet Nam, Ho Xuan Nang, and the director of TIAS, Do Van Nam, a former student of Pierre at the University of Education, presented the project. Both presentations were very encouraging. The former insisted on Phenikaa's intention to strictly obey the basic rules of academic freedom, scientific ethics and excellence that condition successful research. The second, a condensed matter theorist, found the right words to dissipate doubts expressed by some around the table. We copy below an editorial that he wrote recently and summarizes well his views and ambitions.

"We have lived through the period in which the country has experienced a strong and rapid economic growth. It is now necessary to build and consolidate a highly qualified human resource to serve the country.

The University is the place where such high-level labour and innovation resource are formed. As recognized in all countries, the quality of teaching at university is strongly correlated to

the quality of the research led in the latest fields of science. Accordingly, in parallel with the implementation of appropriate infrastructure, including finance, policy and management systems, modern universities must strongly focus on the development of their labour resource, with the objective that each faculty member should have a high level of knowledge and skill, together with high responsibility and good living standards.

The question is now: how to gather such a high-level human resource in a university?

As we all know, for several years Vietnamese youth has increasingly been looking for good education and training conditions. A large number of talented students have had the opportunity to go abroad for training to get high qualification. Most of these young researchers made significant and recognized contributions to different fields of science. However, after having been in contact with international cultural and scientific environments, it is then difficult for them to make a decision between "stay abroad" or "come back", when they have to seek to find balance among many dimensions of life.

In this context, Thanh Tay Institute for Advanced Study (TIAS) is established with the idea of creating an environment of high scientific level, both in line with international standards and suitable for scientists' life, including the safety for their family. Accordingly, at TIAS the development of high-level research groups made of well-motivated and well-paid researchers with appropriate facilities is the preliminary step towards building training programs adapted to today's youth and society.

[...] Talented scientists will be warmly welcome to join us, to share our fundamental values and then to make our best to add our contribution to the development of the country."

Of course, we know too well how long is the way from words to results. For such a seducing initiative to succeed, both the Vietnamese scientific community and the management of the public sector, MOST and MOET, must give it their strongest encouragement and support rather than seeing it as a competitor. If they succeed, it will be good for all of us, if they fail, it will be bad for all of us.

AN INTERVIEW OF TRAN DINH PHONG

Hoai and Diep interviewed a young scientist who came back to Viet Nam after having spent time abroad and was awarded the 2018 Ta Quang Buu Prize. He is a member of the USTH faculty.



Tran Dinh Phong

VATLY: As a young Vietnamese scientist coming back to the country from abroad, what did you expect?

Tran Dinh Phong: In fact, I did not expect much. While being abroad I kept informed of what was happening in the country. Therefore, my mind was made when I decided to come back. Before making a complete move back to Vietnam and joining USTH I spent about half a year going back and forth between my former university in Singapore and Vietnamese research institutes and universities, whether public or private, to have a better understanding of the working conditions in Vietnam. I did not expect to have the same working conditions as what I had abroad because I knew that it would have been unrealistic to hope for that. I was just wishing to meet colleagues at home ready to welcome with an open mind young scientists like me coming back from abroad. I wished to have support to be able to build a research group of my own. Building a research group was the reason for me to come back. I felt that I have enough experience to build and maintain such a group. In Singapore, I had been a group leader, senior research fellow; but this is not a faculty position, therefore, by definition, I could

not be the Principal Investigator (PI) of scientific projects, and I was not allowed to build my own research group. Another factor was to find a place providing an environment that my family would like. When looking around for job opportunities, there have been cases of institutions offering me a job but my family would not have been happy to live there. Finally, I thought why not Vietnam? I had the feeling that if I came back I could do something in Vietnam; therefore, finally, I decided to come back.

VATLY: After some time working in Vietnam, how do you feel?

Tran Dinh Phong: I can say that now our laboratory is able to do most of the experiments which we want to do so far. For really difficult experiments which cannot be accessible in Vietnam we can do it abroad in collaboration with colleagues from Japan, South Korea or France, with whom I keep good contact. Scientifically speaking, our group is of a good level. The progress is not as fast as I had hoped for but we succeed to achieve quite a lot. There is one thing which not only me but Bac Pierre and Professor Dao Tien Khoa have mentioned many times: the support given to research teams in Viet Nam is not sufficient to help them grow as they should in competence and strength. What I mean is that this year's support should be better than last year's and the year to come should be better than the current year in order for us to carry more and more advanced experiments and be able to keep manpower with us for longer time. Our group is an experimental one, our research staff is undergraduate and graduate students (bachelor, master and PhD). Presently, I have difficulties in obtaining sufficient financial resources and finding a proper framework for PhD students to stay with me long enough. In fact, we have no fellowships to give them. For example, in August 2015, I received eight students but only one of them is still working with me today. Good students tend to go and study abroad. Most of those who left our team were first authors of ISI articles. It shows that students in our group do good research work and usually work on competitive scientific problems. However, they

prefer to work abroad with much better working conditions and good scholarships, with the opportunity to become acquainted with the environment in major research institutes. On the long-term, in order to progress, Vietnam needs to find ways for research groups to grow and develop in size and in skills.

Let me give another example of the difficulties which I presently meet. Some of my students want to work with me on some specific topics, to the point of declining full PhD scholarships from other institutes: they work under the joint supervision of myself and another colleague of mine in France or South Korea. Their scholarships cover the time spent abroad but not the time spent at home, which is very difficult for them. A solution must be found if we want to progress. In experimental science, it takes at least six months for students to get familiar with the laboratory and with a specific project. If they have to leave after only 12 or 18 months, this means too short a turn-over; the students may have learned a lot during their stay but the effort invested by the team is lost; we need them to stay longer with us in order to build up experience and skill at the level of the team. This is the price to pay to carry out more advanced research.

VATLY: Can you tell us a bit about the support for your research group?

Tran Dinh Phong: Support is now through NAFOSTED projects, before we had institutional projects from USTH. Moreover, Professor Nguyen Quang Liem (Institute of Material Sciences, VAST) and I have a quite big project funded by the Office of Naval Research Global. Thanks to these financial sources we could buy some good equipment. Very quickly after I joined USTH, the university gave me support to build my own research group. There were financial allocations of the order of 20 to 50 kUSD to buy equipment; therefore, in a short time I could have a team to do research. As I was prepared, when coming back, to have working conditions less efficient than I had in Singapore, whenever I know of a laboratory having suitable equipment I jump in and ask permission to send my students to work there. Right after coming back, I bought and

asked for chemical substances, borrowed equipment trying to immediately start carrying out our experiments, therefore, there was almost no dead time. USTH is a public university, with relatively limited funding resources. However, I got good moral support.



Ta Quang Buu Prize Award Ceremony. Phong is second from right, Deputy Prime Minister Vu Duc Dam is at the extreme left and the MOST minister at the extreme right.

VATLY: What can you say about the differences between working in Vietnam and France or Singapore?

Tran Dinh Phong: The main difference is in the scientific communities, the culture in doing science. Research at high level as in France or Singapore has been developed much earlier than in Vietnam; as a consequence, it is better organised; which means that when you get into the system you just need to run and realise your ideas. Whereas in Vietnam there are often many other complicated issues that you have to deal with. For example, it is normal for a researcher from a Nanyang Technological University laboratory to have his office there but to do experiments in other laboratories. That practice is very welcomed in Singapore. Sharing facilities (not services) is popular. You just need to make a phone call or send an email, then your student will be able to use other people's facilities in their laboratories. Of course, the results will be shared as well. It is a simple process without much paperwork. Similarly, France has the concept of a laboratory without border, a collaboration between strong laboratories that carry out a

common research program, share facilities or use some excellent platform supported by the local government or by the region. In Vietnam, it is not always easy to share facilities between research labs or institutions. I think that to progress better and faster in science, we should work on this practice: create more cooperative research and share available resources.

Another major cultural difference concerns the evaluation of the performance of scientists. I find that evaluation in our country still needs to adapt to international standards. In science, evaluation criteria are not black and white, the performance of a scientist cannot be reduced to a mere number. Numbers are just indicators that help the evaluation. The best way to evaluate the performance of a scientist or of a research team is to invite a professor working in the same field who will be able to evaluate reliably how the scientist or the team is doing and where they stand. I do not mean that counting the number of papers or grants is wrong. Having a lot of grants often means higher reputation. Using grants to evaluate a scientist may be a good indicator but it is not enough. The number of publications is also a good indicator showing how productive a scientist is. However, again, having a lot of papers may not mean being excellent. Even the number of quotations per research paper also depends on the quotation culture of the community. In short, there is no perfect numeric indicator, the only good indicator is evaluation by peers. In developed scientific communities they do this quite well. I think and hope that, sooner or later, we should adopt such evaluation policy.

VATLY: Can you share with us your thoughts and experience in building a research group? What do you want?

Tran Dinh Phong: I have the feeling that we should work more toward building efficient research networks or research clusters to tackle scientific and technological issues. I often think that if you are better than I am or if your team is better than mine, it does not help science to progress; but if we both are good, and both have good teams, together we can carry bigger projects and progress. In other countries, while competing

with each other, researchers also make use of opportunities to collaborate and pull each other up. A small team has limited possibilities to make significant contribution to its field but joining the effort with others increases its impact and visibility. It is then easier to convince the funding agencies that this community is doing well and deserves to be supported. If a community consists of only a few persons, though excellent, it is still questionable whether it can achieve something important. The general trend, in particular in our solar energy domain, is to group together to form clusters of institutes located all over the world. This facilitates exchanges of expertise and our voices are much better heard when applying for funding. Of course, everything originates from small teams, they grow up progressively. But they need to collaborate with others in clusters, consortiums or virtual institutes sharing different approaches, facilities, exchanging ideas to carry big programs together, etc. It is important to boost science in the country that way. For this to succeed, two conditions must be met: 1) the call for collaboration should be open; 2) mutual trust is essential.

What should we expect from our authorities? That the government creates fair opportunities. When having more chances it will be very quickly possible to identify who and which groups are doing well, which teams are on the rise. I strongly wish that our resources become more centralised, it is too much spread out and scattered around. A stronger centralisation would help the government to manage its resources more efficiently. For example, everyone seems to agree that the National Foundation for Science and Technology Development (NAFOSTED) is the most efficient model so far for allocating grants to science in the country. Why not extending the NAFOSTED model to funding science at a higher level? A stronger funding framework would help shaping major scientific orientations in the country in various domains such as technology, agriculture, medicine, etc. I am convinced that the extension of the NAFOSTED model to higher level of funding would prove at least as efficient as NAFOSTED currently is.

At the same time, I hope that the government can centralise resources to build

technical platforms for everyone to use. In our fields, if a university buys an X-ray photospectroscopy device, a key instrument for material characterization, it faces a number of difficulties such as big investments, good number of users for an efficient exploitation of the equipment, important operation and maintenance costs, etc. Such problems of major instruments can be easily solved by the government. For example, the government could invest in a platform managed by an organisation such as NAFOSTED, with all PIs being allocated a slot to work there. This would be very beneficial as a more efficient use of available resources, as well as creating a place where scientists meet and exchange ideas.

VATLY: What do you need? What do you want to change? What do you expect?

Tran Dinh Phong: My sincere wish is that the government would create the most favourable conditions for Vietnamese students to be well trained and to be able to attract more highly skilled scientists to come back to the country. We now have more and more high level scientists having been and being trained abroad. If they see that they could do something meaningful when coming back home they would come back. If we could create conditions sufficiently favourable to attract them, in a decade or so the scientific landscape would change. The scientific policy and the management style would also change accordingly.

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– PHOTO ALBUM –



Thao welcoming the very first visitors of the Hoa Lac observatory



Paul Ho visiting DAP; Dinh Van Trung is on his left



Over 300 people took part in the Space Day in Ho Chi Minh City



Participants at the ITCA Colloquium visiting the Nha Trang Champa tower. Thai and Hoai are in the centre



Hoai, Tuan Anh, Thai, Diep, Phuong, Tram and friends at the bootcamp farewell dinner



Tuan Anh lecturing at the ITCA Colloquium



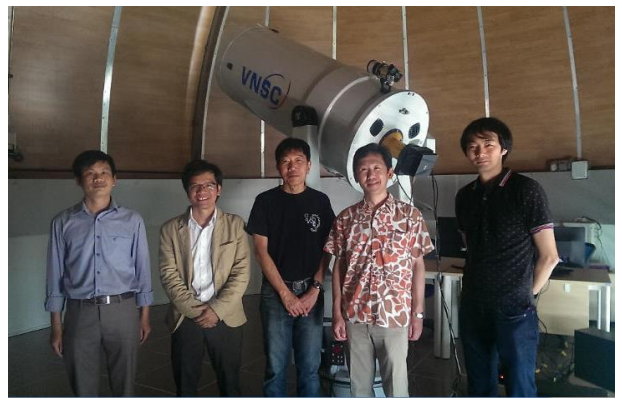
The head of the Physics department of the Ho Chi Minh University of Education, Cao Anh Tuan, together with Loc



Phuong and friends visiting Andora



Tram and his thesis supervisors after the PhD defence at Paris Observatory. Left to right: Sylvie Cabrit, Tram, Pierre Lesaffre and Nhung



NAOJ astronomer friends visiting the Nha Trang observatory



Pierre and Nino in Erice



With Paul Ho at the Hue restaurant in Hanoi



Group picture of the astrobiology school in Bassin d'Arcachon



ITCA Colloquium participants at Nha Trang Observatory