

## VATLY NEWSLETTER

*Our administration favours the many instead of the few; this is why it is called a democracy. If we look to the laws, they afford equal justice to all in their private differences; if no social standing, advancement in public life falls to reputation for capacity, class considerations not being allowed to interfere with merit; nor again does poverty bar the way, if a man is able to serve the state, he is not hindered by the obscurity of his condition.*

Pericles, as reported by Thucydide, ~430 BC



YEAR OF THE MONKEY

*With our best wishes  
of health, success and happiness!*

### CONTENT

This twenty-third issue of the **VATLY NEWSLETTER** opens with the traditional **NEWS FROM THE LABORATORY**. The second half of past year has been one of hard work, rewarded by several publications. Nhung tells us about one of these, describing **ONE OF THE MOST FAMOUS STARS IN THE HISTORY OF ASTRONOMY: MIRA CETI**. Such work was made possible, as explained by Bac Pierre, thanks to **ALMA's OPEN ACCESS POLICY**, which provides public access to its archives one year only after observation. Our affiliation with the Viet Nam Academy of Science and Technology (VAST) is now one year old, an opportunity for Diep to look back at this **FIRST YEAR AT VNASC**, what it gave us and what we may still hope to get out of it. An opportunity also, for Nhung and Diep, to report on **AN**

**INTERVIEW OF PROF. DUONG NGOC HAI, DEPUTY CHAIR OF VAST AND RECTOR OF ITS GRADUATE UNIVERSITY**. On the occasion of Hoai's PhD thesis defence, in December, we welcomed French astronomers and friends: Anne Dutrey, Stéphane Guilloteau, Thibaut Le Bertre, Daniel Rouan and Pierre Lesaffre. Hoai reports on the **TWO WEEKS OF LECTURES AND FRIENDLY EXCHANGES** that we spent with them. In September last year, the Prime Minister invited a few young people and gave ten of them a chance to share with him their main concerns. Nhung, who was selected as one of the ten, tells us about this **MEETING WITH PM NGUYEN TAN DUNG**. Outreach has remained one of our concerns and Tuan Anh tells us about our implication in **A TV PROGRAMME ON ASTRONOMY AND SPACE SCIENCE** while Thao reports on **PROGRESS WITH USING THE**

**HNUE OPTICAL TELESCOPE.** Reports on **SCHOOLS, CONFERENCES AND SHORT VISITS ABROAD** follow. Finally, in March last year, the Prime Minister issued a decision approving a **“PROGRAMME OF DEVELOPMENT IN THE FIELD OF PHYSICS BY 2020”**. We learned about it from Nguyen Duc, a Viet Kieu working in material sciences in the US, who had been informed by the Ministry of Science and Technology... an interesting example of communication within the Vietnamese scientific community. We reproduce its content before closing the issue 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.*

It has now been one year since our transfer to the Vietnam National Satellite Centre (VNSC). We are hosted in a building separated from the main administration and management building, together with young colleagues busy with the preparation of the launching of a small satellite, called nanodragon. As a result, we have little contact with the management. Diep, as leader of our team (officially the Department of Astrophysics) meets with VNSC directorate once a month. The ambition of VNSC is to contribute to the Vietnamese Space Programme, together with the Space Technology Institute, with strong guidance and support from Japan, and, as top priority, to prepare the construction of the future Space Centre in Hoa Lac.

Our action in supporting the revival of the Vietnamese Astronomical Society had a first positive result in the Autumn, with a meeting being held in the IOP building, on VAST campus, where the chairman, Prof. Dinh Van Trung, has his office. In addition to our whole team, the meeting was attended by Prof. Nguyen Quynh Lan, from the Hanoi National University of Education, and by Dinh Van Trung's students. It was an opportunity for Trung, Lan and Diep to present the main lines of the research activities of their teams. In particular, Diep presented the conclusions of our report on a possible future national radio astronomy facility, and our main point, that top priority must be given to let our community

increase in size and skills, received support from the assembly. Lan stated her support to a joint programme of observations using the HNUE 40 cm telescope. Thao reports about it later in this issue.

Also in the Autumn, we were contacted by two Viet Kieu astronomers, Nguyen Trong Hien and Nguyen Luong Quang, who expressed their willingness to help Vietnamese astrophysics and space science. On this occasion, we had a fruitful dialogue on what are our real needs in the difficult Vietnamese environment where fundamental research receives very little support, being moral or material.

Diep followed the progress with our requests for support from NAFOSTED, to collaborate with a Ghent University team on the analysis of Herschel data, and from the French CNRS in the form of a collaboration with VAST. The former was turned down, the decision on the latter should now be imminent.



*Diep and Prof. Duong Ngoc Hai after the interview*

Diep, together with Phuong and Dat, a young USTH bachelor making his dissertation with us, have been working on a paper about the general methodology of analysing radio astronomy observations of the gas envelope of evolved stars. On the occasion of their visit to Ha Noi, Anne Dutrey and Stéphane Guilloteau gave us strong encouragement to complete this work, which they consider quite timely. The paper is now written, including several illustrative applications to the study of evolved stars (as well as of a protostar, which Anne encouraged us to include as an example of major similarities between young and old stars) and will be submitted for publication in MNRAS. Dat presented his dissertation in September and got excellent marks; he has obtained a fellowship for a master in Bonn where

he now studies. Diep and Tuan Anh presented the work of the team at conferences in Thailand and in Hong Kong; they briefly report on this later in this issue.

Nhung has been very active in guiding analyses of observations, which she had selected from ALMA archives. These include three AGB stars, W Aql,  $\pi^1$  Gru and Mira Ceti, the associated articles being either accepted or submitted for publication. Mira Ceti has been a favourite star for astronomers for centuries, Nhung tells us more about it later in the issue.



*Hoai and her thesis defense's jury. Left to right: Diep, Nhung, Thibaut, Stéphane, Hoai, Daniel, Khoa, Pierre and Trung*

Hoai defended her thesis in December and was awarded her PhD degree with “mention très honorable” by the French doctoral school. Daniel Rouan and Dao Tien Khoa were sharing the chair, while Stéphane Guilloteau and Dinh Van Trung were rapporteurs. Hoai got very laudatory comments on her work, but she still needs to go through more steps before getting her Vietnamese degree. Indeed, in spite of our recurrent plea for simplified Vietnamese regulations, including an open letter to the Minister of education and training, which had been in principle very positively received, the reality is still the same as before: Hoai has to send 50 long summaries of her thesis, in Vietnamese, to Vietnamese doctors, and obtain fifteen positive recommendations before being authorised to defend her work a second time in front of an exclusively Vietnamese jury. It is particularly ridiculous in the present case, where neither fifty, nor even fifteen, Vietnamese scientists can be found, who have been trained in astrophysics and could seriously assess Hoai's work. It is a pity for Vietnam to display such inability to adapt rules to reality and to suffer such

bureaucratic inertia.

Hoai's thesis defence was an opportunity for the team to enjoy the visit of Anne Dutrey, Stéphane Guilloteau and Thibaut le Bertre and learn a lot at their contact, either from lectures or from direct exchanges. Anne and Stéphane had taken with them Emilie, their six years old Vietnamese daughter, with whom we made friend. Hoai reports about these days later in this issue. We shall keep close contacts with Bordeaux in the future and we agreed with our three guests to organise a conference on “Cosmic cycle: dust and gas from old to young stars” in Spring 2018 in Quy Nhon.

Tuan Anh, has been very active in helping with the reduction of ALMA data. He is in charge of advising a TV team on the production of a program on astronomy and space science, about which he reports later in this issue. He also attended conferences in Thailand in his role in the young ASEAN astronomy community. Unfortunately, his request for post-doctoral support in Japan, working with a NAOJ team, was not accepted. In July he defended his thesis successfully in front of a Vietnamese jury, six months after having obtained his French degree.

Thao has spent most of her time on getting the SRT ready for use by USTH students and getting prepared with making observations using the 40 cm HNUE telescope. She reports about her progress later in this issue.

Phuong is now approaching the end of the lecture programme that she has to attend at the University of Sciences and will defend her master thesis in the Summer. She will continue with us for a PhD, in cotutelle with Bordeaux University.

We had recently the pleasure to welcome among us a young USTH master student, Nguyen-Tran Tuan Anh, who will make his master and PhD with us.

Bac Pierre, in addition to contributing to the analyses of ALMA data, has written his usual load of articles in Tia Sang, which will now be collected in a book including both Vietnamese and English versions. He also was asked to present a testimony on the achievements of NAFOSTED, the funding agency for physics, and to suggest improvements. In September, after having attended the Erice seminars on Planetary Emergencies and presented the work of the team to the World Laboratory, he met Thibaut and Nguyen Quang

Rieu at the Observatoire on the occasion of his passing by Paris. The encouragement and moral support that they give us are a most precious asset for our progress, for which we are deeply grateful.

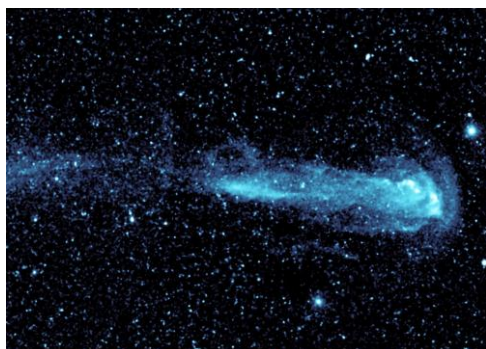
We had opportunities to invite friends for lunch on several occasions, among whom Damien Prêle, Yannick Giraud-Héraud, Denis Puy, and Guillaume Patanchon. Most memorable was sharing a lunch with Viet Phuong, who told us about his memories of fifty years serving as Secretary of Pham Van Dong. On this occasion, we had invited Pham Phuong Chi, whom we got to know on the occasion of the meeting of the PM with a selection of young Vietnamese. She was, together with Nhung, among the ten who addressed PM Dung. We liked very much what she said and we made contact with her. She obtained her PhD at the University of Social Sciences and Humanities, she studies Vietnamese literature at the time that preceded the August Revolution, and spends now a postdoc at Riverside.

We learned from Hiep, who had made his master with us in 2011 and had left research for a while, that he now decided to come back to astrophysics and applied for a fellowship for a master in Macquarie University in Australia.

Last, we had the great pleasure to congratulate Thao who married Nguyen Trong Dai on January 19<sup>th</sup> and wish them happiness for ever and Alain Maestrini and his wife Huyen who became parents of Anne-Vy in early November.

### **ONE OF THE MOST FAMOUS STARS IN THE HISTORY OF ASTRONOMY: MIRA CETI**

*Nhung tells us about a fascinating star, which we had a chance to study with unprecedented spatial resolution using archived ALMA data.*



*Ultraviolet mosaic of Mira's bow shock and tail obtained using NASA's Galaxy Evolution Explorer*



*Thao and her husband (Dai) taking wedding photo*

It is Thibaut who encouraged us to look into ALMA observations of Mira Ceti. If it had not been for him, we would probably never have dared to approach such a mythic star, which, we thought, was the exclusive preserve of top-tier astronomers from which newcomers such as us are excluded. During the twentieth century, some 5000 observations of Mira have been reported to the American Association of Variable Star Observers and the first observation dates back to the end of the sixteenth century. Mira's luminosity oscillates with an eleven months period with very large amplitude, such that it is visible to the naked eye during at least one month in each period.

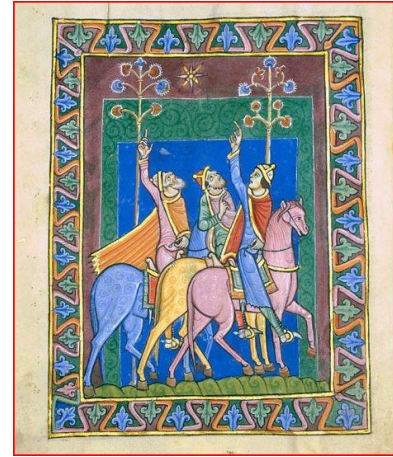
Some people have argued that it has been observed much earlier than 1600, however not convincingly enough to be taken as granted. In particular, in a very entertaining article (Quodlibet Journal, Vol.4, Nr.1, ISSN:1526-6575) Costantino Sigismondi argues that it might well have been the Bethlehem Star that guided the three Magi Kings to the stable where Jesus was born. At that time, 6 to 7 years BC, as Johannes Kepler remarked in 1614, there had been three successive conjunctions between Saturn and Jupiter and Mira was not far away. In 1604, Kepler had observed a Supernova explosion, the remnants of which are named after him, and thought that it was the consequence of a conjunction between Jupiter, Saturn and Mars. Similarly, he thought that the Bethlehem Star was a nova of the same type, caused by the conjunction of Saturn and Jupiter.

Mira was discovered on August 13, 1596, by a Dutch Lutheran pastor and astronomer, David Fabricius, who reported his observations to Tycho Brahe and to Kepler. He was observing Jupiter and

first thought that Mira was a nova because, by the end of September, it had disappeared. But, on February 5<sup>th</sup> 1609, it appeared again: “Wonderful thing!, he wrote Kepler, *I witness to God to have seen and observed twice in so different times and, what is to be noticed, Jupiter was almost in the same place as in 1596. I can't enough contemplate the admirable Work of God, and see here, my dear Kepler, that my star among new stars and comets is real, it is not created ex novo, but they are sometimes deprived of the light, and nevertheless they complete in this way their motions. When actually God wants to show to us something that is beyond the normal order, he enlightens these invisible bodies, letting them to appear and to move in public.*”

In 1603, Johannes Bayer evaluated Mira of magnitude 5, and named it Omicron Ceti; but he failed to recognize that it was absent from Ptolemy catalogue. Later in 1638, Johann Holwarda, determined its period to be 11 months and in 1642 Johannes Hevelius of Danzig named the star Mira, "The Wonderful" and started a campaign of careful observations that lasted from 1659 to 1678. William Herschel observed the maximum brightness of Mira (magnitude 1.3) on Nov 9, 1779.

The past two decades have witnessed spectacular progress in our knowledge of Mira, with multi-wavelength observations of unprecedented sensitivity and resolution. It is a binary, the main star, Mira A, having been on the Asymptotic Giant Branch long enough to experience several dredge up episodes. In 2007, Ireland and coworkers categorically asserted, interpreting observations in the infrared, that its companion, Mira B, was a Main Sequence star surrounded by an accretion disk in which planets could form and where life might appear. Three years later, in 2010, Sokoloski and Bildsten asserted, no less categorically, that it is a White Dwarf.



Indeed, the Chandra observation of an X ray outburst in 2007 and of variable OH maser emission in 2010, together with observations in the UV, witness violent events typical of what is expected from accretion by a White Dwarf. Recent ALMA observation at 95 and 229 GHz of partially ionized gas gravitationally bound to Mira B resolved its spatial extension at the level of only three astronomical units. The very high velocity of Mira in the interstellar medium, of the order of 130 kms<sup>-1</sup>, generates a cometary wake and a bow shock that have been observed in the UV in 2007.



Recently, the short distance environment of Mira has been observed using ALMA in <sup>12</sup>CO(3-2) with an unprecedented spatial resolution of ~0.5'' up to a distance of ~10'' from the central star by Ramstedt et al. (2014). The map reveals a complex pattern of arcs, which the authors describe as “the wonderful complexity of the Mira AB system” and suggests that Mira A’s slow wind is being accreted by Mira B in the orbital plane. Our contribution has been to analyse other ALMA observations that have recently been open to public access and offer a slightly better resolution at short distance from the pair of stars. We give evidence for gas outflows from Mira A, part of which is

focalised, and probably partly accreted by Mira B, as well as detached debris suggesting violent mass ejection episodes that occurred at both a short time scale, a few centuries, and a longer one, a few millennia.

In addition of having given us an opportunity to be first to publish a detailed description of the molecular gas morphology and kinematics at short distances to the stars, this work has been a very entertaining and exciting exercise.

### ALMA's OPEN ACCESS POLICY

*Bac Pierre tells us about ALMA's policy of opening its archives to the public one year only after observation and the chance it means to us.*



*ALMA's New Year card thanking "all who contribute to make ALMA a success and wishing the best for 2016". The drawing is from 3<sup>rd</sup> grade children of a primary school in Iquique and displays the antennae observing the protoplanetary disk of HL Tau under a starry sky.*

Past year has given us a chance to analyse data from observations using the most advanced radio astronomy instrument available today, the Atacama Large Millimeter/sub-millimeter Array (ALMA), in competition with the best research teams in the field. ALMA archives are a gold mine for us, an unexpected windfall that drastically changes the perspective of our research potential.

ALMA is a giant array of fifty 12-m movable antennas, with baselines up to 16 km, and an additional compact array of 7-m and 12-m antennas to image extended targets, located at 5000 m altitude on the plateau of the Atacama desert, in Chile. It observes at wavelengths in the range of 3 mm to 400  $\mu\text{m}$  (84 to 720 GHz). The design of ALMA was driven by three key science goals: detect spectral line emission from CO in a  $z=3$

galaxy in less than 24 hours; image the gas kinematics in protostars and in protoplanetary disks around young Sun-like stars in the nearest molecular clouds (150 pc); provide precise high dynamic range images at an angular resolution of 0.1 arcsec. ALMA is operated as a partnership of ESO, NSF (USA) and NINS (Japan), together with contributions from Canada, Taiwan, Korea and Chile. The field of view, measured as the FWHM of the primary beam, is 21" at 300 GHz. The spatial resolution (FWHM) is about 76" divided by the maximal baseline in km and the frequency in GHz, namely 16 mas at 300 GHz for a 16 km largest baseline. ALMA can use up to 7680 frequency channels having widths ranging between 3.8 kHz and 15.6 MHz, for a total bandwidth not exceeding 8 GHz. At an observing frequency of 110 GHz, the highest spectral resolution implies a velocity resolution of 0.01 km/s. The thin and dry atmosphere, together with the 4 K front end electronics, provide excellent sensitivity and low noise. Continuum observations (typically of the dust) result in four spectral windows that can be combined to form a single image with an effective frequency width of 7.5 GHz.

As many readers are more familiar with the environment of particle physics than with that of astronomy and astrophysics, I thought that they may be interested in learning about what open access to ALMA data means in practice for us. In what follows, I summarize the motivations of the community of astronomers and I comment on relevant differences between particle physics and astrophysics in this respect.



*ALMA site at night with the Milky Way clearly seen by naked eye*

As far as motivations are concerned, let me quote *in extenso* the resolution that was adopted by

the general assembly of the International Astronomer Union (IAU) in 2003:

*Recognizing that scientific advances rely on full and open access to data; that it is in the interests of astronomy generally that archived data be made as widely accessible as possible, and that the technology exists via the world-wide web to do so cheaply and effectively; that the development of the Virtual Observatory will enable effective use to be made of such archives, thus increasing the effectiveness and scientific return of astronomical research;*

*Considering that access to observing time on major astronomical facilities is sometimes necessarily and legitimately restricted for funding or other reasons; that after data have been obtained on such a facility, access to such data is often necessarily and legitimately restricted for some period (the “proprietary period”, typically of one to two years), to the observer, students, instrument builders, or other defined groups, so that they may have a reasonable opportunity to publish their results, and thereby capitalise on their investment of time and resources put into the observations; that in many cases, after this proprietary period the data are placed in a data archive where they are made more widely available;*

*Recommends that data obtained on publicly-funded major national or international astronomical facilities should, after a reasonable proprietary period in which they are available only to observers or other designated users of the facility, be placed in an archive where they may be accessed via the internet by all research astronomers. As far as possible, the data should be accompanied by appropriate metadata and other information or tools to make them scientifically valuable; such data should not be subject to intellectual property rights. The form in which data are made available, and the subsequent processing of such data, may be appropriately protected by copyright laws, but the fair usage (including educational purposes) of the archive data themselves should not be subject to restrictions; funding agencies provide encouragement and support to enable data produced by astronomical research that they fund to be deposited, after some proprietary period as defined above, in recognized data archives which provide unrestricted access to these data.*



*ALMA's telescope*

These views are widely shared by the astronomer community and a significant amount of effort and money has been invested in order to closely follow the above guidelines. In particular, in the case of ALMA, the raw data are reduced to a form amenable to analysis by a dedicated staff and Help Desks are manned to assist the users. Data reduction implies several calibrations to obtain what is called “visibilities”. Basically, with  $N$  antennae, one records  $N(N-1)/2$  complex numbers (an amplitude and a phase), one for each baseline. For  $N=60$ , this means 900 visibilities recorded every few seconds in each frequency bin (typically 50 to 100 bins in order to cover the molecular line under study, more or less red-or blue-shifted depending on the winds present in the source). After accounting for the various calibrations and for the rotation of the Earth, one produces a single visibility map, which needs to be Fourier-transformed to obtain a sky map. As the angular resolution is typically a few percent of the angular aperture of the field of view, the data consist of a few thousand pixels, each with some hundred frequency bins, meaning typically a few  $10^5$  sets of four numbers: the two sky coordinates, the frequency and the signal amplitude. As one can see, the work required from the ALMA staff to reduce the data is significant and the end user has access to well pre-digested information, either in the form of final visibilities or of a sky map, as he wishes. The astronomers who have proposed the observation and those who had nothing to do with the proposal are then in identical position, once the data have been made public, as far as using and analysing them is concerned. Release to public access occurs only one year after the data have been reduced. Usually, in order to protect themselves against being overtaken by another

research team, the proponents of the observation publish promptly a letter in a standard journal, such as Astronomy and Astrophysics or the Journal of Astrophysics, in which they simply show the data and make some relatively obvious comments, however eventually leaving the field to teams such as ours for a detailed analysis.

Recently, CERN has launched its Open Data Portal where data from real collision events, produced by the LHC experiments, have been for the first time made openly available to all. Quoting from the Director General *one hopes that these open data will support and inspire the global research community, including students and citizen scientists. Indeed, the principle of openness is enshrined in CERN's founding Convention, and all LHC publications have been published Open Access, free for all to read and re-use. Widening the scope, the LHC collaborations recently approved Open Data policies and will release collision data over the coming years.* This is indeed a very commendable initiative and will undoubtedly be made excellent use of for education. However, as far as doing actual research is concerned, particle physics and astrophysics are in very different situations. There are many reasons for that. Let me quote a few, limiting my comments to ALMA data of the kind we are using, essentially observing the cool gas that surrounds stars, either being formed or dying, or that embeds galaxies.

LHC data are made of events, one needs to analyse thousands or even millions of such events to select a few that carry interesting information. ALMA data are the result of an exposure time of only a few minutes and are reduced to a single three dimensional map (two sky coordinates and a Doppler shift) of the detected radio signal. Of course, there are also “events” in astronomy, such as supernovae implosions, gamma ray bursts or X-ray flares, but we cannot trigger them... The time scale of the evolution of what we observe is from centuries to million years (if one excludes the trivial effect of the proper movement of the source) in the case of stars, up to billion years in the case of galaxies. LHC data bring together information from a large number of sub-detectors, each responding differently to different particle types; their interpretation implies a detailed understanding of these responses. ALMA data are of a single nature; they do obviously require a

good understanding of the molecular physics governing the emission of the detected radiation, but this is independent from the detector itself. LHC data are very large and require important storage facilities and/or networks such as the GRID for an easy access. ALMA data can be downloaded on our PCs from the web.

What this means in practice is that ALMA data can be used by teams like ours exactly as they are by the best teams in the world. The price to pay is just a delay of one year. In a country where support to fundamental science, not only material but even moral, is weak, this means an invaluable asset that deserves being fully exploited. The Vietnamese community of scientists has not yet appreciated the high value of this opportunity; many people still think that we need to invest in instruments or to pay expansive fees to join some international collaborations. But we need to invest in brains, and observing the Universe is free of charge. It is time to foster astrophysics research in the country and to recognize that after 25 years of sending PhD students abroad to be trained on particle physics, we have not yet been able to bring together a team having the ability to compete on the international scene.

Let me close these comments by quoting from a team of US scientists concerned with the handling of massive astronomical data sets (R.J. Brunner, S.G. Djorgovsky, T.A. Prince and A.S. Szalay, Handbook of Massive Data Sets., Kluwer Academic publishers, Norwell, MA, USA, 2002, p.931-979): *A major paradigm shift is now taking place in astronomy and space science. Astronomy has suddenly become an immensely data-rich field, with numerous digital-sky surveys across a range of wavelengths [...] we can now map the Universe systematically, and in a panchromatic manner. This will enable quantitatively and qualitatively new science, [...] empower scientists and students anywhere, without an access to large telescopes, to do first-rate science. This can only invigorate the field, as it opens the access to unprecedented amounts of data to a fresh pool of talents.*

### **FIRST YEAR AT VNSC**

*One year after our transfer to VNSC, Diep reports about the experience.*

It has been a year since we moved from the Institute for Nuclear Science and Technology to

the Vietnam National Satellite Center (VNSC). The new environment is clearly better suited to our work, even if a few obstacles still need to be overcome.

After the transfer, VNSC created a new department to host the group. VATLY has now a new name, Department of Astrophysics (DAP). As far as I know, we are the only unit in the country having “astrophysics” mentioned in the name. Thanks to this official label, foreign scientists find out more easily about us and contact us. In particular, in 2015, we were approached by Prof. Maarten Baes from Ghent University (Belgium), and we together proposed a project as part of a bilateral cooperation agreement signed between the Vietnam National Foundation for Science and Technology Development (NAFOSTED) and Fonds Wetenschappelijk Onderzoek (WFO). The proposal was to study gravitationally lensed objects behind the Virgo cluster using data collected by the Herschel Space Observatory. It got an excellent review by one of the referees, in the top 6 to 20%, but the other referee complained that “it was not clearly written why collaboration with astronomers in Vietnam was crucial” and we did not get approval... Yet, we hope, in a near future, to have more collaboration opportunities of this type.

Being part of an institute of the Vietnam Academy of Science and Technology (VAST), which is under direct authority of the Prime Minister, at the same level as a ministry, we have, in principle, access to many funding sources: projects at VNSC and VAST levels; project for young scientists; independent projects; national key programme projects; projects in collaboration with provinces or international cooperation projects. Making use of an existing agreement between VAST and CNRS (France), together with Prof. Thibaut Le Bertre from Paris Observatory, we proposed a collaboration to study evolved stars and obtain financial support for short visits in each other foreign institute. We are currently waiting for the decision.

VNSC is a young organisation (this year, it will celebrate its fifth anniversary); it has a staff of about 125, with an average age of ~30 years. The Head, Dr Pham Anh Tuan, is very dynamic and maintains a lively and motivated atmosphere. Meetings are short and to the point. The administration is at the service of the staff rather

than the opposite, as is often the case elsewhere. They help us with facing the intricacies of the Vietnamese bureaucracy, which may reach incredible levels: just to quote an example, when we moved to VNSC we decided to leave most of our equipment to INST but to take with us the small radio telescope (which, by the way, we had bought with money from our own private pocket) and install it on the roof of the University of Science and Technology of Hanoi (USTH), at walking distance from our offices. It took us several months to complete the paper work, implying several exchanges of documents between the Ministry of Science and Technology and the Ministry of Finance.

The directorate supports our proposals when it has the power to do so and when they fit in their plans. For example to organize international conferences (this year with SEAAN and in 2018 in Quy Nhon in collaboration with Bordeaux); to establish a collaboration agreement with Hanoi National University of Education to use their optical telescope for training and getting experience with observations in the visible; to collaborate with CNES and China for maintaining and exploiting one or two antennas in a network for the detection of gamma ray bursts. But it also happens that our proposals, even if very reasonable and sensible, do not fit in such a scheme. In such cases, we have to face adverse regulations and the lack of full understanding of what are our real needs. For example, we were asked by our directorate to report on the possible acquisition of a national facility for astronomy. We consulted experienced foreign scientists as well as our Vietnamese colleagues and proposed, on the long term, to build a ~20 m diameter radio telescope, operated at millimeter wavelength, to be insertable in a Very Long Baseline Network. However, we stated that on a shorter time scale, for the next ten years or so, the priority was to build up a community in the country having the size (~50 PhDs) and the skills required for operating, maintaining and exploiting such a facility. Such a far-reaching vision of the future was unfortunately beyond the scope of our authorities and we were asked to limit our proposal to 2020. We then proposed actions aimed at having our community develop and progress: we proposed to acquire half a dozen small radio telescopes such as our and dispatch them on loan to various users (preliminary

contacts had given evidence for the existence of a number of competent, enthusiastic and responsible such potential users) in order to promote interest for radio astronomy across the country: however, this was found impracticable because it involved cooperation between different ministries and was not supported; we proposed to set up a scientific advisory committee that should meet once a year and include foreign members, but this is not usual practice in the country and seems unlikely to get support; we proposed to make it easier for us to get support to attend schools and conferences, but there exist no provision for such support and when I went to Hong Kong to attend a conference on evolved stars, I had to be supported by private funds from a benefactor; the same when I and Tuan Anh went to Thailand in December.

It will take time for us to better explain to our authorities what we are doing, what are our needs, how important it is for us to publish our work, what it means for us to analyse archived data from the best instrument in the world, ALMA, etc. Basic traditional values of the culture of fundamental research did not yet fully permeate the S&T community in the country. We do our utmost to foster exchanges between the rest of the VNSC staff and us, in the form of seminars or otherwise and we indeed maintain excellent relations with them. We would welcome more frequent contacts with the members of the directorate, we had such a meeting with a deputy director of VNSC, Vu Viet Phuong, which was very helpful to help getting our message across. We will be happier when more people will better understand our needs, difficulties and challenges: we hope that it will soon be the case.

***AN INTERVIEW OF PR DUONG NGOC HAI,  
DEPUTY CHAIR OF VAST AND RECTOR OF  
ITS GRADUATE UNIVERSITY***

*Diep and Nhung report on their meeting with Prof. Duong Ngoc Hai and his answers to their questions related to the academic environment at VAST.*

The Vietnam Academy of Science and Technology (VAST) is a government agency established in 1975. VAST is committed to carry out basic research in natural sciences and technology development; provide objective grounds for

science and technology management, for shaping policies, strategies and plans for socio-economic development; train high quality human resources for science and technology. Currently, VAST has over 4000 staff members (2642 permanent members, 198 professors and associate professors, 751 doctors, 846 masters). It consists of 51 subordinate units (33 research units, 6 administrative units, 4 self-financed units, 1 state enterprise and 7 other units). VAST headquarters are located in Hanoi and have branches in Phu Tho, Hai Phong, Ho Chi Minh city, Nha Trang, Da Nang, Da Lat and Hue. The Graduate University of Science and Technology (GUST) was established a year ago with the mission to train master and PhD students in science and technology. Professor Duong Ngoc Hai is the Vice-President of VAST and at the same time the director of the university. We report an interview with him below:



*Prof. Duong Ngoc Hai*

**VATLY:** Could you briefly tell us about GUST, the academic role played by VAST in terms of doctoral school, relations with universities, in particular the University of Science and Technology of Hanoi (USTH), etc.

**Prof. Duong Ngoc Hai:** The idea of creating GUST was to centralise and synchronise the training effort under VAST. The model of a training centre under the authority of the Academy exists in many countries such as in China, Japan or Korea. The advantages of having training under such an academic environment is the availability of a good infrastructure to support research, of project money to support students and, particularly important, of a broad network of international collaboration that ensures the quality of the training. Students can directly take part in projects with support in both finance and expertise. GUST has the potential to become an excellent training

centre. Historically speaking, graduate training under VAST already started long ago, more than 30 years ago, with mathematics, physics and mechanics at the Institute of Mathematics, the Institute of Physics and the Institute of Mechanics respectively. The Vietnamese education law allows research institutions to train graduate students, directly at PhD level but only indirectly at master level, meaning that to train master students we must collaborate with a university. Indeed, many VAST institutes have a long experience in training master students under such a scheme. When GUST was created, nineteen institutes got permission from the Ministry of Education and Training (MoET) to train PhD students, and four to train master students. At PhD level we are currently providing training in more than forty different branches of science. Another argument that pleaded in favour of the creation of GUST was the experience acquired by the Vietnam Academy of Social Sciences that has created its own graduate university five years ago. As far as the organization is concerned, each department of the university is under one, or eventually a few, VAST research institutes. The GUST Department of Physics is essentially under the Institute of Physics, but the head of the department invites lecturers from the Institute of Material Sciences, the Institute of Mechanics, or other similar institutes. At variance, the Department of Chemistry is organized jointly by several institutes: the Institute of Chemistry, the Institute of Chemical Technology, the Institute of Marine Biochemistry, the Institute of Natural Products Chemistry, the Institute of Material Sciences and the Institute of Tropical Techniques and Technology, etc. Much of the scientific equipment owned by VAST institutes is also used for training GUST students. Training is closely linked to real research rather than resting mostly on lectures, as is common practice in Vietnamese universities.

This is the general idea that governed the creation of GUST, which has now eleven departments after one year of operation. The first load of PhD students was recruited in September 2015 and we are now preparing for the next load in March 2016. We currently have over 700 PhD students, of whom some 600 had been recruited under the old scheme and joined GUST at the time of its creation and 147 are newly recruited. We are planning to open training at master level in 2016.

This is an important step: GUST will now manage training at master level independently from universities.

VAST Directorate is determined to closely tie training and research: as VAST is leading research in the country, its excellence must also apply to the quality of the training that it provides, the aim being to reach international standards. We will create programmes giving stronger support to students, at the same time as being more demanding on the quality of their research. Note that PhD degrees now in Vietnam are issued by universities, GUST taking care of the training and MoET monitoring its quality in conformity with regulations.

Finally, concerning the relation with USTH, GUST's headquarters are hosted in the same building as USTH but they are completely independent units for the time being. USTH is under MoET and was established under an agreement between Vietnam and France in the general framework of international relations between the two countries. A major difference is that USTH provides training at bachelor level while we do not. Moreover, their training at master and PhD levels is significantly different from ours. Our government is currently preparing to transform such international universities (there exist others, in particular with Germany and with Japan) into governmental units. In this context, the idea to transfer USTH to VAST is under current discussion, together with other possible scenarios. The outcome should be known in a not too distant future and the decision will be taken by the government.

**VATLY:** We will have a PhD student in academic year 2016/2017. She will get her master degree this June or July. We wish to have her work for her PhD under a joint supervision agreement with University of Bordeaux, sharing her time between Ha Noi and Bordeaux. Our past experience with this scheme (five cases) is excellent, particularly beneficial to Vietnam. How should we proceed? We heard that there may be difficulties to go through the Institute of Physics as we used to do earlier, is that correct?

**Prof. Duong Ngoc Hai:** Cotutelle is a good idea which we have been trying to implement by signing memoranda of understanding with universities such as Sydney University of Technology, University of North Bangkok, Austria

Institute of Technology, etc. At the same time, and in the same spirit, we have been using the so-called “911” MoET programme to send students study abroad for a PhD. Three VAST institutes are using this scheme. GUST will support such initiatives: in principle, there is no problem with cotutelles. First, having a foreign scientist taking part in a training programme makes no problem with MoET. There is no problem either with sending a student abroad for short training periods in the context of a purely Vietnamese PhD. In the case of a cotutelle, with two universities simultaneously issuing a PhD degree, there is no problem in principle as long as both universities have formally agreed on the practical conditions implied by the scheme and as long as they conform to the rules in force in each country. In practice, there may still be some technical difficulties which need to be overcome, but I do not expect this to be a serious obstacle.

**VATLY:** Could you briefly tell us about your vision of the organization of space science at VAST, the relative roles of the Vietnam National Satellite Center (VNSC) and the Space Technology Institute (STI), in particular in the domains of research and higher education?

**Prof. Duong Ngoc Hai:** The VAST directorate fully appreciates the importance of space technology research for Vietnam, this is why we accepted to be responsible toward the government for its development. VAST is first in Vietnam to systematically carry out research and develop technology in this field. To this aim, VAST has established two units, the Space Technology Institute and the Vietnam National Satellite Centre.

On the long term, we will develop both space science and space technology, as we do in other branches of science, supporting both fundamental and applied research. Together with the research on general space science and technology, VNSC is in charge of the Vietnam Space Center project, focusing on problems of satellites and satellite technology; its first priority is to build the basic infrastructure for satellite technology in Hoa Lac High Tech Park. In addition, it must develop manpower (by training master and PhD students in collaboration with Japan) and master the technologies implied in the construction of small satellites. The project has three concrete outputs: 1) basic infrastructure in Hoa Lac by 2020; 2) a staff consisting of a number

of masters and PhDs as planned; 3) the construction and exploitation of two satellites using radar technology, LOTUSat 1 and 2. The goal is to make the centre become a leader in satellite technology and be the contact point to other space agencies in Southeast Asia. Of course, success will depend on our ability to play such a role. Apart from satellite technology, which is mainly taken care of by VNSC, the rest, in principle, is taken care of by STI, and also VNSC. We know that the VNREDSat-1 with optical technology project was implemented by STI. There are also other organizations in the country, which have satellite applications in their activities. The organisation of space science in Vietnam will depend on how well we are able to develop and exploit. It will all depend on our abilities.

**VATLY:** What we need most from VAST is support in taking part in conferences and schools and in inviting foreign scientists. These are standard needs for a team involved in fundamental research. Resources available from our Institute are earmarked for the construction of the future Hoa Lac Space Centre and do not cover such needs. Do you have any advice for us to get some support in this direction, in addition to what we can get from the National Foundation for Science and Technology Development (NAFOSTED)?

**Prof. Duong Ngoc Hai:** To apply for funding, we must use the mechanism made available to us by the system in which we live. Currently, funding in Vietnam is divided into two main types: the first one is support for running, namely for maintaining daily activities, and it is usually small; the other is support via projects, or simply speaking, it is to carry out a group of tasks that require concrete results. Therefore, it is up to us to propose tasks or projects at the suitable level (VAST, ministerial, national or bilateral) to obtain funding. During the past five years, NAFOSTED has created more favourable conditions for fundamental research. It is the natural channel to support research, including support for projects, for organizing scientific conferences and for attending conferences. You must make use of this channel or you may propose an independent project, for example to collaborate with other units, either inside or outside VAST. This is the only way for you to obtain funds, I do not know of any other.

**VATLY:** Thank you very much for spending time for us.

**TWO WEEKS OF LECTURES AND FRIENDLY EXCHANGES**

*Hoai reports about the visit of Anne Dutrey, Stéphane Guilloteau and Thibaut Le Bertre on the occasion of the defence of her PhD thesis.*

On December 11<sup>th</sup>, I defended my PhD thesis at the Institute of Physics of Hanoi in front of a jury consisting of members from both Vietnam and France. Prof. Daniel Rouan (Paris) and Prof. Dao Tien Khoa (Ha Noi) were the co-chairs, Dr. Stéphane Guilloteau (Bordeaux) and Dr. Dinh Van Trung (Ha Noi) were the referees. On this occasion, we organised a series of lectures and seminars taking advantage of the presence of our visitors in Ha Noi. The speakers were Dr. Stéphane Guilloteau and his wife, Dr. Anne Dutrey, Prof. Thibaut Le Bertre, Dr. Pierre Lesaffre and VATLY representatives. The lectures, sometimes accompanied with computer hand-on guidance, were very useful to the whole group to increase our skills in analysing data and to explore into new fields of astrophysics: protostars and magneto-hydrodynamic shocks.



*The two co-chairs of the jury congratulated Hoai for her successful thesis defence*

Stéphane Guilloteau is an expert in interferometry, his visit to Ha Noi was timely, the group having many questions on understanding the ALMA data to ask him. He gave us two excellent lectures on molecular radiation at millimeter wavelengths and on the use of GILDAS, a software used to analyse interferometry data. Anne Dutrey gave a general talk on protostars and then on a particular case which she has studied for a long time: GG Tau. Thibaut gave a talk on HI detection around AGB stars with most updated

information. Pierre Lesaffre had arrived in Ha Noi one week before the lecture series to teach at USTH and he gave a talk on the formation of bow shocks. The group also took this opportunity to present our work. Tuan Anh talked generally about all the research work of the group and Nhung gave a more detailed presentation about our recent studies of AGB stars. She asked for comments and suggestions from our visitors, in particular on a paper on the general methodology of the study of the morphology and kinematic of axially symmetric stars and on a study of Mira Ceti, a well-known star recently observed by ALMA.



*From left to right: Anne, Thao, Nhung, Phuong, Stéphane, Emilie (on Stéphane's shoulders), Hoai, Thibaut and Pierre*

We got many useful comments, in particular from Stéphane and Anne with whom we are keeping contact. Following a suggestion by Anne, who underlined similarities between the studies of the envelopes of evolved stars and of protostars, we are now studying a protostar, L1527.

This may open a new research direction for the group, namely on the formation of stars, in addition to the death of stars. On this occasion, we also discussed about long term collaboration between Hanoi and Bordeaux, in particular, the possibility for VATLY members to spend short stays in Bordeaux or for sharing supervision of PhD students. We also discussed about co-organising a conference on dust and gas from old to young stars at the international conference centre (ICISE) in Quy Nhon in 2018. We contacted Prof. Tran Thanh Van and got his full support for the idea.

We also took this opportunity to organise a tour for our visitors to visit some places nearby Hanoi. We took Thibaut, his wife Patricia,

Stéphane, Anne and their daughter Emilie, to Bac Ninh where we visited Dau pagoda, the oldest pagoda in Vietnam. We also took them to visit But Thap pagoda, the best preserved architecture in Vietnam. We also visited Dong Ho folk painting village where we could follow all the steps involved in painting on paper or wood. On another day, Hoai and Phuong took them to Bat Trang village. We had a very nice tour around the ancient village to see directly people painting on big vases or making ceramic products using rotating bases. We ended the tour at a ceramic market and enjoyed watching, and eventually buying, a lot of beautiful items.

### **MEETING WITH PM NGUYEN TAN DUNG**

*Nhung reports about her meeting with the Prime Minister, together with other representatives of the Vietnamese youth.*

On September 11<sup>th</sup>, the Ministry of Science and Technology (MOST) hold a meeting between government leaders, with the presence of Prime Minister Nguyen Tan Dung, and about 70 young scientists working in various fields from all over the country. The aim of the meeting was for the government leaders to acknowledge the contribution of young scientists to the development of science and technology, and to encourage them to continue their research with efficiency and creativeness. It was also an opportunity for the young scientists to express their thoughts and aspirations to the leaders in order for them to create more appropriate policies, better suited to the need of scientists. As this type of meeting between the government leaders and young scientists was held for the first time, it had high expectation and support from many scientists, in particular young scientists, and it drew much attention from the public. It showed the concern and determination of the government for the development of science and technology, an essential factor for the development of the country.

It was a great surprise and honour for me to be selected as one of the ten young scientists who had a chance to give a speech at the meeting. I expressed the desire of young scientists to have more chances to contribute to the development of S&T, not only to follow already-planned programmes but also to take active part in planning

long-term programmes. I also mentioned the advantage of collecting comments broadly from scientists in general and young scientists in particular, and having public discussions in improving the efficiency of S&T policies and making more efficient use of national budget for investing in scientific facilities. Many of us, the participants of the meeting, shared two main concerns: the need of trust and confidence in young scientists, and of a transparent and open mechanism in managing S&T.

During the meeting, there was an outstanding speech, given by Dr. Pham Phuong Chi, a representative of young social scientists from the Institute of Literature, which impressed many of the audience. She expressed the desire of young scientists to be seen and evaluated based on “the achievements which they got, their publications, abilities rather than their ages, genders, positions,...”. Moreover, she emphasised that the trust and respect to scientists must be reflected in their freedom of research and creativity, accepting and respecting different views in sciences, especially in social sciences.



*Nhung giving her speech at the meeting*

Many young scientists confirmed in their speeches that although policies for S&T in recent years were the object of significant improvements, there are still many obstacles and barriers for their research ideas to be implemented, such as transparency in approving and evaluating research projects and the irrelevance of some financial regulations.

There were also comments from speakers on enhancing the efficiency of policies for start-up businesses, to increase the links between universities/institutes and enterprises, and the need

for a national investment fund for young scientists, enabling them to convert their research results into products.

One of the highlights of the meeting was that, after listening to the work of Dr. Nguyen Ba Hai from HCMC University of Technology and Education who successfully developed a vision aid device for blind people, PM Nguyen Tan Dung agreed to give funding for the production of over one hundred thousand of such devices to be donated to the blind people in Vietnam.

At the end of the meeting, PM Dung praised the responsible suggestions and proposals made by the young scientists present at the meeting, and asked MOST and relevant ministries and agencies to create more policies, solutions and favourable conditions for scientists in general and young scientists in particular focusing on the effective implementation of policies associated with developing human resources, start-up business, and encouraging the development of scientific and technological enterprises.

### ***A TV PROGRAMME ON ASTRONOMY AND SPACE SCIENCE***

*Tuan Anh reports on our implication in a TV programme on astronomy and space science.*

In Vietnam, many young people are interested in astronomy in general. There exist a dozen of astronomy amateur clubs across the country with up to some thousand members in total. Events such as astronomy summer camps, offline observations, shooting stars nights, water rockets shows, etc., attract a lot of young people, mostly students. There is a need for organizing this community, but there exist no TV programme dedicated to this.

In our role as Department of Astrophysics (DAP) of the Vietnam National Satellite Centre (VNSC), we are expected to help with education and public outreach, and we happily do so occasionally. Last year, we gave public talks on the Space day and on the Science, Technology, Engineering and Math (STEM) day, for example. A former member of our centre, Thang, who is now working for Hanoi Cable TV, is setting up a TV programme for astronomy and space technology aimed at a general audience. The idea is to have professional astrophysicists explain

astronomy, astrophysics and space technology in an understandable and attractive way. Thang contacted us and, together, we approached the VNSC directorate. The program offers mutual benefits in many respects. It is good for the community to communicate with people in the field. It is good for us to tell them about our research. It is also good for VNSC to attract the attention of the general public on space technology, which it has mission to develop. The proposal got full support from our directorate board and I have been appointed coordinator of the programme.

Together with Thang, we have drafted a one year programme. All members of DAP will take part. We plan to have an episode every second week, 30 minutes each, namely 25 episodes totalling twelve and a half hours. The programme covers a variety of topics: planets, exoplanets, star evolution, galaxies, space technology, etc. We try to give as attractive as possible a picture of the Universe and of space technology to the audience. We also plan to have a slot to answer questions from the audience.

Thang submitted the proposal to Hanoi Cable TV and obtained approval. We are now preparing for the first three demo episodes which may start around March this year.

### ***PROGRESS WITH USING THE HNUE OPTICAL TELESCOPE.***

*Thao reports on the progress of the project of making observations using the 40 cm telescope of the University of Education in preparation for making the best possible use of the 50 cm telescope to be installed in the Space Centre at Hoa Lac.*

The Richey-Chretien 50 cm telescope and Echelle spectrometer that will equip the future Space Centre will arrive at VNSC by the end of this year. The instrument will be used to foster interest in astronomy among the population, in particular for training university students and for giving an opportunity of observing the sky to amateur astronomers.

In order for the instrument to be made optimal use of, it is important to learn already now which observations can realistically be made under weather conditions typical of Hanoi, with high humidity and light pollution. On the 7<sup>th</sup> of

December, together with Pierre Lesaffre on the occasion of the visit of Prof. Daniel Rouan, who co-chaired Hoai's thesis defence and lectured at USTH, we used the USTH spectrometer installed on the HNUE telescope to observe the sky. This instrument is similar to the Hoa Lac future telescope, even if of slightly lesser sensitivity and resolution. Together with USTH master students and HNUE undergraduate students, we learned how to operate the telescope and observed some bright stars such as Capella and Bellatrix; we recorded spectra of Deneb and of the Hanoi sky and learned how to read and analyse the data.

Making use of the HNUE telescope gives us a unique opportunity to train and gain familiarity and experience with such observations. We can learn this way what is feasible under the difficult weather conditions that prevail in Ha Noi and produce a realistic programme of observations to be made in Hoa Lac.

A document has been written as a draft agreement between VNSC and HNUE that defines such a training programme and proposes a set of observations to be made in 2016. For the programme to be successful, full support must be obtained from the managements of HNUE, USTH and VNSC. The small team in charge must include at least one person from each of these institutions, those from HNUE and USTH being the persons responsible for the operation and maintenance of the telescope and spectrometer respectively. We propose that students, amateur astronomers and members of the HNUE, USTH and VNSC staff be encouraged to join from the beginning. Prof. Quynh Lan from HNUE has responded very positively to the proposal and will help with its successful implementation.

In preparation for the night observations, measurements can already be made during the day, including calibrations and various preliminary tests. In particular, measuring and mapping solar spectra will be one of the first measurements to be performed. As night observations are concerned, both with and without spectrometry, we propose in priority:

1. Observation of Algol, a variable star reaching an altitude of  $70^\circ$  in the first four months of the year.
2. Observation of planets, in particular Jupiter, and measurement of its rotational velocity from the Doppler tilt of its spectral lines in March.

3. Observation of planetary nebulae, in particular NGC 6853.

4. Observation of A-B type stars: Rigel, Alnilam, Bellatrix.

We are looking forward for a fruitful collaboration from which all partners will obtain important benefits.

### **SCHOOLS, CONFERENCES AND SHORT VISITS ABROAD**

*Diep and Tuan Anh have attended conferences in Thailand and in Hong Kong. They briefly report below.*

In the second half of the year we attended two meetings and a conference in Thailand and Hong Kong respectively. The former are the 7<sup>th</sup> Southeast Asia Astronomy Network (SEAAN) and the 4<sup>th</sup> Southeast Asian Young Astronomers Collaboration (SEAYAC) meetings which were organized in sequence by the National Astronomical Research Institute of Thailand (NARIT) from November 30<sup>th</sup> to December 1<sup>st</sup> and from December 3<sup>rd</sup> to December 4<sup>th</sup> in the south of Thailand, in Krabi province; the latter is the 11<sup>th</sup> Pacific Rim Conference on Stellar Astrophysics organized by the University of Hong Kong which was held from December 14<sup>th</sup> through December 17<sup>th</sup> at the university.

SEAAN was created in 2007 by NARIT with the aim of strengthening research work and education activities among the ten member countries in South East Asia. In this spirit, SEAAN organizes a yearly meeting in a different member country each year. We learnt about the existence of the network in 2011 and immediately joined it. For this SEAAN meeting Diep was serving as a Scientific Organizing Committee (SOC) member. There were about 40 participants attending the meeting including about 10 participants from SEAYAC who came earlier in order to attend both meetings. The first session of the meeting, on November 30<sup>th</sup>, was devoted to the SEAAN business meeting where six country reports and six working group reports were presented. Diep gave a five-minute report about Vietnam and later he gave a talk on the Research at the Department of Astrophysics in a scientific session. Speakers of the meeting were not only coming from the region

but also from countries outside the region such as Japan, Taiwan and China. It was useful for us to get to know about the work of colleagues from the region and also for them to know about us. One of the outcomes of the meeting is that in March two colleagues from NARIT and from University of Malaya (Malaysia) will visit us. They are constructing and developing small radio telescopes by themselves and are curious to share our experience in operating such kind of telescopes. They are also interested in exploring possibilities of collaboration. Another outcome of the meeting was that we were encouraged to organise the next SEAN meeting. After consulting our directorate, we decided to do so: the next SEAN meeting will be held in Ha Noi in November 2016.



*Diep giving the country report at the SEAAN business meeting*

SEAYAC is a group of young astronomers from the South East Asian Region. Its main objective is to encourage interaction and collaboration between young astronomers from all Southeast Asian nations. By hosting regular meetings/conferences and other activities, young astronomers from each SEA country get exposure in attending and organizing international conferences. The visa-free policy of SEA nations makes it easy for young astronomers to attend such meetings. In the past, we have sent our group members to attend all three previous meetings in the Philippines, Indonesia and Malaysia. This time Tuan Anh was the only representative from our group to attend the meeting. He is the nation contact point for Vietnam and he was one of the SOC members. During the meeting, he gave a talk on his work about “ $^{12}\text{CO}$  emission from the Red Rectangle”. As usual, the atmosphere was very

friendly, participants having informal discussions and enjoying time outside the meetings.

The 11<sup>th</sup> Pacific Rim Conference on Stellar Astrophysics covered the topics of mass loss mechanisms in evolved stars, chemistry of circumstellar envelopes, dynamical evolution of planetary nebulae, morphology and shaping of planetary nebulae, synthesis of complex molecules and carbonaceous solids in the late stages of stellar evolution, and the stellar-solar system connection. The conference attracted over hundred participants from all over the Pacific Rim. Dinh Van Trung gave an invited talk on Molecular Imaging of Evolved Stars and Diep presented a poster on a paper about general methodology of the study of the morphology and kinematic of axially symmetric stars. It was the first time for Diep to attend a conference devoted only to stellar astrophysics. It was also an opportunity for him to meet again VATLY friends, Dr Young Chol Minh, and some of the authors of the fields which we use to quote in our work.

Attending schools, conferences and short stays abroad are indispensable activities of scientists. Year 2015 was our first year in VNSC. Therefore, many things were in a transition phase. It was also the year when we started to apply for new projects, trying new financial support channels. We did not get funding for meetings and conferences yet. We got support from private funding to attend the meetings and conference. It would be beneficial for scientists to have a flexible fund which can give support to them for attending such events.



*Diep (left) and Tuan Anh (right) with a colleague from University of Malaya.*

**PROGRAMME OF DEVELOPMENT IN THE  
FIELD OF PHYSICS BY 2020**

*We copy below excerpts from the programme of  
direct relevance to us*

**I. OBJECTIVES**

1. To enhance science and technology potential in the field of physics, combining high quality training with basic research and application-oriented basic research. By 2020, striving for the field of physics of Vietnam to be ranked equally to that of advanced countries in the region.

2. To enhance research capacity of university lecturers in the field of physics nation wide, attracting and training talented young physicists. To ensure by 2020 a strong manpower in the field of physics in universities and colleges, in which the percentage of physics lecturers with doctoral degree in physics faculties of major universities is higher than 50%.

3. To develop research directions in the field of physics which are Viet Nam's strengths in order to quickly achieve advance level in the region and the world. To improve Viet Nam physics level and position in the international arena. By 2020, striving for an increase of the number of publications in prestigious international journal (belong to ISI database) of 30%/year on average. To form advanced physics research and training centers which are recognized internationally.

4. To deploy research of some modern physics directions, which will become the core for the development of some multi-disciplinary science and technology areas, and for the application of physics achievements in production and real life. To associate theoretical research with experimental research and applied research.

**II. MISSION AND SOLUTION**

1. To determine priority directions for basic research and application-oriented basic research of

physics branch by 2020, with a vision by 2030, including the following main directions:

*a) Basic research:*

- Theoretical and computational physics; [...]

*b) Application-oriented basic research:*

- Environmental monitoring and processing; [...]

- Development of some modern, specialized and particularized science equipments. [...]

2. To encourage lecturers in universities to carry out research in physics. To build and implement physics research program for young lecturers in universities. [...]

3. To enhance international cooperation in order to develop physics, [...]; to expand participation of Vietnam researchers at international physics research centers, bilateral and multilateral research projects; [...]

4. To organize major international and national physics conferences, seminars, short-term international physics courses, in which support competence young physicists from neighbor countries, in order to create attraction in the region.

5. To encourage Vietnamese diaspora scientists and international scientists to participate in research and training activities in physics.

**III. PROGRAM IMPLEMENTATION AND  
FUNDING**

1. Program implementation funding is provided from the following sources:

- State budget to meet research and investment missions for potential development ordered by the State;

- The National Foundation for Science and Technology Development focused on basic research in physics;

- International cooperation, enterprise, organization, individual sponsor and other legal mobilization sources. [...]

**Distribution:** Elie Aslanides, Patrick Aurenche, Maarten Baes, Jim Beatty, Cristoforo Benvenuti, Jean Pierre Bibring, Pierre Billoir, Frederic Boone, Bui Duy Cam, Ludwik Celnikier, Catherine Cesarsky, Ngo Bao Chau, Pham Phuong Chi, Nguyen Duc Chien, Nguyen Mau Chung, Françoise Combes, Pierre Cox, Alain Cordier, Jim W. Cronin, Manoel Dialinas, Luigi Di Lella, Giap Van Duong, Anne Dutrey, 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, Duong Ngoc Hai, Jacques Haïssinski, Chu Hao, Masahiko Hayashi, John Hearnshaw, Pham Duy Hien, Nguyen Van Hieu, Emmanuel Hinglais, Nguyen Dai 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 Lena, 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, Guillaume Patanchon, Minh Ha Pham-Delègue, Tran Viet Phuong, Vu Viet Phuong, Philippe Quentin, Burton Richter, Nguyen Quang Rieu, Jean-Michel Rieubland, Daniel Rouan, Carlo Rubbia, Pierre Sebban, Sally Seidel, Kaz Sekiguchi, Rogel Mari Sese, Greg Snow, Paul Sommers, Do Hoang Son, Phan Hong Son, Michel Spiro, Jack Steinberger, 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.

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**– PHOTO ALBUM –**



*VATLY group having lunch with Viet Phuong (second from left) and Phuong Chi (third from left)*



*VATLY members happily received a greeting card from a VNESC colleague who is studying in Japan*



*Diep (right) and some of the SEAYAC's participants*



*Diep chairing a session at SEAAN meeting*



*The (a former VATLY's student) visiting the group on the occasion of Vietnamese Teacher's Day*



*Tuan Anh (left) and Diep (third from left) with Indonesian participants at SEAAN meeting*



*SEAAN meeting's group photo*



*Hoai and her friends after the thesis defence*



*Tuan Anh and Diep with SEAYAC participants*



*Hoai and her family members*



*Tuan Anh and SEAYAC's friends*



*Left to right: Hoai, Thibaut, Hoai's husband (Son) and her father*



*The group invited Thao's future husband for a lunch before their wedding*



*Thao and Dai*



*Emilie and Phuong in front of a Dong Ho folk painting gallery*



*Phuong, Tuan Anh and Diep with VNSC's colleagues visiting Chu Van An temple in Hai Duong on the occasion of the 4th anniversary of the establishment of VNSC*



*At Thao's wedding party in Hai Phong city*



*VNSC staff's group photo in Con Son (Hai Duong province)*



*Pacific Rim conference on stellar astrophysics's group photo*



*Young scientists with Minister of Science and Technology Nguyen Quan and PM Nguyen Tan Dung. Nhung is sixth from left, followed by Minister Quan, a lecturer at the University of Electricity, PM Dung and Chi.*