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(2, Dvoryans'ka Str., Odessa 65026, Ukraine)**INTERVIEW WITH LEONID BULAVIN**

The interview was taken on February 27, 2015 at the Faculty of Physics of Taras Shevchenko National University of Kyiv.

1. Your childhood and school years passed in a suburb of Poltava on the riversides of Vorskla and Kolomak. Tell us, please, about this wonderful area. When did you start to think about problems of world's structure?

I was born in the town of Poltava at a suburb of Panyanka and lived for 16 years in a suburb of Lisok, in an adobe house (khata) that was built by my grandfather Vasyl Pavlovych Bulavin almost 100 years ago. My father Anatolii Vasyl'ovych, being a boy, helped to my grandfather to drive wheelbarrows with clay for walls of the khata. My grandfather, as a railman, received a land piece for the building of his house in a suburb of Poltava near a cutoff meander of the river of Kolomak. This meander had many branches surrounded with a forest. Therefore, this suburb was called Lisok (small

forest). I resided on the Kharkiv Street. Our vegetable garden, from which the Poltava monastery was seen, contacted with the railcar park, where at least thirty railways passed. The other side of the Kharkiv Street was near the meander of the river of Kolomak. I walked for 5 min to Kolomak and approximately 10 min to Vorskla. These two rivers are opposite by their characters. The river Kolomak runs through a reed. On free places, you could see white and yellow lilies. Water in Kolomak was so pure that I with my friends, by swimming and diving, drank water directly from the river. I remember else a jump ramp, from which we dived. Vorskla is a completely different river. Its right riverside is steep approximately 2-3 m in height with beautiful wide sand beaches. Of course, we had also certain entertainments on Vorskla. We constructed a Tarzan-type swing, from which we jumped in water. On a sand beach, we played soccer. When we became older, we went boating on kayaks. The other entertainment was the following. We frequently traveled by trains. It was an ordinary matter, because our fathers were mainly railmen. My father was firstly an engine-driver on steam locomotives and then on diesel ones. We frequently sat in a freight train and went somewhere outside the town. There, we arrived at sand pits, where we were able to jump down and to move on the slope together with a sand avalanche. Sometimes, I traveled with my father in the cab of a steam locomotive. I took a shovel and helped a stoker to throw coal from a tender into a firebox. Diesel locomotives were endowed with various devices, and I liked it. But I did not like the strong vibration. In steam locomotives, I felt myself as at home. Maybe, because my father worked as a railman, I had a definite aspiration to the technique and then to newest technologies.

The suburbs of Poltava and Poltava itself are a fairy tale. I very enjoy Poltava. When I go abroad, I am frequently asked: "Where are you from?" I do not say

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that I went from Kyiv. I say that I went from Poltava, and my answer amazes nobody. They think that I live in Poltava and work in Kyiv. Such distances between a workplace and a dwelling are not a piece of news in the world.

When did I start to think about problems of world's structure? Maybe, from the very childhood. Because the night sky above a Poltava suburb is very bright. It is not such as in Kyiv or at the Poltava center. This chasm even frightened me. I wanted to understand: What is it? What is the infinity? This is impossible to understand even now, rather to get used to it. In childhood, this was else harder. As for the structure of the world, I began to think about it in school years. For example, I asked myself sometimes in middle classes how the trees are growing, why they have just a certain height, but not higher. I saw that there is a definite limit for each type of trees. Then I found out that the capillary phenomena determine the maximum height of a tree, and the record height has a sequoia. At that time, I thought: Why are the deviations of points of the Earth from the level of the ocean equal to plus-minus 10 km? In other words, why do not the altitudes of mountains and the depths of the world ocean exceed approximately 10 km? Such approach to science and the interest in world's structure were supported by that I and my brother attended some circles by ourselves, without instructions of parents.

In circles, we made the acting models of gliders and then those of electric locomotives. We even traveled to the competitions in Kharkiv with the acting models of electric locomotives. We tried to produce various details of a model so that they were similar to the original. At that time, I met the first lesson of injustice. The organizers of a competition spoiled several models, including our one, by supplying the strong current with a rheostat in order that we will not not become leaders. When I knew this fact, it was awful for me.

2. How frequently do you visit your small motherland?

Each year one summer month, as minimum, I go to Poltava on holiday. In addition, I go sometimes to my friend, on their jubilees. Earlier, when my father and mother were alive, my brother went to the parents more frequently. Now, a niece lives in parents' khata. My father, mother, and brother are in

the other world now; therefore, I arrive at Poltava rarely. But I cannot live without Poltava!

3. For which reasons did you choose the Kyiv University, rather than the Kharkiv one being almost nearby, after the school?

As for a high school and the direction, I hesitated for a long time. My teacher of Russian language insisted that I try to go to the Leningrad literature institute. Sometimes, I wrote a composition on the theme: "We are born to make a fairy tale by a reality!" For one evening, I wrote a whole exercise-book by poems. The teacher wrote a large-size number 5 and a very small number 2, as estimates. The latter was for the syntax and the orthography. My teacher of biology hoped for that I will go to the biological faculty. In the school garden, I made graftings to saplings, and I was successful in 190 cases from 200. She knew that I like to deal with flowers and fruit trees, as my father. I grafted rose on dog-rose, apple tree on pear-tree, and apricot tree on plum-tree. But in the middle of the last class, we were visited by the lecturer of the Kyiv University from the Faculty of Physics Yuri Tsyashchenko. He was very free and easy and attracted as a magnet. I felt that my those inspirations to newest technologies, to superengineering, to the understanding of world's laws won. I wanted to be similar to him, who did be very particular. Approximately one month before, I had conversation with my girl, with which I was in friendship. Her father was also an engine-driver of steam locomotives. I and she thought to go to a medical institute, because my mother and her three sisters were physicians. But the father's influence was stronger, and I went in physics. Why did not I go to the Kharkiv University? Because the lecturer went namely from Kyiv, and I desired to learn namely there, though the way from Poltava to Kyiv was very uncomfortable at that time. Whereas, there were no problems to go to Kharkiv, since the regular trains went in several hours. By the way, my aunt Vira learned in Kharkiv at the University. She was very good-looking. When the war came, she, being the second-year student, went to Moscow with her friend, who lived at Pereshchepyn', to learn as radio operators. First, they were directed to the Kharkiv cauldron, where our troops were surrounded. There, they fulfilled the combat task. After that, she was sent to Poltava occupied by fascists. She came to par-

ents' khata at four o'clock at night. In one hour, she was arrested by fascists, who were informed by neighbors. Then she was shot up.

4. Who were your first lecturers?

I have known by which person should be a lecturer from Professors of the Faculty of Physics. In the first turn, I mention Yurii Ivanovych Shymans'kyi, Halyna Petrivna Roshchyna, Iryna Ivanivna Adamenko, Solomon Isaakovych Pekar, and Kyryl Borysovych Tolpygo. They were fine lecturers and good physicists. Really, I began to study the practical physics on the fifth course, when I turned out at the Joint Institute of Nuclear Research. There, the fate joined me with Aleksandr Vasil'evich Strelkov, who became my microchief. The motto of his life was: "Physics is a simple thing!". He was very opened and simple and had a profound knowledge of physics. It was a pleasure for me to work and to communicate with him. We discussed not only physical themes. We read the stories and books by Solzhenitsyn forbidden at that time, sang the songs by Okudzhava and Vysotskii, and skied. For example, we were in a two-day skiing in the Moscow region. By the way, we acquainted in a village with a girlfriend of A. Kollontai. It was evening. By skiing, we went from the forest to a village. There were 20 houses, but the smoke went up only from one chimney. We entered the house and saw about 15 old persons, mainly grannies, who were drinking tea. The room was pure and fine. But foods were almost absent. We gave canned foods to them, and they proposed us to take a samovar as a present. At that time, the samovar was a superpresent, but we refuse, because it would be hard to carry this present.

My second teacher of physics, a senior microchief, was Yurii Mechislavovich Ostanevich. Yurii Mechislavovich Ostanevich did not defend a candidate thesis, but at once a doctoral one. I remember, as it was. He wrote it before my very eyes. Il'ya Mikhailovich Frank and Fedor L'vovich Shapiro, who guided the Laboratory of Neutron Physics, simply locked Yurii Mechislavovich at the Laboratory in order that he was there and wrote the doctoral dissertation. Yurii Mechislavovich was at a distance of half a step to the discovery of the effect that is called now the Mössbauer effect. Aleksandr Vasil'evich Strelkov is the physicist who discovered ultracold neutrons

(UCNs). Once, Fedor L'vovich Shapiro called Aleksandr Strelkov, Yurii Pokatilovskii, and me and proposed: the pulse fast reactor (PFR) will operate the whole summer for you, and we will seek ultracold neutrons. We worked the whole summer and found the first UCNs. In some time, the leaders of the Kyiv University knew this fact, and the Vice-Rector wrote to Nikolai Nikolaevich Bogolyubov that the University would like that I will be engaged with the theme, on which I was sent, namely the physics of fluids. I had a very warmful and touching conversation with Nikolai Nikolaevich Bogolyubov. He encouraged me and said that "the physics of fluids is also very interesting. The study of UCNs is a good direction, but the Kyiv University needs more that you will work in the physics of fluids; therefore, you should work in that field." These words of Academician N.N. Bogolyubov forced me to develop, with a triple force, the direction of studies "Physics of fluids" at JINR, which was absent there prior to me. I say that Yurii Mechislavovich Ostanevich constructed the first installation for a small-angle scattering of neutrons for, in the first turn, liquid systems. With him, we had long conversations and executed the first experiments on this installation, which was the first in the world. Now, it is known over the world as the YMO (Yurii Mechislavovich Ostanevich) installation. At the present time, there are at least 10 installations analogous to the YMO one. Only Germany has, it seems to me, four ones.

5. I.Z. Fisher and you made one of the most famous discoveries in molecular physics in the second half of the XX-th century. You proved the existence of collective self-diffusion in fluids.

At which circumstances did you turn to namely this problem?

What forced me to deal with collective self-diffusion? First, there are such fundamental categories as the continuous and the discrete, the even and the odd, and the collective and the one-particle. They are present in physics and outside it. I mention that the unrealizability of the building of a communism follows from the requirement that only collective and solely collective features of the human behavior must be basic. We know that there were houses in Kharkiv, like in a kibbutz, where the flats were joined by a com-

mon balcony in order that the habitants can communicate with one another at any time. The other side of a medal is the one-particle motion or the individual features of the human behavior. It is clear that the life is such as it is, by involving the collective and individual motives. This corresponds to the human nature. In physics, by the way, the idealization is one of the methods to cognize a phenomenon. We know about the ideal solid and the ideal gas. But all we meet in the Nature is the essential deviation from those idealizations. The same concerns the phenomenon of diffusion. The one-particle and completely collective mechanisms of diffusion are certain idealizations. Depending on the state of a system, the contribution of that or another component is larger or less. I understood that, by using the quasielastic scattering of neutrons and by varying the scattering angle, it is possible to study both these mechanisms. In fact, I was engaged with this theme experimentally.

6. How do you perceive the departure of the best Ukrainian pupils and students abroad? This is a phenomenon, which is negative for Ukraine in the short-term perspective. Can Ukraine use the potential of our specialists in the diaspora in the long-term perspective like China and India?

My attention is two-fold. When I was Dean (for 17 years), I had a hope and said the students that "our state needs you, and you are the basis, on which a new state can be constructed". Now, I am also sure that the contributions of the so-called technicians and the physicists must be significant. The technicians, physicists, and mathematicians have a more consistent logics, and this fact allows them to foresee certain events. As a bright example, I mention the landing of the research apparatus on the Churyumov–Gerasymenko comet. Conceive: the apparatus flid 10 years and lands exactly on the comet! Unfortunately, this property to be logical is, in my opinion, weaker in the researchers in humanitarian sciences, though they have a lot of other advantages. Therefore, I should like that our best students will remain in Ukraine. Then state's potential will increase. The society must use the fact that our youth, by my conviction, is more talented, than the youth of many countries. Of course, I would like that our so-

ciety be open. To attain this, it is necessary that our young experts can go to other countries. In this case, the people in those countries will know about Ukraine and about our people. I am sure that the collaboration with specialists of other countries will create the positive image of Ukraine in the world and will prove that we want the democracy. We have already made the first step on this way, but many things should be else made. Those specialists, who leaved Ukraine, must help it, certainly. As a rule, it happens just so. I know that my disciples, who are now in Germany and France, went to manifest for the holistic Ukrainian country against the aggression. It is pleasant for me that my disciples do not fall behind in the formation of the consciousness of the world community in favor of Ukraine.

7. What can you say about the concentration of scientific studies in Kyiv high schools? Germany, the USA, and the Great Britain have the opposite tendency.

I do not sure that such concentration exists really. As for the experimental physics, the higher possibilities are possessed by the Academy of Sciences, rather than high schools. The former has more novel facilities. For example, such device as an optic spectrometer was purchased by V.E. Lashkaryov Institute of Semiconductor Physics for 500,000 euro. The University cannot buy such device now. The Academy of Sciences can create the centers of collective application. The funds available at the University do not allow one to create such centers. My disciple Doctor of Phys.-Math. Sci. Valerii Volodymyrovych Klepko, who is Deputy Director of the Institute of Chemistry of High-Molecular Compounds, say that his institute has purchased a high-quality European chemical laboratory for about 1 mln euro and invites us to make common studies. I support the creation of close connections with the scientific centers of countries over the world. For example, we have a common project with the Joint Institute of Nuclear Research. This gives possibility for us to work for free on the modern reactor and on many devices purchased by the JINR. The second direction is the collaboration with the Strasbourg University. We have the agreement with this university, according to which up to four students of our chair can learn at the Strasbourg University and get two diplomas of the

Kyiv and Strasbourg Universities. We try to make so that the magister work will be of interest for the chair of molecular physics of our University and for the institute, where the student learned in the magistracy, namely Ch. Sadron Institute. Our third international partner is the Pekin University, with which we study quantum fluids. In addition, we understand that it is necessary to carry on experimental studies jointly with other universities and institutes. For example, we execute common works with Lviv University and the Institute of Condensed Matter Physics in Lviv. They have devices that allow one to measure the viscosity at temperatures higher than 1000 K, i.e., it is possible to find the viscosity of melted metals, semiconductors, and salts. For example, we jointly studied the salts used in blankets of the new-generation reactors, the so-called salt reactors. For a long time, we collaborate with I.I. Mechnikov Odesa University, where such outstanding physicists as Iosif Zalmanovich Fisher, Mykola Petrovych Malomuzh, and Volodymyr Leonidovych Kulins'kyi worked and are working. The last is, by the way, a leaver of our doctorate. We write manuals of physics together with Professor of V.N. Karazin Kharkiv University Academician M.O. Azarenkov. We also have close contacts and common publications with researchers of M.M. Bogolyubov Institute for Theoretical Physics, Institute of Nuclear Research, Institute of Safety Problems of NPPs, Institute of Physics, V.E. Lashkaryov Institute of Semiconductor Physics, E.O. Paton Institute of Electrowelding, V.I. Vernads'kyi Institute of General and Inorganic Chemistry, O.O. Chuiko Institute of Surface Chemistry, Institute of Chemistry of High-Molecular Compounds, A.V. Dumans'kyi Institute of Colloid Chemistry and Chemistry of Water, F.D. Ovcharenko Institute of Biocolloid Chemistry, O.V. Palladin Institute of Biochemistry, R.E. Kavets'kyi Institute of Experimental Pathology, Oncology, and Radiobiology, M.M. Amosov National Institute of Heart-Vessel Surgery, O.O. Bogomolets National Medical University, and National Technical University of Ukraine "Kyiv Polytechnical Institute".

8. Are you satisfied by your activity at Taras Shevchenko University of Kyiv?

Yes, because I like to teach young students. But I invite only laborous ones to work with me. As usual,

they are childs from various regions, and their parents are not rich. I excite the curiosity of students from first courses. When they become interested in the work, I begin to write the articles together with them. Then some of them write the articles individually, and this is a very pleasant part of my activity. I should like to note that, by my conviction, science is not for students only. Science is holistic. When the student enters the scientific work, he/she must feel that this is the high-level science. Till now, I remember, with satisfaction, my report at the meeting of members of the Neutron Committee of the 15 countries-participants of JINR. I was a fifth-year student, and I was glad that the white-haired professors asked me questions. I was fond else more of that I was able to answer those ones. I think that a similar situation must be a guiding star for each student starting the way in science. It is necessary to tend to the high science.

Undoubtedly, I like not all in my activity. There are such things that, I consider, do not correspond to the necessary attitude of the society to the science.

9. What are you not fond of? What should be changed at the University in the first turn?

I do not like those remainders of the socialism, which are present at the universities of Ukraine. I am sure that the University should be organized so, as this is practiced in European countries. To say it simpler, any University must have two power branches. One power branch is "legislative". The second one is "executive". In my opinion, the legislative power branch is the Scientific Council, which should include all Professors and Doctors of science of a University. Just they must make decisions in the mode of electronic communication about the movement of the University as a scientific-educational institution, which chairs should be opened and which ones must be closed, and the financial questions. I do not agree with the inadequate situation where the members of the Scientific Council are students, Candidates of science, and heads of technical departments. Is it the Scientific Council?

The Council of a University should have, surely, the highest prestige and should be interested in all aspects of the life of the University. The Council of the University must be headed by Rector, whose main

mission consists in the creation of internal and external conditions for a rapid development of the University and, not in the last turn, to attain the stable financing of the University. In my opinion, Academician L.V. Gubers'kyi executes the charge of Rector of Taras Shevchenko National University of Kyiv in the best way and has already made many useful things for the harmonic stable development of the University, by remaining a democratic, tolerant, and humanistic person.

As for the Scientific Council of the University and the Scientific Councils of faculties (institutes), they should be headed by elected famous scientists of the University, who will work for one-two years with the following rotation.

The Council of a faculty must be headed by Dean. It should include all heads of chairs, heads of other departments, the trade-union organization, and the organizations of students and veterans of the war. It will solve the living problems with regard for the decisions of the Scientific Council of the University and Scientific Council of the faculty.

Now, the situation is different. Really, there is no separation at Ukraine's Universities into the "legislative" and "executive" power branches. There is the so-called labor collective, which is organized by the trade-union organization. It is a "quasilegislativ" power branch in an Ukrainian university. I call this, in the first turn, a remainder of the socialism in Ukrainian higher schools. Namely the labor collective makes the "legislative" decisions. I think that it is improper, because the decision concerning the strategy of development of a university should be made by professionals. In the first turn, I say about the Professors of universities. The trade-union organization must exist, undoubtedly. Possibly, one trade-union organization of students, and another one of lecturers or scientists. The main task of trade-union organizations is the defense of the interests of the corresponding strata of workers, rather than the creation of the legislative base at the universities. Of course, the trade-union organizations must influence both legislative and executive power branches. I think that it is necessary to carry on the electronic poll among lecturers, employees, and students of the University on various questions of the life at the University. Then each specialist will be able to propose, in the open mode or, sometimes, in the anonymous one, the own versions as for the improvement of various departments

of the University. At this point, we delay essentially from Europe and other countries of the world.

10. You was proposed to become Director of I.M. Frank Laboratory of Neutron Physics (LNP). Please, tell us about this in more details

Indeed, I received several proposals concerning the possible leadership. Of course, the most attractive was the proposal to head the Laboratory of Neutron Physics at the Joint Institute of Nuclear Research. I received this proposal three years ago. I thought about it, but it happened that I found myself in a hospital. For this reason, the election of the Director of LNP was shifted by one year in order that I would participate in it. But I was not able to do it because of the family circumstances. President of the NAS of Ukraine Academician Borys Evgenovych Paton said that this proposal is a great honor for Ukraine. In fact, the history of JINR consisting of six laboratories shows that the non-Russians were Directors only two times. The LNP of JINR was established by Il'ya Mikhailovich Frank, the winner of Nobel's prize, an orphanage ward in past. He was an extremely sensitive and tactful person. I have the very warmful feeling to this laboratory named after Il'ya Mikhailovich Frank. I would be glad to head the LNP, but it is impossible due to the living circumstances.

11. In 1986 poui after the disaster at the Chernobyl NPP, some physicists took active participation in the works related to the localization of its consequences. Is the possibility to attract scientists-physicists for the consulting of military experts and for the collaboration with the scientists in the military fields in connection with the execution of the ATO in Ukraine considered now?

I am sure that the participation of physicists in the ATO must be greater than it is now. I have made some proposals, which would help to the troops in the ATO zone. One of my projects concerns the purification of the surface of tanks before their repair. It is clear that the tanks after the battle should be put again on tracks. My first proposal would facilitate their repair. The second proposal consists in the construction of a high-power flame-thrower. I am sure

that all physicists must make the own contribution to the ATO, like biologists. Country's fate depends on this, and we should not gradually enter the active state, but must do what we can: to transfer the ready technologies, rather than to take money from the state for their development. All this should be made else yesterday. We must think all the time how we can help our boys. By the way, I began to study the medical physics on the basis of the reasoning, which is proposed by me now to physicists for their participation in the ATO. Why? Because I am sure that physicists know and can do many things. All our knowledge should be introduced as soon as possible into medicine. Indeed, the state spent money for us on a kindergarten, then on a school, university, post-graduate course. We should return this debt to the people, who gave their small assets in order that we obtain knowledge.

12. What do you think about the relatively simple, but, in fact, purely formal introduction of the so-called Bologna system?

I think that we did not catch the basic motive of this system. In my opinion, it consists in that each student can feel the own mobility in the circle of universities in Europe. If he/she wants to go to France, Germany, or Spain, it is possible, since all learning plans are unified. This unification is necessary in order that each student can learn one semester from ten ones in some other university. Such approach joins the countries of Europe and favors the process of transfer of knowledge by students from one university to another one. I think that just this is the basic idea in the Bologna system. Of course, it is necessary that the state or EC finances such programs. Without this item, the rest of positions of the Bologna agreement costs a little. We saw some similar thing in the former Soviet Union, when a student from Georgia was able to learn in Ukraine or Uzbekistan, since there existed the typical learning plans. The same must be realized at the present time. But in the scope of Europe, rather than in a single state. I should like to note that, in my opinion, the Bologna system is oriented to the interaction of classical or middle-level universities. It must not concern the universities-leaders of education such as the Harvard and Oxford universities, Ecole Polytechnique in Paris, *etc.* Each such university has the "own

face" well-known in the world. I believe that the Kyiv University would be not in the Bologna system, but in the system of those universities that tend to head the higher education in the own country.

13. What do you think about the reason for the low ratings of Ukrainian universities in the world table of ranks?

Mainly, this happened due to the unsatisfactory exchange by scientists and the insufficient organization of truly International conferences. The organization of the so-called scientific-practical conferences with participation of 3–5 foreign colleagues has already entered the practice. These conferences should not be called international. In the really international conference, about fifty foreign scientists from 20–30 countries of the world take participation.

Such collaboration of scientists from various countries creates the real possibility to write common articles, common books, and common manuals. It is clear that, in this case, the University approaches almost automatically the level of those universities that are well-known in Europe.

14. Please, estimate the so-called humanization of educational programs. Which is your attitude to nonprofile disciplines at the physical faculties of universities such as pedagogics, philosophy, the safety of life activity, *etc.*, which are not purely scientific and arose always students' disgust?

My attitude to the imposition of a number of various courses to post-graduates of the physical, mathematical, and technical faculties is negative. This decelerates the work of the post-graduates. At present, the process of cognition is running by the principle of differentiation. One person cannot learn all integrally for a short period. Undoubtedly, a graduate of the University should be a cultural person and know a lot of things. At the same time, all information in the courses that are imposed to the post-graduates can be easily found in the Internet for half an hour. I am sure that the post-graduates of the University can create the own system of pedagogical and philosophical knowledge on the basis of a specific information and the own life experience.

As for the foreign languages, their teaching at the University gives no possibility, unfortunately, to learn them perfectly. I do not know why. Possibly, this process must start at schools. For example, my relative of 8 years old speaks almost freely in English, though she learns at an ordinary school.

15. How do you estimate the fact that the wages at the Kyiv University exceed almost twice those in many other higher schools with the same level of accreditation?

I think that the payment for work is a way to attract specialists. The high wages is a means to attract more skilled specialists to the Kyiv University, on the one hand. On the other hand, let us compare my native Poltava and Kyiv. If I would rent a flat in Poltava, I would pay for it twice less. It should be taken into account that a part of lecturers at the Kyiv University has no own dwelling. Therefore, a part of the high wages is spent, obviously, on the housing payments.

16. Do you consider that it would be better to restore the simpler understandable name for the Kyiv University such as Kyiv University or Kyiv State University? The best university in the world is known as the Cambridge university, though Isaac Newton, James Maxwell, Paul Dirac, and a lot of other famous scientists learned there

I consider that the name must be Taras Shevchenko Kyiv University. This is all. The word "national" should be omitted. If it is called after the name of Taras Shevchenko, the university is national. Some time ago, the certain universities were distinguished by the word "national", which gave some economic preference to them. At present, almost all universities in Ukraine became national, and this word carries no load and does not characterize the advantages or the working style of many universities.

17. Which is your attitude to the decrease in the hours on physics at secondary schools?

I object strongly against a decrease in the hours on physics at secondary schools even for those pupils who will not go to physics. For the last years, our society turned to the side of humanitarian sciences. But the

free flight of the country can occur only if two wings are present: natural and humanitarian educations.

18. How do you estimate the modern state of the system of independent evaluation of the knowledge of the pupils of secondary schools?

I am sure that, in addition to the so-called independent evaluation, the real conversation of a Professor and an entrant should hold additionally in order that the former will understand whether the latter consciously chose his/her way. Because the learning and the work by a speciality compose a stayer distance, rather than a sprinter one. It is necessary to verify whether the entrant does like profoundly a speciality or this is a passion that will disappear in a half-year. In this year, I had talk with a first-year student possessing good marks who decided: "I will go away." The system of independent evaluation came to us from the USA. But I know that it is already rejected there, because the direct communication is more weighty and more objective. We must trust to Professors. They want to have worthy disciples who will be successful in science and will enhance the prestige of their teachers.

19. The interaction between institutes of the NAS of Ukraine and the universities becomes more stable, which is confirmed by the participation of talented students in studies at the institutions of the NAS of Ukraine. What should be made for the more efficient collaboration of the universities and institutes of the Academy of Sciences?

I think that some nuclei exist already. I mean the common scientific projects. If we know, Vice-President of the NAS of Ukraine Anatolii Glibovych Zagorodny and me are the Co-Heads of the Division of Targeted Training of the NAS of Ukraine. In this year, the authors of five works won a competition. These works were guided by the scientists from both the University and the Academy of Sciences, which jointly financed these projects. I think that such common projects should be realized in the future, because they favor, first, the integration of science and, second, the addressed training of specialists for the Academy of Sciences by our University.

20. How do you evaluate the matriculation onto physical faculties of universities by marks?

I consider that it is not the ideal system. The system must be more pliable with regard for the marks of independent evaluation and the result of the interview at a faculty in order to finally decide who from the entrants is worthy to be a first-year student.

21. The activity of a Minor Academy of Sciences (MAS) is directed to the attraction of talented pupils of Ukraine's schools to the scientific work. Do the students of the University, who participated in the competitions-defenses of their works at the MAS, reveal their best qualities in the learning and in the scientific work?

This idea is good. When I was Dean, I signed the agreement with President of the MAS, according to which 15 pupils from various regions will go into the Faculty of Physics at the expense of the MAS. They carried on the experiments for two weeks. I note that almost all pupils directed from the MAS became the students in the same year. I consider that this is a good possibility for pupils to approach the professional work.

22. How do you evaluate the level of pupils from the Ukrainian Phys.-Math. Lyceum (UPML), which is a structural subdivision of the Kyiv University? What should be changed in its work?

Unfortunately, this level is far from the required one in view of the fact that it is a specialized lyceum. At present, few pupils from UPML enter the physical and mathematical faculties of the Kyiv University. More frequently, they choose the humanitarian fields or something else. As the organization at the Kyiv University, UPML does not fulfil their functions completely, at my glance. Strictly speaking, the situation concerning any lyceum is very delicate and fine. When we take the "skim" from various classes and put it, for example, to the 145-th school, it is necessary to take the psychological items into account. If a pupil was a leader in his/her class and then found him/herself in a class, where all are lead-

ers, there arise the psychological injuries and disorders. Therefore, it is necessary to be careful with a lyceum. I do not sure that each talented child must go to a lyceum. I say so to those parents who asked my advice. I think that only if a pupil has formed already as a personality, he/she can go to a lyceum.

23. The speciality "medical physics" introduced by you at the chair of molecular physics is successfully developed. Are you satisfied by the dynamics of its development? Which demand of the entrants of the faculty for this speciality?

The speciality "medical physics" was, indeed, established for the first time in Ukraine at our Faculty, when I was Dean, almost 25 years ago. This speciality is developed now at two chairs: the chair of molecular physics and the chair of functional materials or, earlier, the chair of radiation physics. I should like to say that the medical physics is referred now to applied sciences, and this narrows somewhat the possibilities and tasks of the medical physics. I think that the medical physics should not be considered as a means of training of experts for the services of medical devices, for example, tomographs. This is not all. Who will create new methods of diagnostics of patients? Who will generate new ideas of the construction of new medical devices? I believe that the medical physics is a part of physics that describes the physical phenomena on various levels of self-organization of a human organism. There are several such levels: molecular, sub-molecular, and cellular ones, the level of organs, the level of a system of organs, and, finally, the level of the whole organism. Each of these levels is characterized by the own physics. We must understand how the information is transferred from one level to another one. Then we will understand how the patient must be cured with regard for all those levels of self-organization. Therefore, the biological physics does not double the medical physics, on the one hand. On the other hand, it is clear that the medical physics must have the fundamental component. In fact, it is necessary to formulate those laws in the medical physics, which act in a person on different levels of his/her organization. The demand for the medical physics is stable. We have a first-year group in-

cluding 20 students, who will be engaged with the medical physics at the Kyiv University on two above-mentioned chairs.

24. Which is your attitude to the possibility of the introduction of such complex specialities as the environmental physics and the statistical analysis of financial processes (with mathematical statistics, financial kinetics, and even with the bookkeeping and the fiscal accounting) at the Faculty of Physics? Who from the teaching staff at the Kyiv University is teaching or can teach these courses?

The analysis of the development of any branch of science indicates that the contact of sciences gives always many new things. Therefore, such contacts lead to new specialities. For example, I agree that the environmental physics is, of course, an important discipline, as well as the statistical analysis of financial processes. I even do not know whether the latter belongs to physics or mathematics. It is obvious that the specialities must be established on the junction of two or three sciences. Are there such experts at the University? I think that such specialists can be found, but I cannot call their names. This is the matter of the Scientific Council of the University. In what is the University famous? It is famous, because it joins many specialists in different directions at the corresponding chairs. Assume that the state needs to develop some trend. Then the Scientific Council of the University says: "We need to establish a new chair or to create a new speciality on the base of these two chairs". This is the task of the Scientific Council of the University. Further, the Council of the University guided by Rector will make the organizational decisions: how to make this and for which funds. Of course, the budget of the University can be approved by both councils jointly or separately. Now, Rector made a lot of useful things for the University. Respecting him, I say, however, that none of the persons can be the expert in all branches of science. Therefore, the scientific community of the University must help to the University to develop in the contemporary trend.

25. Which is your attitude to the idea of the creation of the national register of scientists in the natural sciences and in mathematics? Will the distribution of state's funds in the correspondence with the position of a scientist in such register be efficient?

We observe now a fashion to create various social databases. In my opinion, such information is useful, but, in the first turn, from the viewpoint of statistics. At the same time, I never trusted to the information about a person, until I will communicate with him/her. Therefore, I will not choose an assistant for myself, by using only such database.

26. In the world, the value of h-index equal to 10 is used as the lower bound for the preliminary selection of candidates on the leading positions. Then some other criteria are applied to choose the most suitable person. Which criteria must be used, in your opinion, in the introduction of scientists in the national register?

The Hirsch index turned out vulnerable to the agreements of various groups of scientists to cite one another. It becomes else more vulnerable in the case where the referee of a journal communicates with the possible author and, in a certain manner, advises him to cite the definite works. In this context, the ResearchGate, which shows the demand of the world scientific community for a definite scientific product, is more objective, in my opinion. Why? Because it operates with tens of thousands of "downloaded" copies of a certain article or a book. In this case, the agreements between the groups of scientists have no effect. Undoubtedly, each system of evaluation has some drawbacks, and some clever persons can find, in the course of time, some ways to higher values of an index. Therefore, I do not agree with that the appointment on a specific position should be determined only by the artificially created scientific criteria. But such criteria must be a base for the estimation of the activity of a scientist. In this case, it is necessary also to take his/her human qualities into account.

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