VATLY NEWSLETTER

A man dies when he refuses to stand up for that which is right.
A man dies when he refuses to stand up for justice.
A man dies when he refuses to take a stand for that which is true.

Martin Luther King

CONTENT

This twenty-ninth issue of the *VATLY NEWSLETTER* opens with the traditional *NEWS FROM THE LABORATORY*, followed by a report on *THE LAUNCHING OF MICRODRAGON* written by Nhung. Next, we present interesting results obtained from *FURTHER STUDIES OF AGB STAR EP AQR*, followed by a brief report by Diep on *EAO AND BISTRO* (EAO stands for East Asian Observatory and BISTRO for B-fields In STar-forming Regions Observations). Loc and Nhung report about *PROGRESS WITH OUTREACH*, in particular with the Public Education Centre in Hoa Lac. An article written by Pierre for Tia Sang in the wake of the Chu Hao event, *CREATIONISM VS EVOLUTION*, follows. A brief account of a conference held in Hanoi on *PARTICLES, GRAVITY AND THE UNIVERSE* comes next, followed by an interview of Professor Do Van-Nam, head of *THE PHENIKAA INSTITUTE FOR ADVANCED STUDIES*. 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.

In the preceding issue of the Newsletter we gave a detailed report on the analysis that was made of the CO(1-0) and CO(2-1) line emissions of a dying star, EP Aqr. This has now been published in MNRAS and in the wake of this work we studied the emission of two other lines, SO_2 and SiO, which trace the close environment of the star, at variance with CO lines that probe the circumstellar envelope up to much larger distances. We obtained very interesting results, also published in MNRAS, which we briefly present below. Together with the work done on GG Tau, a system of three protostars, this made 2018 a rather productive year. We were proud to see the quality of our work be recognized by the Academy of Science and Technology in the form of three awards: two for the excellence of the research completed in 2018 (one to the whole team and one to Diep) and one to Hoai, selected together with five colleagues as "Outstanding Young Scientist of the Year"; she was the only physicist in the lot.

Hoai, second from left, named Outstanding Young Scientist of the Year

Together with two colleagues, Loc and Dung who work on outreach activities such as welcoming young visitors to the Hoa Lac site, Thao made a number of observations using the 50 cm telescope. They demonstrate the excellent quality of the camera and provide material for a forthcoming article to be published in Com. Phys. Vietnam, describing the telescope, its performance and its main features.

Tuan Anh presented Vietnamese astrophysics in general and the work of the team in particular at a conference on Particles, Gravity and the Universe, that was held in the main VNSC auditorium and had been organised by our friend Ky from the Institute of Physics; we report about the event elsewhere in the Newsletter. The conference was an opportunity for us to invite the LHC ATLAS spokesman, Andreas Hoecker, to visit the lab and share a lunch with us.

In December, a sad event cast a shadow on the image that Viet Nam gives to the world: our friend Chu Hao, who visited VATLY in 2013 and gave us an interview on this occasion (issue number 18 of the Newsletter), was blamed by the Party for not respecting its orthodoxy. Chu Hao, descended from a famous revolutionary family, has been dedicating his life to increasing the level of knowledge and culture in the country; he played an important role in the development of science in modern Viet Nam and created a publishing house aimed at translating in Vietnamese major writings of universal literature, philosophy and history for making them accessible to all. On this occasion Pierre wrote an article that was published in Tia Sang and that we copy below.

Signing ceremony of the Mekong Basin MoU, Ha Long Bay, November 2018

A very important event in the life of the Institute occurred on January 18th, when Microdragon, the first Vietnam-designed-and-made Earth observation satellite, was successfully launched and placed in orbit. It has since been sending its first images and Nhung reports elsewhere on progress and future plans. Another success of VNSC has been the conception of a toolkit meant at university students eager to learn about satellite design and construction. At the same time, the team of Pham Thanh Thi Nga, who works on Earth observation satellite data, concluded a study of the impact of typhoon-induced floods on agriculture in the Centre of Vietnam. Together, these produced two publications authored by VNSC members in addition to ours, the former in the International Journal of Emerging Technology and Advanced Engineering (2018, 8,11) and the latter in Natural Hazards (2018, 92, 189), both international refereed journals. The appointment of Pham Anh Tuan as 2019 chair of CEOS, the Committee on Earth Observation Satellites, has been the cherry on the cake (see ceos.org for details). In the message that he gave on this occasion[1], Anh Tuan states that CEOS will focus on the Mekong Delta region in 2019, in the wake of the MoU that was signed in November with the Mekong River Commission, an intergovernmental organization working with the governments of Cambodia, Laos, Thailand and Vietnam to jointly manage water resources and development in the Mekong Basin.

Two young ladies from the Central Highlands, both former USTH master students, Ngoc and Ngan, who graduated in Buon Ma Thuot and Quy Nhon respectively, joined the team in October to spend some time with us. Ngoc obtained her master degree from LESIA in Paris-Meudon on observations of Mercury and spent her time with us putting together an article on the mapping of the Borealis Quadrangle of Mercury using MESSENGER data; the article has been submitted for publication in Com. Phys. Vietnam. We would very much have liked to keep Ngoc with us but we were unfortunately unable to convince our hierarchy. Moreover, as all other Vietnamese PhD students, she (wrongly) thinks that she better studies abroad and is looking for a place outside Vietnam where to make her PhD work.

Ngan obtained her degree from LISA in Paris-Créteil on the chemical composition of exoplanet atmospheres hosting very different conditions of temperature and pressure than found in the solar system. She has been working with Diep on BISTRO (see article in this issue) and has just left for Poland where she obtained a position at

[1] http://ceos.org/about-ceos/publications-2/

Nikolas Copernicus University in Torun to study infrared emissions of protostars.
This semester, it was Tuan Anh's and Nhung's turn to teach at USTH. We still received no positive answer to our request to be part of their doctoral effort and be recognized as one of the teams entitled to train PhD students. It is a pity because much of our work is wasted in terms of training students: such is the case of the work on EP Aqr, which could have been the subject of an excellent PhD thesis; such is also the case of the work to be done with the Hoa Lac telescope, which could provide material for several master theses; the problem is not only with USTH but also, may be mostly, with the conviction of most students that they must go abroad for their PhD, the Vietnamese situation being notoriously bad; this is very sad, and until now, we have been unable to make ourselves heard when preaching the contrary. A new rector will soon be appointed and we shall then give the idea another try.

Phuong making her presentation at the Daejoen conference on dust polarization and magnetism

Several among us spent time, are spending time or will soon spend time abroad at conferences, schools and visits of various kinds. At the end of February, Thai, Phuong and Ngoc attended a three-day school on star and planet formation hosted and financially supported by the National Astronomical Observatory of Japan (NAOJ) in Tokyo. Last November, Phuong attended a conference organised by the Korea Astronomy and Space Science Institute (KASI) in the Korean town of Daejoen on dust polarization and magnetism, with financial support from KASI; she presented her results on the detection of H_2S in the disc of GG Tau, first of its kind. Diep joined the annual meeting of the South East Asia Astronomy Network in October in Lampung (Indonesia) with financial support from NARIT and from the local

A new observatory is under construction in Lampung: Diep leaves the imprint of his hand in one of its bricks for eternity.

organizers. Hoai will go to France in May and visit our collaborators in Paris and Bordeaux, where she will present our work, before spending time in Grenoble with the IRAM team, learning about NOEMA data reduction. She will be financially supported by Paris Observatory, as Tuan Anh had been two years ago, thanks to a scheme allowing for making use of resources freed by vacant positions. Phuong just left for her last four-month stay in Bordeaux, to complete her thesis work; the defence is expected to take place in Ha Noi in December this year. Tuan Anh will go to Hawaii in May, in the framework of our invitation to take part in the activities of the East Asian Observatory with the JCMT. His expenses while over there will be covered by EAO but it was unfortunately impossible to make our management understand that such activities are important and deserve being supported: we have to pay Tuan Anh's plane ticket from our own pocket. The idea that material investments need operation budgets and that research teams need running budgets has not yet made its way to the minds of Vietnamese science managers, resulting in a huge waste of money and, more importantly, of young brains. On our side, we were honoured by visits of several colleagues and friends, such as Hoang Chi Thiem, who is now working in KASI

on dust polarization and magnetic fields. In particular, Edwige Chapillon and Anne Dutrey spent each a week with us in the framework of Phuong's co-supervision, an occasion for us to hear seminars from them and to present our own work. We applied again for support from the French Embassy to help with the cost incurred by journeys of Anne to Ha Noi and of Diep to Bordeaux, such exchanges being obviously very beneficial to the efficiency of our collaboration. Last year, our application had not been retained but we just heard that this year it has been; in addition to the financial support that it implies, it also means for us an important moral support from the French Embassy in Hanoi.

End of year party in the VNSC cafeteria with Anne

We had the pleasure of a visit of a Korean delegation led by the director of KASI, who were touring Viet Nam with the idea to explore possible collaborations. They also visited USTH university, IOP (the Institute of Physics) and HNUE (University of Education). Together with Diep, they met Anh Tuan, the VNSC director. We invited them to the lab and to share a lunch with us. Among them was Young Chol Minh, a close friend of our team who is giving us much support whenever he has the opportunity to do so.

Diep and Pierre were invited by the Vinatom directorate to attend a series of three lectures given by an Austrian scientist on nuclear applications in industry, safety and medicine. We invited him to visit the lab and share a lunch with us. End October, a young lady from the University of Engineering and Technology of the Viet Nam National University in Ha Noi, Nguyen Thi Nhat Thanh, gave a very interesting seminar on the activities of her Institute, centred on Earth satellite observations and illustrating the poor communication, not to mention coordination, between Vietnamese scientists working in this domain (unfortunately the same is true in many other domains of science), each institute tending to work essentially in the ignorance of the work of the others.

KASI delegation in front of USTH building; Diep is on the left and Young Chol Minh in the centre

Our friend Hoang Tuy, who celebrated his 91st birthday on December 17th, was honoured by the visit of the Prime Minister on the occasion of Têt. Pierre and occasionally Diep meet him at his place regularly, spending an hour or so with him chatting about things ranging from the most futile to reconstructing Viet Nam… when not the world.

Our friend Hoang Tuy has recently celebrated his 91st birthday. He is seen here being honoured by the visit of the Prime Minster on the occasion of Têt 2019.

THE LAUNCHING OF MICRODRAGON

On January 18th, MicroDragon, the first Earth observation satellite designed and constructed by Vietnamese engineers, was launched and placed in orbit. Nhung reports about the event, its genesis, what it means for VNSC, what it implies in the future.

Seven years ago, an agreement was signed between Vietnam and Japan to cooperate on a project entitled "Disaster prevention and response to climate change using Earth observation satellites". The project enters in a framework of official development assistance (ODA) from the Government of Japan; it is coordinated by the Japan International Cooperation Agency (JICA) and implemented by the Vietnam National Space Center (VNSC/VAST) for a ten years period, from 2012 to 2022. It receives funding from both governments. MicroDragon, an Earth observation satellite, is part of the project and is aimed at training the staff. By the end of the project period, Vietnam should receive and exploit a 600 kg satellite made in Japan, LotusSat-1. In the middle of 2017 the Vietnamese government decided to initiate a review of a number of ODA projects and, recently, the Prime Minister agreed to pursue the project, including the LotusSat-1 phase. A successor to LotusSat-1, LotusSat-2, was originally included in the plan and supposed to be designed, manufactured and tested mostly by Vietnam. Its inclusion in a future plan still needs to be decided.

In this framework, 36 young VNSC engineers have been sent to five Japanese universities between 2013 and 2017 to study and obtain a master degree in satellite technology. All took part in the design, assembly, manufacturing and testing of the MicroDragon satellite under guidance of Japanese professors and experts.

MicroDragon is a 50 kg satellite, equipped with cameras operating in optical bands with resolution reaching 70 meter. Its mission is to observe the Vietnamese coast, to assess water quality and to locate concentrations of aquatic fauna in order to support aquaculture. The satellite had been completed and tested by 2017. Its nominal lifetime is only two years but such satellites usually live much longer than nominal.

On January 18th 2019, Microdragon was launched by an Epsilon rocket of the Japan Aerospace Exploration Agency (JAXA) from Uchinoura Space Center in Japan and placed in orbit at an altitude of about 500 km. Its first signal were successfully received on the same day from a ground station located at Tokyo University; six VNSC engineers had joined the Japanese team for a one-week training period during which they became familiar with monitoring and control in the initial phase of operation. During that week, the satellite passed tests demonstrating the stability of its operation in space.

VNSC engineers and Japanese members of the MicroDragon project at the Tokyo University ground station following first reception of its signals on January 18, 2019

MicroDragon has sent its first images of the Earth surface on January 22nd, demonstrating the proper operation of the camera. The quality of the images will be progressively improved in the coming two to three months by adjusting and optimizing the relevant parameters. VNSC is now submitting a proposal to VAST for sending two engineers to Japan to carry out this task together with Japanese experts.

The launching of MicroDragon attracted great attention and interest from the public and the media. It marked an important step for Vietnam in the pursuit of its dream of mastering satellite technology sufficiently well to be able someday to design and manufacture its own small satellites. It not only gave strong encouragement to the young

engineers who are starting to master the technology but it also helped with promoting the project and obtaining necessary support for its continuation and progress.

On this occasion, some of the young VNSC engineers, who are involved in the MicroDragon project, got a chance to meet the Prime Minister. He acknowledged the efforts that they had deployed, praised them for the initial results that have been obtained and encouraged them to pursue their training in order to fully master satellite technology. The young engineers expressed the wish that a long term plan could be adopted that would secure the future and enable them to devote themselves fully to the development of the field. The Prime Minister confirmed that the government had agreed to continue to support studies in satellite technology and said that a detailed program will be elaborated for its development, with a focus on the training of human resources.

Currently, a much smaller satellite, NanoDragon, weighing less than 10 kg, is being designed at VNSC by a team of young VNSC engineers and will be fully "made in Vietnam". Its missions are two: one is to acquire familiarity with the control of the movement of the satellite in orbit, using a control unit that has been developed at VNSC; the other is to detect and identify Automatic Identification System (AIS) signals emitted by ships. Recently, JAXA agreed to help with the launching of the satellite into orbit, expected in 2020.

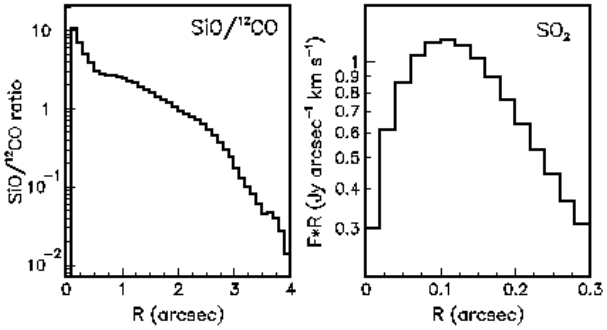
In parallel with its activities on satellite technology, VNSC engineers have been busy in developing and supporting education and training. In this context, they have conceived and assembled a kit, MicroSat Kit, for training young students to become familiar with the design and construction of small Earth observation satellites. It simulates the different phases of the design and construction as well as of its exploitation when in orbit. A detailed report has been published in the International Journal of Emerging Technology and Advanced Engineering.

The success of the construction and launching of MicroDragon is just a first step towards the long-term development of satellite technology and space science in Vietnam, which needs strong determination and support from the government as well as from the scientific community.

FURTHER STUDIES OF AGB STAR EP AQR

In the wake of the studies of AGB star EP Aqr, which we described in some detail in the preceding issue of the Newsletter, we analysed other ALMA observations of the same star tracing its close environment and had the good surprise to obtain very interesting new results. We report briefly about these.

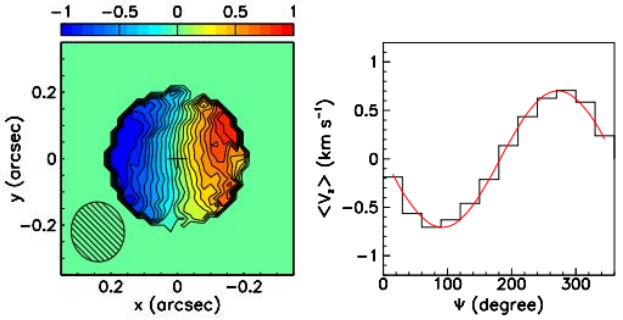
In the preceding issue, we have shown how the study of ALMA observations of CO(1-0) and CO(2-1) emissions of the circumstellar envelope of AGB star EP Aqr tells us about the temperature and density distribution up to distances in the range of some thousand au (astronomical units). The main result is the detection of an axi-symmetric radial wind of velocity increasing from some 2 km/s at the equator to some 11 km/s at the poles, with a flux reaching a maximum of intensity at intermediate latitudes and producing a mass loss rate of $(1.6\pm0.4)10^{-7}$ solar masses per year. The study focussed on distances exceeding some 250 au, where the outflow consists of two distinct components, of which one is equatorial. We expanded our study with the analysis of ALMA observations of SO_2 and SiO emissions, which probe the gas envelope at shorter distances.



Left: R-distribution of the ratio of SiO to CO emissions (1 arcsec means 114 au, R is the distance from the star projected on the sky plane). Right: intensity of SO_2 emission multiplied by R.

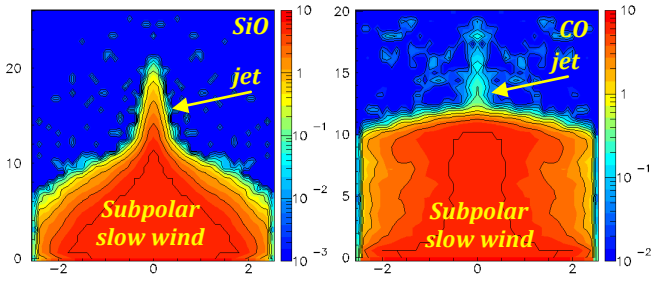
As illustrated on the figure above, SiO emission reaches no farther than some 300 au, the gas molecules aggregating rapidly onto dust grains and disappearing from the gas phase. The case of SO_2 is even more dramatic, reaching no farther

than some 30 au; the reason in this case is that SO_2 emission is excited by stellar UV radiation (as opposed to by collisions in the case of SiO and CO) at the same time as SO_2 molecules are dissociated by this same stellar radiation.
The main results of the analysis are:
Close to the star photosphere, rotation (~4 to 5 km/s) and isotropic radial expansion (reaching up to a few km/s) combine with probably significant turbulence to produce a broad SO_2 line profile (~7.5 km/s FWHM). Evidence for rotation is illustrated below.



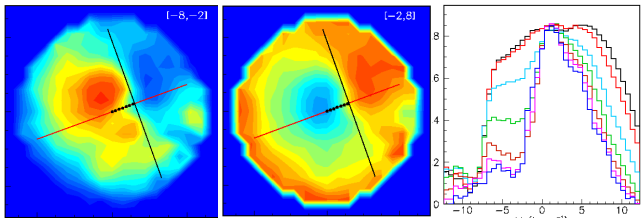
SO_2 emission. Left: map of the mean Doppler velocity at R<23 au. Right: Dependence of the mean Doppler velocity on position angle.

Two narrow polar jets, launched from less than 25 au away from the star, build up between ~20 au and ~100 au to a velocity of ~20 km/s. They fade away at larger distances. A same axis serves as axis of rotation close to the star (SO_2), as jet axis (SiO and CO) and as axi-symmetry axis of the circumstellar envelope at large distances (CO).
As illustrated below, the jets are near noise level in the case of CO emission.



Distribution of the intensity of SiO (left) and CO(right) emissions in the plane $|V_z|$ vs x. Here V_z is the Doppler velocity and x is the direction on the sky plane perpendicular to the projection of the star axis.

The radial wind described in the preceding issue builds up at distances up to ~300 au from the star; qualitatively it behaves as if it were produced by the jets dragging on gas along them as they fade away. A strong depletion of SiO and CO emissions, displaying sharp boundaries, is observed to start close to the star and to rapidly broaden away from it, up to cover the whole blue-western quadrant. It induces important blue-west/red-east asymmetry in SiO emission but weaker in CO emission. It is interpreted as the result of shocks occurring at the interface of the jets and the slow radial wind surrounding the star.



Depletion in SiO emission. The left and middle panels display the intensity integrated over respective Doppler velocity intervals of [–8,–2] and [–2,+8] km/s for R<230 au. The right panel displays the evolution of the Doppler velocity distribution when approaching the interface (see black dots on the left panels).

The observation of narrow polar jets in a young AGB star was unexpected. A more orthodox interpretation of the high Doppler velocity component, between 10 and 20 km/s, would be a radial expansion triggered by the pulsations of the star very close to its photosphere; however, such an interpretation is not compatible with the SO_2 observation of rotation dominance close to the star, with no evidence for fast expansion. The jets could be launched by the star itself or, more likely, by a close-by companion. However, such a companion could not be held responsible for the formation of the equatorial spiral detected in CO emission at large distances. In any case, these results give clear evidence for an early breaking of spherical symmetry, at variance with the usual gospel of a late super-wind playing this role at the post-AGB phase, just before the transition to Planetary Nebula.

EAO AND BISTRO

The James Clerk Maxwell Telescope (JCMT) is a 15 m diameter single dish telescope working in the sub-mm region and instrumented with both bolometer and radio heterodyne detectors. Located near the top of Maunakea in Hawaii, it is operated by the East Asian Observatory, which gives us access to its observations. In this framework, Diep contributes to the work of the BISTRO survey and tells us what this is about.

James Clerk Maxwell Telescope

Though living in a Revolution 4.0 world, geographical proximity remains an important factor for collaboration in research. Scientists from a same or nearby regions have an easier time to understand each other and to share ways of thinking influenced by the eco-political environment. From the very first day we have understood that keeping up with international standards in research, international collaboration is a must. We have been keeping close contact with our colleagues from Europe (France), South East Asia and East Asia. Of these, the East Asian Observatory, formed by the East Asian Core Observatories Association, is a very good umbrella for us to foster collaboration. We have been attending many events organised by EAO: regular meetings, young astronomers meetings, schools or conferences. We also received a lot of help, advice and support, both moral and financial, from EAO observatory members and scientists. As was explained in the preceding issue of the Newsletter, Vietnam joined EAO in 2017 as a partner under observer status. By joining EAO, Vietnamese astronomers can have full access to all EAO facilities. Currently, EAO is operating the James Clerk Maxwell Telescope (JCMT), a 15 m dish, the largest submillimetre-wavelength single dish telescope in the world, located on top of Mauna Kea in Hawaii.

In February 2018, I attended the EAO meeting in Seoul. On this occasion I discussed with colleagues from the observatory the possibility to participate in one of the JCMT's Large Programmes, a survey of B-fields In Star-forming Region Observations (BISTRO). BISTRO maps the polarised light coming from cores and filaments on scales of 1000-5000 AU of the denser parts of the Gould Belt star-forming regions. The aim of the project is to address currently open questions on star formation, such as the role played by magnetic fields and turbulence. We have been allocated a data sample on Auriga region for exploration. The polarised light is measured using a polarimeter, POL2, placed in front of the JCMT's detector, the Submillimetre Common User Bolometer Array-2 (SCUBA2). The data were collected in eight days between 2017 and 2019 on the occasion of 21 visits for a total integration time of some 14 hours. The last two observations were made on January 19th, 2019. The BISTRO collaboration includes some 130 scientists from UK, Japan, Korea, Taiwan, China, Canada and now Vietnam. Together with a former USTH master student, who has now left for Toruń to work on her PhD thesis, I have been working on these data. We got all the necessary support from EAO and BISTRO for installing data reduction packages, reducing data and enabling us to work on the data analysis. We also attended by Skype the monthly meeting of the BISTRO data reduction group in order to understand better the instrument and the data. We will keep working on the data with the aim of obtaining magnetic maps of the Auriga region.

Our involvement in this collaboration is yet another demonstration that astronomy and astrophysics are very good at promoting international collaboration and at enhancing the level of research, education and training in science and technology in the country. At the frontier of current knowledge, they give developing countries access to the most competent scientific

communities, to the best instruments and to data of the highest quality. With a relatively modest support from home for salaries and for attending conferences and training courses, they make room for us in one of the most dynamic branches of contemporary science. This is a chance which we should not miss.

PROGRESS WITH OUTREACH

Progress with the outreach programme in Hoa Lac, to which we were introduced by Nhung in the preceding issue of the Newsletter, with opening of the Planetarium to the public planned for April or May, is reported by Loc and Nhung. Moreover, the construction of a website aimed in priority to a young audience is presented.

After nearly two years of preparation, the public outreach activity of the Vietnam National Space Centre (VNSC) has been launched in March 2019. The activities exploit the facilities of VNSC at Hoa Lac Hi-tech Park which include an observatory and a planetarium. Both share a same building, the Public Education Centre (PEC), which will also host a Science Museum in the near future. With its telescope, the largest in Vietnam, its science museum and its planetarium PEC will soon become a major centre for public outreach in astronomy and space technology.

A similar effort is taking place in Quy Nhon on the site of the International Centre for Interdisciplinary Science and Education where a beautiful circular building has been built to host a planetarium and where several exhibition rooms are already open to visitors.

Some years ago, a planetarium had been offered to Vietnam by Vietnamese astronomers working in Japan and had been installed in Vinh. It was successfully operated for several years and hosted visits of university students from all over the country. However, it encountered difficulties following the acquisition of the site by a private company and had to close down.

In 2017, VNSC completed the installation of two planetariums, one near Hanoi (in Hoa Lac Hi-tech Park) and the other in Nha Trang, with respective volumes of 100 and 60 seats. This March, VNSC decided to launch a combined program, starting with groups of very young students, including three modules: the planetarium show, a lecture on astronomy, and, for the younger visitors, practical exercises and games related to science.

The idea is to spend a month or two for running-in and to ultimately have the ability to reach a regime of daily visits hosting up to three groups a day. Visitors are expected to come from schools, mostly primary schools at the beginning, in the framework of a program of the Ministry of Education and Training that encourages these to organise visits of places illustrating what is being taught to the children. We expect that as soon as the announcement will be made many schools will apply, probably more than we can accommodate. Public transportation from Ha Noi to Hoa Lac is running smoothly and takes about one hour.

The planetarium show lasts 45 minutes with the simulation and live explanation covering the first 15 minutes. Loc will show and explain the celestial sphere seen from Earth, its daily motion, as well as the apparent motions of the Sun, the Moon and five planets on the sky along the ecliptic. The audience can then explore the system of constellations and enjoy a virtual journey into deep space to see nebulae and galaxies. The simulation is followed by one of five available full-dome movies, lasting between 20 and 30 minutes. Commentaries are dubbed into Vietnamese.

Public Education Centre in Hoa Lac: young visitors learning about planets

The visitors move next to a lecture room to listen to Dung delivering a lecture on astronomy divided into three levels: under 10 years old, from 10 to 15 years old, and above 15 years old. For the time being, we shall concentrate on the lower level. The lecture matches what is being taught in the

astronomy lectures of the recent national education program, including but not limited to: solar system, moon phases, size of the Universe, eclipses, tidal effect, motions of celestial bodies, telescopes. The topics will be selected according to the specificity of each group. After the lecture, the visitors will take part in practical exercises: the younger children by colouring images of the planets or solving quizzes; the older pupils by having a chance to watch through small telescopes under Thao's guidance. The visitors are next taken to the nearby observatory, home to the 50-cm telescope.

The third module is reserved for the younger children and is hosted in a separate room, devoted to activities meant to introduce them to scientific and technical achievements that marked the history of the conquest of Space. They can assemble small paper rockets that they blow away with a straw, learn about real rockets, shuttles and satellites and build small cardboard models of these, play with models of air cushions and robot arms, etc.

Playing with a model of air cushion at Hoa Lac

Altogether, we hope that the children will keep an inspiring impression of a visit that will trigger and enhance their passion for science.

Finally, the creation of a website dedicated to public outreach has just been completed. It provides detailed information on the educational program at PEC mentioned earlier, the planetarium and the 50-cm telescope, news and basic knowledge in astronomy and space science. The news will be regularly updated. Part of it will be specifically addressed to young children. The whole team contributed to the writing of the site and will keep updating it. It is now ready to be open to the public.

CREATIONISM VERSUS EVOLUTION

In the wake of the Chu Hao event, Pierre wrote the article below for Tia Sang, somewhat with tongue in cheek. Chu Hao was running a publishing house having the ambition to translate in Vietnamese major works of the universal literature in order to raise the level of knowledge of the Vietnamese young generation. In December, he received a blame for having published books that promoted ideas different from those which the Party is preaching. These were from authors such as Stuart Mill or Tocqueville, standard textbooks for students abroad. He then left the Party, together with a handful of other intellectuals, in particular the writer Nguyen Ngoc. Vietnamese intellectuals living abroad expressed their concern in an open letter to the General Secretary of the Party and President of the State, Nguyen Phu Trong, and to the Prime Minister, Nguyen Xuan Phuc, but there was no explicit reaction from the community of Vietnamese intellectuals living in the country; in particular, the scientific community and institutions such as the Vietnamese Physics Society kept silent and did not comment. Here is Pierre's article:

An ignorant people makes a weak nation
Hô Chi Minh

I was recently flabbergasted by reading that four in ten Americans believe that God created Earth ten-thousand years ago. I knew that creationism was still alive in the United States, and even was taught in some southern schools as the only truth, but I was not aware of the importance of such disastrous illiteracy and backwardness[2].

There have been twenty-five centuries since Confucius praised the role of education and knowledge in reaching wisdom: "*Education*

[2] I also learned recently, after publication of the article, that a quarter of US citizens believe that God wanted Trump to become president. Incredible!

brings confidence; confidence brings hope; hope brings peace". There have been twenty-five centuries since Pericles taught mankind how to live together; but when I compare his famous funeral oration[3] with Donald Trump's tweets, I cannot refrain from being dismayed by the decline that it displays. Twenty-five centuries, but we are not much better off today and ignorance is still wreaking havoc in the world in which we live. The wave of populism that is currently shaking the western world, from Donald Trump's America to Nigel Farage's Britain, builds up on the ignorance of their supporters: ignorance of the reality of the globalized world in which we are living, ignorance of its recent history, of the wars that it endured, of the lessons to be learned from the ventures of the many regimes that it went through.

At variance with ignorance, knowledge of our history and of the doctrines on which we had hoped to build a better world is a lesson of humility and wisdom: it makes us conscious of how difficult we find to live together in peace, in harmony and in respect of the humanist values in which we all believe: justice, generosity, solidarity, integrity and human dignity.

American creationists, according to those who analyse this phenomenon, do not want their children to learn about evolution because they fear that if they would, they would no longer believe in God. I find it difficult, in the twenty-first century, to understand how such obscurantism can still be so widespread. I am not myself believing in any god, but if I were, I would like my belief to be strengthened by my conviction that counter-arguments are too weak to make me change my mind.

What I find particularly offending is the lack of respect for children that such behaviour reveals from creationist parents: they think that their children are too stupid to have their own judgement and they deliberately maintain them in such a state of stupidity to make sure that they keep believing in their god. What kind of a god is that, who coerces his believers into adoring him? Respect for children, on the contrary, would mean opening their minds to other views in order for them to adopt whatever belief they feel most convinced about. Believing in a doctrine because one has been told to do so deserves contempt; having convictions deserves respect.

Religion is an act of faith, but that does not mean that it should rest on ignorance and that its adepts should be forbidden to learn about other doctrines. On the contrary. I remember when I was a young student, shortly after World War II, when the harms of Nazism and Fascism had become evident to the world, looking for a copy of *Mein Kampf*, Hitler's manifesto. I was curious to understand how a civilized and tolerant nation, blessed with a rich culture, could have fallen into such villainy. I had a very hard time to find a copy: the book was considered sacrilege, daring to read it was kind of a crime. On the contrary, I read *My Kampf* as an excellent antidote against the nazist and fascist gospels, which Hitler and Mussolini had imposed on their people by brainwashing and by building on ignorance[4].

Prime Minister Nguyễn Xuân Phúc has repeatedly stressed the important role played by education and training in general and of science and technology in particular in the development of the nation: Viet Nam needs to transform from a cheap-labour-based to a knowledge-based economy. It means that it must train a generation of responsible citizens gifted with an open mind and a critical judgement that enable them to decide by themselves which way to follow in the best interest of the country.

Chu Hao visited VATLY in 2013

[3] http://hrlibrary.umn.edu/education/thucydides.html

[4] https://www.dw.com/en/cultural-incineration-80-years-since-nazi-book-burnings/a-16798958

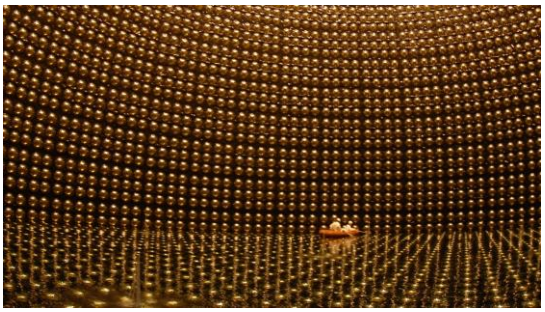
Science is an excellent school for such training: it rejects arguments of authority; it refuses to sweep under the carpet arguments that contradict its theories. Science is not religion. Non-scientists find it often difficult to understand that: they think of a theory as something one can believe or deny; as if there were believers and deniers of special and general relativity, believers and deniers of quantum mechanics, believers and deniers of molecular biology and evolution. Science has no belief, the theory of today is what it has best to offer and it will be replaced tomorrow by a better one, more accurate and more general: science has no ambition to claim being the exclusive keeper of some absolute truth. What matters in science is not belief or denial, it is knowledge or ignorance.
As scientists, we must feel responsible to promote a "critical" attitude of reasoning, in the sense in which Kant was using the word when writing his *Critique of Pure Reason*. We need to teach the young generation how to look at the world around them with wide open eyes, how to think about what they see with wide open minds; they need to learn about the views of others in order to enrich their own when they share them and to fight them efficiently when they don't. Between knowledge and ignorance, we chose knowledge; between evolution and creationism, we chose evolution.

PARTICLES, GRAVITY AND THE UNIVERSE

Early December, an international conference on particle physics and cosmology was held in Hanoi. After a brief introduction of the topics that were addressed we copy from an article written by Pierre for Tia Sang on this occasion some thoughts that such a meeting may inspire to whoever cares about the progress of Vietnamese science.

While nearly absent from the curriculum of Vietnamese universities, particle physics, astrophysics and cosmology share a privileged position at the frontier of modern physics. In the second half of the past century, in less than three decades, particle physics has put together an incredibly successful picture of the world as seen at short distances, the so-called Standard Model (SM) of particle physics. Its beauty rests on the simplicity of the premises on which it is built. For now four decades, experiments have been confirming with increased precision the SM picture, providing no hint at solving the puzzles that particle physics is still keeping for us: in addition to the mysterious flavour symmetry, several clues suggest that the SM is but a low energy realisation of a more general and unified theory that governs energies some fifteen orders of magnitude larger than currently explored by experiments. This disproportion with respect to the scale of the SM world generates problems (grand-unification and hierarchy) as may also do neutrinos toward low energies, with a mass six orders of magnitude smaller than the otherwise lightest known fermion, the electron. The fear that the answer to the puzzles that the SM leaves us with might be out of reach of experiments led some to speak of a crisis of particle physics but the general opinion is obviously more optimistic, hoping for soon-to-come discoveries of deviations from the SM predictions, opening a window on what is currently called "physics beyond the SM".
When looking at large distances, the landscape is dominated by gravity, which is neglected in the SM picture. Conversely the quantum physics inherent to the SM can be essentially ignored when dealing with gravity on large scales. No deviation from the predictions of general relativity has been explicitly unravelled and the recent detection of gravitational waves, the existence of which is a necessity in any sensible theory of gravitation, opens the way to more precise tests than currently available. Yet, two major flaws indicate that our understanding of gravity is incorrect: one is the complete failure of our model of the Universe to match observations, the other is the incompatibility of general relativity and quantum physics at what is called the "Planck scale". Observations of stars, galaxies and the gas and dust that populate the space in between account for only 5% of what is predicted; of the remaining 95%, one has good reasons to believe that a quarter of it is made of a form of matter that has essentially no other interaction than gravity; it is called "dark matter" and all attempts at revealing its existence have failed until now; of the other three quarters, we have no idea of what they consist of, all we can do is to give it a name: "dark energy". In addition to these two major

puzzles, our current picture of the Universe is facing a third problem: that of understanding the very first moments of its life, when it is believed to have expanded exponentially for a very short time, what is called "inflation".



The Japanese T2K long baseline neutrino experiment. The SuperKamiokande detector (here shown when starting to be filled, note the tiny boat that gives the scale) detects neutrinos produced 300 km away in Tsukuba by the accelerator complex of J-Park. It consists of a cylindrical underground cavern some 40 m in both height and diameter filled with 50,000 tons of ultrapure water and covered with 13,000 photomultiplier tubes that detect light from Cherenkov radiation produced by interacting neutrinos. A Vietnamese team is currently being formed to participate in the T2K collaboration and will hopefully be given all necessary support to succeed.

But the main problem that both general relativity and quantum theory are facing is to understand what happens at the Planck scale, which requires new physics; many believe that solving it would answer most of the other questions that have been mentioned above. For over three decades, research has followed the road of "superstrings" where "super" stands for supersymmetry, a symmetry relating fermions to bosons and where "strings" and "branes", with sizes at the Planck scale, are the basic 1-d and 2-d objects of the theory, which must be hosted in a space-time of 9+1 dimensions, of which 6 are compactified. Some two decades ago, one realized that a more general theory, in 10+1 dimensions, called M-theory, unifies 11-d supergravity with the five consistent versions of string theory as limiting cases, different versions of string theories being related by highly non trivial duality relations. The extreme mathematical complexity of standard superstring theory and the experimental inaccessibility of the Planck scale, together with the lack of encouraging signals, are causing a surge of different approaches based on the direct study of quantum size black holes without biasing influence of string prejudices.

The conference covered nicely all above topics and provided a good picture of the involvement of Asian physicists, and in particular Vietnamese physicists, in their progress. It was attended by some hundred participants, one half from Vietnam and one third from other Asian countries, with a particularly strong Japanese participation. Prestigious invited speakers summarized the state of the art. Five of them reported on the achievements, progress and perspectives of major experimental installations, including the LHC collider that measured the mass of the Higgs boson to a precision of 2 permil and detected some of its very rare decay modes and three installations based in Japan: the long baseline neutrino experiment T2K, showing signs of CP violation and including the refurbishing of the Superkamiokande detector; the Belle II b-quark factory now starting operation with an upgraded detector; and soon to start collecting data the new underground cryogenic gravitational wave detector KAGRA. On a longer time scale the high luminosity LHC programme and the hyper-K Japanese project set the bases for a productive future while the Litebird satellite, with a very strong Japanese participation, is being considered as a serious candidate for the search for primordial gravitational waves emitted at the time of inflation.

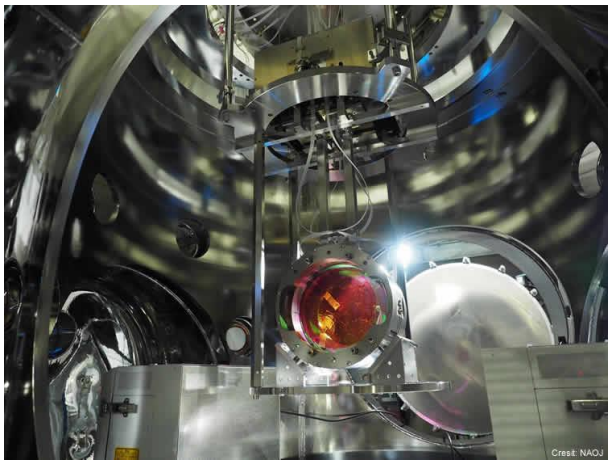
Nine invited theory talks reported about progress in the fields of general relativity and Planck scale physics with particular emphasis on the roles of gravitational waves and of black holes, the detection of gravitational waves having opened a new window on cosmology and on the study of the population of the Universe in neutron stars and black holes.

The status of astrophysics research in Vietnam was reviewed by Tuan Anh with emphasis on the work of our team, shared between stellar physics (protostars in formation and stars at the end of their lifetime) and the study of galaxies of the early Universe at large redshifts.

Six out of 21 contributed talks were presented by Vietnamese physicists and illustrated the diversity

of the research work being accomplished in the country.

In his summary talk, Tom Browder commented on the opportunities that the field offers for Viet Nam to make major contribution to its progress, taking advantage of the investment made by the international scientific community to successfully face the many challenges that it presents. He noted the heavy brain drain that the country is enduring and recognized that previous attempts to stop it have failed. To reverse the situation, he said that all it takes is a long term vision and high level support to the constitution of skilled research teams.



KAGRA is an underground gravitational wave detector that will start operation this year in Japan. It consists of two laser interferometry arms at right angle, each 3 kilometres long, operated at low temperature and under vacuum. Gravitational waves modify the length of the arms by a fraction of a nanometre. The picture shows the suspension of the test mass in the vacuum chamber at the end of one of the arms.

Before departing, the participants expressed their warm gratitude to Nguyen Anh Ky and his team, from the Institute of Physics, for his dedication to having made the conference a success.

Lessons for Viet Nam

Indeed, the Vietnamese research effort is scattered and sprinkled over too many isolated individuals. Many were trained abroad and, when back home, simply continued collaborating with their foreign hosts without being given a chance to build a Vietnamese team around them. They do train students but cannot keep any to work with them on a long term. Too often, the author list of the publications in which they take part includes no other Vietnamese name than their own. When they retire, they leave no legacy behind them and their contribution to the progress of Vietnamese science is confined to the time during which they were active.

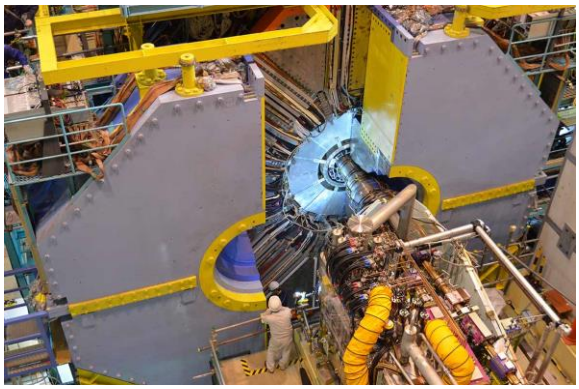
Such individualistic approach to science, deeply rooted in the Vietnamese tradition, is preventing progress. We need to recognize that the talents of a team are much more than the sum of the talents of the individuals who make it. By exchanging and confronting ideas, by sharing knowledge and skills, a team generates the atmosphere of excellence that research needs to be successful.

Too often, we seem to have the idea that being a good scientist is imprinted in our genes. It is not, of course, and there are as many young Vietnamese having the skill and aptitude to become a good scientist as there are in any other country. Hard work, intellectual and moral rigour, determination and courage, in a word all the qualities that make scientific excellence carry no passport. Curiously, we feel proud when a Vietnamese scientist who left the country long ago is honoured by international recognition. We should instead feel sorry not to have been able to recognize his talent at an early stage, sorry not to have been able to give him proper training, motivation and encouragement at home, sorry not to have been able to give him the support that foreign scientists gave him. We may feel happy to see his talent receive international recognition to the extent that, as some do, he feels committed to help his native country to develop and to progress; but proud we should not feel.

While such pride is out of place, its contrary, a complete lack of confidence in the skills and talents of the young generation and in what they are able to achieve is deeply harming us and severely preventing progress. The wealth of the country is in the brains of the young generation, we should not waste it by failing to recognize its value.

It is time to encourage team work in the country and give proper support to scientists who have the skill and talent to build a team around them. This applies to theorists as well as to experimenters and

to all fields of science. It is already somewhat recognized in condensed matter physics and material sciences, where several successful Vietnamese research teams exist, but is not properly accepted in the fields covered by the present conference.



The Belle 2 detector is seen here being assembled. It is designed to study the decays of so-called b-quarks produced in pairs together with their anti-particle counterpart from collisions between electrons and positrons in the high luminosity Super KEKB collider. It started operation early last year and has recently published first results. The Institute of Physics in Ha Noi is a member of the collaboration.

I know of efforts to encourage the promotion of astrophysics in the curriculum of Vietnamese universities; they have been discouraged and turned down. I know of efforts to simplify the rules governing the award of PhD degrees in case of collaboration with prestigious foreign universities; they have been discouraged and turned down. I know of efforts to avoid wasting money in acquiring expensive instruments that are essentially unused and invest instead in a better funding of the participation of Vietnamese researchers in international conferences, workshops and schools; they have been discouraged and turned down. I know of efforts to build up small teams of excellence in the domains of microelectronics and integrated circuits, from which Viet Nam is nearly absent; they have been discouraged and turned down. I know of efforts to make our learned societies more active, to have them become forums in which young scientists can openly debate and exchange their views on the best way to make science progress; they have been discouraged and turned down; indeed, these societies, such as the Vietnam Physics Society do not even accept foreign members, a remnant of wartime probably.

We seem to lack the long term vision that Tom Browder was alluding to in his summary talk. We should ask for support from the international community in the form of international scientific advisory committees that would help us finding the best way to progress. But I know of efforts to do so at the level of institutes as well as national level; they have been discouraged and turned down.

It is time to change style.

Among the recipients of this year Ta Quang Buu's Prize were two young and brilliant Vietnamese scientists who recently came back to the country. One of them was attending the conference. They are emblematic of what the country needs to make its research progress. To them and to all those who, like them, are the future of Vietnamese science, let us give all the support they need to build or maintain productive teams around them, let us place our confidence in their talent and excellence, let us stop the brain drain that is preventing the country to take the place that it deserves on the international scene. Let us prove Tom Browder right when he predicts that with proper support and a long term vision "the next generation of Vietnamese scientists could be leading the way in many of the areas covered by the conference".

THE PHENIKAA INSTITUTE FOR ADVANCED STUDIES

Following our comments on the topic of private vs public higher education and research, published in the preceding issue of the Newsletter, Diep, Hoai and Tuan Anh interviewed Professor Do Van-Nam, head of the Phenikaa Institute of Advanced Studies, who kindly accepted to tell us about his experience and hopes.

VATLY: Could you please briefly introduce PIAS to the readers of VATLY Newsletter?

Do Van-Nam: On August 9th, 2018 the PHENIKAA Corporation launched the PHENIKAA Institute for Advanced Study (PIAS)

and the PHENIKAA Research & Technology Institute (PRATI). PIAS is an autonomous unit, belonging to PHENIKAA University, concentrating on scientific research and serving training purposes of PHENIKAA University. PRATI, unlike PIAS, focuses on technology research and development for production-related purposes of the Corporation, and in a broader extent, the development of industry of the country. Currently, both institutes are sharing a floor in a same building. In addition, we are installing laboratories on the campus of PHENIKAA University in Ha Dong district. PIAS's goal is to become an academic centre of excellence. To do so we adopt scientific values and standards at international level right from start. We focus on constructing and developing the Institute in harmony with our key orientations across the tasks that it implies: assembling research groups of excellent quality having the ability to conduct research tasks defined jointly by the researchers and the institute, enhancing the position of the Institute on the international scene, investing in modern infrastructure.

At present, the biggest challenge for us is human resources: whatever we do needs people. PHENIKAA Corporation has expressed its strong determination to support building PIAS; a strategy to do so has been proposed; what we need now are the people having both the skills and the dedication to implement it. The first thing to be done is to prepare the "working space", which includes defining clearly policies and strategies to enable those who are considering joining us to be clear about what to expect. My goal is to attract young people who have been trained in different academic environments, whether in the country or abroad, to come here and work with us. The Institute means to create an opportunity, a favourable environment for scientists to join, but it is their privilege to decide: we rely on their judgement and we do not feel constrained to recruit blindly a large contingent. Joining us should be seen as an opportunity to develop one's career, to build a good research team, to contribute to the success of PIAS, and ultimately of the University and the Corporation. Recently, we recruited a young Indian researcher and have been discussing with other foreign candidates.

Our recruitment policy is centred on building research groups. Accordingly, we preferably recruit group leaders and research fellows who will then act as the seed for developing the research team. It will be up to them to make use of their knowledge of the scientific community active in their specific domain and of their network of colleagues to build up a team sharing with them a same dedication and a same vision of their goals. Doing so will give strength to the team spirit.

Tuan-Anh, Diep, Do Van-Nam and Hoai at PIAS

In its development strategy, PIAS identifies seven main development areas: physics, materials sciences and chemistry, advanced devices, environmental science, medicine and pharmacy, energy, and data science. The Institute's development direction is quite broad, creating opportunities for outstanding scientists. Furthermore, these seven selected areas have in common their relation to materials that play an important role in various technologies and are the bridge between basic and applied sciences. The institute's strategy is thus to focus on material sciences and, from there, to develop basic and applied science.

PIAS currently has a staff of about 20 researchers, mostly physicists, in particular material scientists, working on the physics of electrons in materials and devices, developing methods and techniques to solve problems of charged-carrier transport, biomedical materials, data science, particle physics; in particular research is on-going in material sciences on giant magnetoresistance,

magnetised nanostructures and sensor components.
PIAS has not decided on a quota for its research staff: when a group becomes sufficiently large and strong, it can be supported to develop into an independent centre or institute.

VATLY: Can you tell us about PIAS's policy to attract high quality staff members?

Do Van-Nam: Young people care very much about the salary that they are offered and scientists are no exception. In our institute, the salary scale for researchers is several times higher than in the public sector. It is determined on the basis of commitment, skills and responsibility related to the job position. However, the salary is only one side of the problem. We believe that the working environment is essential for scientists. The institute is not simply a place where you work, it is where you spend most of your life, where your career is being built. Therefore, securing an environment for scientists to work is a task that takes all your attention and care. This comes in addition to having to invest in infrastructure, labs and equipment.
The Institute has a scheme for inviting research fellows and visiting professors to work with us and/or to give lectures, regardless of where they are from, Vietnam or abroad. It also has a scheme to support university students in the context of internships and master or PhD theses. For bachelor and master students, the support is in the form of scholarships, with an amount based on their motivation as well as on their skills and aptitude to work hard. For PhD students, the support takes the form of a short-term contract, with an amount based on their skills and commitment to the work. The Institute's yearly budget, approved by the Corporation, is quite flexible.
However, we consider that our academic staff must keep strong connections with their scientific community: they are encouraged to seek support to their participation in domestic and international conferences and schools from external funding sources, such as NAFOSTED; some support may be obtained from the Institute budget when necessary.

VATLY: We understand that PIAS has an international advisory committee, at variance with domestic institutions. How does the committee work? How are their recommendations, evaluations and advice implemented?

Do Van-Nam: This is a committee that I use to give me advice in my role as responsible for PIAS management: my knowledge and expertise are obviously limited and the advice from experts having a deep knowledge of the fields that we are developing is very valuable. The committee has many members but it is not always necessary to consult all of them simultaneously. Depending on the case, I may seek advice from only some experts. As the committee members have different expertise and possibly different views, I have to sort out myself which decision to take. When writing down the yearly or long-term plan, as head of the Institute, I decide on its content before submitting it to experts; then, I usually collect a lot of valuable contributions that help with improving the plan. But I decide on the first version, from which the committee may contribute new ideas. After a certain period of time, the committee will help with the evaluation of the Institute's activities and achievements, making recommendations for making appropriate adjustments.

VATLY: How do you see the contribution of young people to policy making procedure?

Do Van-Nam: Certainly this is something where young scientists can play a role. But for the young generation to develop, they need the help and experience of the previous generation, who are close enough to them to understand the challenges and difficulties that they are facing. I mean that the current generation of young students born around 1990-2000, who concentrate on their university studies, need the help of their senior colleagues born around 1980 who are now at the age of the most active. These senior colleagues, who are still young and strong, must be given a chance to have their word and make their contribution to the overall policy at national scale. The older generations in turn are close to the

generation of the 1980s, who will easily transmit their message to the younger generation. These older generations are still playing an important role in training, research and policy-making institutions. So it is very important to maintain a good connection between generations; this will help with involving younger generations in policy-making activities more than they are today. The urgency for such a change of thinking and working style should be realised.

VATLY: What is the biggest challenge to successfully build PIAS?

Do Van-Nam: Our institute was created last year. Therefore, the emphasis has been on trying to maintain the continuity of the professional activities of the researchers who have joined us. On the management side, we needed to consolidate the mechanisms that govern the operation. In doing so, we have received strong support from the Corporation, both at top level and at the level of the departments, and with allocations in conformity with the approved budget.

The first difficulty we encountered was the lack of homogeneity of the recruited research staff: they are good and skilled but their visions and habits differ and are not easily harmonized. Some integrate very quickly but others need more time to get used to the new working style and to assimilate the mission and goals of PIAS. It is my responsibility to make sure that this transition is taking place smoothly.

Another difficulty is the way in which the performance of an institute is being commonly assessed. For example, the current practice in evaluating a research institute is to take blindly the number of publications as the only indicator. However, particularly when evaluating a young institute, other elements must be taken into account. The pressure that an ill-considered application of this only criterion in assessing our performance exerts on us is stressing and may force us into taking steps that are not in the best interest of the institute. Making sure that evaluation criteria are applied judiciously in the evaluation of research and training institutions is the responsibility of those who decide on the national policy in matters of science and education.

At the moment, private institutions have not received any negative feedback from the government, whether at ministerial level or else, and former experience with some other private institutions is encouraging: scientists keep applying and receiving support for projects submitted to NAFOSTED or other funding agencies at ministerial or governmental level. We have seen no sign of discrimination between private and public institutions, so I am quite optimistic.

There has even been declarations by the Government encouraging explicitly the creation of private institutions but, for the time being, these are only words and concretization is yet to come. In my opinion, the government should be stronger in supporting the creation of private universities and research institutes, which will feed back positively to the development of the country and attract more resources from the private sector. But private institutions do not replace public institutions. The country has so many challenges to face, the private sector needs to contribute to the overall effort. It is important that state policies define clearly the direction in which to go, in such a way that all sectors can efficiently contribute to the development of the society and of the country. In particular, at variance with domains such as economy, where the private sector may have very strong impact, scientific domains need to comply with the policy of the country, based on a long-term vision, which lessens the impact that the private sector may have.

VATLY: What kind of support do you expect from the government and the ministries?

Do Van-Nam: In general, the country needs a clear national strategy for its development, including the role that science and technology are expected to play, such that its actors in both public and private sectors know which directions to follow. This does not prevent universities and research institutes from having their own specific identity and style. In our case, PHENIKAA founded PIAS in the spirit of giving it the means to start, providing the necessary initial

investments, but intends to let it go its own way once it would have matured and come of age. As a rule, PHENIKAA is conscious that a research institute is not the same as other manufacturing and business branches of the corporation and that academic freedom needs to be respected in the sense that the institute must decide concretely what to work on. The national policy that the government needs to define must create a fair environment giving equal opportunity to the private and public sectors to access resources, with no discrimination between them. This is currently the case.

VATLY: Salary and working conditions are better in the private sector than in the public sector. Does that generate "brain drain" from public to private sector? Do you think PIAS's success will exert pressure on the public sector to improve salaries and working conditions?

Do Van-Nam: I am sure it will. We don't need to wait until PIAS has proven to be successful, its mere creation has already had a positive impact. It has opened new opportunities for scientists; a healthy competition between private and public sectors is a factor of progress, fostering dynamism and inventiveness. At the beginning, the private sector is in a more favourable position in terms of salaries and working conditions. Young scientists returning from abroad to institutions such as PIAS are much better off than those who work in the public sector, although they may have the same qualifications and skills. This means a shift from public to private institutions that has a positive feedback effect: the latter, in order to survive, need to change style, to evolve and possibly restructure themselves. Those who join us are conscious of the positive role they can play this way in helping the situation to improve at national level. In fact, we should not be concerned about this internal "brain drain" issue, from public to private, as long as we remain true to the interest of the country.

VATLY: How can PIAS and PHENIKAA University succeed in a research and education environment that suffers of flaws such as cheating, inequality, lack of professionalism, lack of integrity and of long-term vision; in particular, giving the impression at any price that results have been obtained is a common disease (chạy theo thành tích in Vietnamese) that needs to be cured. What makes PHENIKAA think that they can do better than others?

Do Van-Nam: First, the aims of PIAS and PHENIKAA University must be clearly stated from start and match international standards. One cannot compromise on this point, one must stick to the initial orientation that one has decided to follow. For example, enrolling students is a major problem for a young university, the well-known universities that have existed for a long time being in a more favourable position to attract and absorb the best students. We must accept to start small but we must refrain from the temptation to lower the quality in order to increase the contingent. We may be small but we must be good. Only at this price can we have a chance to reach the level of excellence at which we are aiming.
Today, the young generation is looking for well-paid jobs, giving opportunities for travel abroad: they tend to choose to study in sectors such as finance or services. This was to be expected, I can't blame them. But the universities that adapt their curriculum to what the students expect, in order to recruit more of them, need to be blamed. They fall into the trap of thinking only of their own interest but forget the role and responsibility that they have toward the future of the young generation. On the long term, their behaviour will create social imbalance. For example, training in engineering at bachelor/master 1 level requires some 5 to 6 years of study while some universities tend to shorten the duration of bachelor/master-1 training to only 3 to 4 years. In addition, the training that is usually given in Vietnamese universities is of very bad quality: it does not encourage students to analyse problems in depth and have a broad vision, it is sprinkled over many different topics, it lacks overall vision and unity: as a result the students do not acquire any deep and broad knowledge but tend to get lost in details and not to learn a systematic approach to problems. Therefore, the national policy should stop such a decline of the quality of training; it should preserve the mission of universities to

create and disseminate knowledge and not let them fall into the trap of becoming business-making institutions. With PHENIKAA, the university considers important to care about both student and faculty communities. The task of students is to study and to acquire skills and methods that will help them with recognizing, evaluating and solving problems; that of lecturers is to cultivate and develop their professional skills in both teaching and research. A good university must maintain both communities up to such ambitions. For their research work, scientists need to have students working with them. Indeed, in a university environment, lecturers and students need each other, implying that training must proceed both from lectures and direct exchanges with scientists. Currently, recruiting good and suitable students is not easy, but it does not mean that students now are less clever than in the past. The whole world is changing. So, for each lecturer, one must devise proper teaching and training methods adapted to the specificity of his domain. Moreover, it is essential that the training orients students in directions that match the evolution of the society and the present and future job opportunities.

In general, academic scientific staff must both teach and conduct research. We pay particular attention to making sure that they do both well; we insist that they must secure high standards when facing the obstacles that they meet. We are committed to providing high quality research and training, at a level of excellence that matches international standards. It may be difficult at the beginning, but I am convinced that we will succeed.

VATLY: Thank you very much for accepting the interview. We wish you to receive the support and encouragements that you need to grow and succeed.

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Contact: vatlynewsletter@gmail.com
The VATLY web site: https://vnsc.org.vn/dap

– *PHOTO ALBUM* –

Happy birthday bac Pierre!

Coffee break with Phuong, Anne, Diep, Hoai and Ngoc

Celebrating bac Pierre's birthday in a Chinese restaurant

Ngan's farewell party in the office

Conference on particles, gravity and the Universe in Hanoi: Dinh Nguyen Dzinh and Pierre.

Awards of the year at VAST: Diep is second from right.

Hoai's award as Outstanding Scientist of the Year

Diep's award

Phuong, Thai and Ngoc at NAOJ

Anne visiting Hanoi's old town

Group picture of the Tokyo school on star and planet formation.