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A D SAKHAROV'S 90TH BIRTHDAY COMMEMORATION

A D Sakharov: personality and fate

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Abstract. A D Sakharov was an amazingly gifted person for whom, with his combined talents as a physicist and inventor, "physical laws and the relation among phenomena were directly visualized and tangible in all their inherent simplicity" (I E Tamm). The author of the key ideas involved in the hydrogen weapons and fusion reactor programs, and well aware of his scientific and public status, Sakharov was, nevertheless, a modest and highly decent man, always trustful of people in discussing their or his problems. Although his greatest satisfaction lay in successfully solving fundamental problems in physics and cosmology, fate and duty made him turn to matters of universal human significance, particularly human rights, to the gruelling struggle to which he devoted many years of his life.

Andrei Dmitrievich said in one of his interviews in 1988: "...my fate proved to be larger than my personality. I only tried to be at the level of own fate" [1].

This statement is equally modest and exact.

1. "We do not choose our fate"

In the fall of 1961, having received a communication about the successful test of the highest-power 50-megaton hydrogen bomb on Novaya Zemlya island, A D Sakharov came to Moscow to see his ill father. Already in Moscow, he learned about the successful test of another bomb, a 'gadget' that he had worked hard on and called the 'initiative gadget'. One of the parameters of this gadget was record breaking.

When visiting his father at a hospital, he did not know then that only five weeks remained for Dmitrii Ivanovich to live. Sakharov remembered this meeting, which was important in his life, and the words that Dmitrii Ivanovich said to him:

"When you were studying at the university, you once said that you could take great enjoyment in discovering the secrets of nature. We do not choose our fate. However, I am sad that your destiny proved to be different. It seems to me that you could be happier."

"I do not remember," Sakharov wrote, "what I replied to him. It seems that I somehow agreed with his thought that we do not choose our fate. What else could I say to him on that November day in 1961?... Turns of my fate, which could be gratifying or terrifying to him, were still ahead. However, I could not tell him about the successful test, and this would not be a reply to his question. Nor could I tell him that I was puzzled with the task of tests. Papa knew about my peaceful thermonuclear studies and he was proud of them. However, this was not enough for him not to feel the psychological discomfort. Perhaps the only thing that I could tell him was that I was going to seriously get into physics and cosmology. But this also seemed very vague to me at that time" [2].

Note the phrase about the psychological discomfort: the father felt it for both of them.

I would like to relate in my report about the turns of fate which played, in my opinion, a considerable role in the life of Andrei Dmitrievich (AD for brevity). In my opinion, there were six or even seven twists. But first we return to 1945, the joyful year the war ended.

In 1945, Sakharov became a postgraduate of Igor Evgen'evich Tamm and defended his thesis for Candidate of Physicomathematical Sciences in 1947. These were the years of the very rapid development of quantum electrodynamics caused by two fundamental experimental discoveries.

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First, Lamb and Retherford (1947) confirmed by radiospectroscopy methods with a high accuracy the splitting of the $n = 2$, $j = 1/2$ energy level of a hydrogen atom into two sublevels, $2S_{1/2}$ and $2P_{1/2}$. This splitting, only barely noticeable by optical methods away back in 1934, contradicted the relativistic Dirac theory for a hydrogen atom, according to which these levels should coincide.

Second, Kusch and Foley (1947–1948) discovered, also by the radiospectroscopy method, the comparatively small addition, on the order of 10^{-3}, to the electron magnetic moment equal to the Bohr magneton, according to the Dirac theory.

AD hit on an idea that the splitting of the degenerate energy level of the hydrogen atom appears due to the interaction of electrons with quantum fluctuations of the electromagnetic field in a vacuum, more exactly due to the difference between this interaction for an electron bound in the atom and a free electron. Although high-frequency fluctuations of the field introduce an infinite contribution to each of these interactions, this contribution is identical for the bound and free electrons and disappears in the calculation of the difference effect determined by fluctuations of the field at subatomic frequencies.

Unfortunately, Igor Evgen'evich did not support Sakharov's idea, referring to Dancoff's work, which proved to be erroneous. At this time, Bethe (1947) reported the nonrelativistic calculation of the difference between levels $2S_{1/2}$ and $2P_{1/2}$. Twenty years later, he was awarded a Nobel Prize in Physics for his work.

"Thus, I missed an opportunity to do the most important work of that time (and the most important, with a huge gap, in my life)", AD writes [2]. We know now that he believed that the best his work was that on the baryon asymmetry of the Universe. It seems that the huge gap he was talking about is the time gap between the latter paper and the work he thought about and dreamed to have done in the past.

The theoretical explanation of the 'anomalous' addition to the magnetic moment of the electron was given by Schwinger in the same year that it was discovered experimentally. It reduced to taking into consideration of the same interaction of the electron with fluctuations of the electromagnetic field in a vacuum. AD was delighted with Schwinger's work and reported it at Tamm's seminar, "feeling like a messenger of the Gods." Seventeen years later, Schwinger was also awarded a Nobel Prize in Physics for this work.

2. Hydrogen bomb development at KB-11

One should not think that the first turn of Sakharov's fate occurred when he, together with Belen'kii, Ginzburg, and Romanov, entered Tamm's group for verifying the calculations of Zel'dovich's group for the development of a hydrogen bomb.

And this turn did not occur even when Andrei Dmitrievich and Vitaly Lazarevich proposed their 'First' and 'Second' ideas which provided the basis for creating our first hydrogen bomb, RDS-6s.

The first turn of his fate took place in early 1949 when B L Vannikov, Chief of the First Main Directorate of USSR Council of Ministers — the powerful organization supervising the Soviet Atomic project — invited I E Tamm and A D Sakharov to his office. He informed them that Sakharov must be transferred to work under Khariton, which was necessary for the successful development of the project.

Igor Evgen'evich began to tell him that Sakharov is a very talented theoretical physicist who can make many significant contributions to the most important fields of modern science. Vannikov listened very attentively, smiling slightly, until a telephone rang. His face became strained.

"Yes, they are here... . Talking, doubting."

A pause.

"Obey, I will pass this them."

He hung up the receiver and said:

"Lavrenty Pavlovich called. He seriously asks you to accept our proposal."

Once outside, Igor Evgen'evich said:

"It seems that the matter has taken a serious turn."

Nobody wanted to plunge completely into the bosom of secret physics.

In March 1950, Sakharov, Romanov, and somewhat later Tamm came to work permanently at KB-11 (Design Bureau No. 11 of the USSR AS Laboratory No. 2). I joined this group in May 1951 after graduating from the Department of Physics at Moscow State University and a sudden 'detachment' from postgraduate studies. This was an abrupt turn of my destiny as well.

The development of the RDS-6s was well on its way. Less than a year into my participation in the work, the time was right to prepare the main mathematical task for detailed calculations of physical processes and the energy release in the *sloika* (named after a Russian layer cake) requiring the numerical solution of a system of equations in partial derivatives.

Andrei Dmitrievich wrote the plan of the task in my work notebook and asked me to check it and add the required details, which I did for a few days. After AD read the task and made some remarks, I rewrote it with my fountain pen with greenish – blue ink on a large sheet of graph paper which was specially given to me [3].

Now it is known from documents that this task was written on 5 April 1952, was titled "Formulation of the problem on the action of the MZ," and was signed by Sakharov and me (MZ is the acronym of a Russian multilayer charge) [4]. It was first sent to Landau's group, for which this task was the first one sent from Tamm's group, and then was forwarded to Tikhonov's group.

After a few days, Tamm received a top-secret note from Landau containing the following:

"Dear Igor Evgen'evich,

The very instructive note you sent, unfortunately, does not contain the values of velocities of particles of all groups. I ask you promptly to send them to us.

Your L Landau 11/IV 52."

This was obviously my fault. The velocities of neutrons of three groups in the task were simply denoted as v_1, v_2, and v_3.

Both groups fulfilled the task by the end of December 1952 and obtained considerable energy releases of 250 and 220 kilotons, respectively.

The energy release of the *sloika* tested on 12 August 1953 proved to be noticeably higher, 400 kilotons, because the actual cross section of the DT reaction was larger than that assumed in calculations and due to the use of tritium not only in the first layer, as in calculations, but also in the second light layer. This was the spectacular success of Tamm's group. IE and AD became Heroes of Socialist Labor and received very large Stalin Prizes, cottages, and cars.

I do not know why it was me whom AD asked to take part in the formulation of this important task. Possibly he wanted

to arouse my interest in a higher level of calculations of the 'gadget' and simultaneously introduce me to the elite of Soviet theoretical physics: Landau, Lifshitz, Khalatnikov, and Meiman, to whom I came in two months to write down the data on the Li^6 burning out.

Later on, E M Lifshitz was a reviewer of my doctoral dissertation, and during the difficult years for AD, when we met at the editorial office of *JETP*, he used to take me away to the garden of the institute and question me in detail about him. G N Flerov also sympathized with AD, but I met him rarely.

Due to my participation, AD was spared the preliminary appraisal of his personality and his offspring, the MZ, by Landau's group. I remember how closely they questioned me about him, trying to assign a 'star number' to him according to Landau's classification. It proved to be that they never saw him and did not read documents written by his hand.

There was another reason to take me on as a co-author, which I understood when visited Tikhonov's group after Landau's group. Sakharov had been in contact with this group already for a few years. And I knew almost all the members of the group. Tikhonov read lectures for our course, Samarskii gave me exams, and Rozhdestvenskii was my classmate. I did not know only V Ya Gol'din, but he met me with such a smile as if we had parted only yesterday, and said: ''Vladimir Ivanovich, you wrote the task so clearly, write it always for us.'' It seems that the tasks written by Sakharov were intended for 'supermen'. I knew that to understand AD was not simple.

3. Main turn of Andrei Sakharov's fate

Rumors about the huge energy release in American thermonuclear tests 'Mike' and 'Bravo' started our scientists thinking about the atomic implosion of the *sloika*. Collective discussions and probably some elements of ideas from the top-secret materials from Fuchs of 1948 [5] led to the 'Third' idea — the implosion of the 'sloika' by radiation from a usual atomic bomb. This idea was realized, together with the two previous ideas, in the RDS-37 hydrogen bomb.

The test of this bomb at the Semipalatinsk proving ground on 22 November 1955 terminated in a banquet where Marshal Nedelin proposed that AD give the first toast. AD said (citation from book [2]):

'''I propose that we drink that our gadgets exploded successfully today over the test site will never be exploded over cities.'

Breathless silence came over the table as if I had said something indecent. All conversations died off. Nedelin sneered, stood up with a glass in his hand, and said:

'Let me tell you a proverb. An old man, in a shirt only, is standing in front of an icon with a lamp and praying: ''Direct and strengthen, direct and strengthen.'' And his old woman is lying by the heater and says from there: ''Pray only for strength; I can direct myself.'' Let us drink to strengthening.

...All men in the room were silent for a few seconds, and then began to talk unnaturally loudly. ... Many years have elapsed, but I am still feeling this crack of the whip.''

Yes, this was a stab at Sakharov's pride and his hidden pacifism. And it initiated a new, maybe the main, turn of his fate. He understood, of course, that the use of the awful weapon would entirely depend on the party and the military administration. ''But it is one thing to understand and quite another to feel it with all of own's being as the reality of life and death.'' The conviction that ''this is good physics'' and that ''this work is necessary'' gradually gave way to the second plan, conceding to the moral, panhuman position of the preservation of peace.

The success of the test in 1955 earned AD a second medal of the Hero of Socialist Labor. At the same time, AD more and more perceived the danger of nuclear tests: while in 1953 the express mass transplantation of the civilian population from the proving ground was required, in 1955 a girl and a soldier perished and many people away from the proving ground were seriously injured. In 1958, AD published two articles about the radiation danger of nuclear tests with a brief conclusion that each megaton detonation leads in the future to ten thousand victims of oncological diseases.

In the same year, Sakharov attempted in vain to achieve a continuation of the moratorium on atomic detonations imposed in the USSR, and persuaded Kurchatov, but the latter failed to persuade Khrushchev.

During the next moratorium, Sakharov probably decided to increase his authority in the eyes of the administration by the development of an unprecedented high-power gadget. As a result, the moratorium was interrupted in 1961 by the test of this superhigh-power 50-megaton hydrogen bomb, which had a political character rather than a military one. AD was awarded the third star of the Hero of Socialist Labor. This contradictory activity on the development of weapons and a weapon test ban, involving sharp conflicts with colleagues and administration, especially in 1962, was a peculiar zigzag in his fate, but it also had a positive result in 1963: the Partial Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space, and Under Water, signed in Moscow.

It seems that zigzags and contradictions are unavoidable and, therefore, they are forgivable for a man understanding his real scientific and technical contribution to the Soviet Atomic project, which was no less than the contributions of other three-star Heroes: Zel'dovich, Kurchatov, Khariton, and Shchelkin. And they are especially forgivable for a man going much farther already along the path of panhuman significance.

4. Beginning of open public activism

In 1964, AD successfully spoke at the Academy of Sciences against the election of biologist N I Nuzhdin to the Academy, considering him and Lysenko responsible for ''the shameful, bad pages in the development of Soviet science.'' In 1966, he signed a letter of 25 famous people against the rehabilitation of Stalin and got acquainted with R Medvedev and his book about Stalin, which noticeably influenced the evolution of his views. In 1967, AD sent a letter to Brezhnev in defense of four dissidents. In response, the administration relieved him of one of his positions at the secret 'object'.

In June 1968, a long article, ''Reflections on progress, peaceful coexistence, and intellectual freedom'' by AD was published in foreign papers. He wrote about the dangers of thermonuclear destruction, ecological self-poisoning, the dehumanization of humankind, the necessity of the convergence of the socialist and capitalist systems, the crimes of Stalin, and the absence of democracy in the USSR. This time, AD was completely dropped from work at the 'object'.

On 26 August 1968, AD met A I Solzhenitsyn. This encounter revealed their different views concerning the necessary public transformations.

5. Wife's death and his return to FIAN

On 8 March 1969, Sakharov's wife died, leaving him in despair and grief, followed by long desolation. This was a cruel blow by destiny for AD, who was, in fact, a big child taken care of all his life by his grandmother, mother, and then Klavdiya Alekseevna. In fact, he had no real friends.

E L Feinberg came to AD's home and proposed on behalf of Tamm and theorists from the Theory Department that he return to FIAN. AD agreed at once and wrote an application to D B Skobel'tsyn, the director of FIAN. Igor Evgen'evich, who was gravely ill, also asked M V Keldysh, the President of the Academy of Sciences, to help. After three months, the approval was received and AD became again a Senior Researcher at FIAN.

Between 1967 and 1980, AD published more than 15 scientific papers: on the baryon asymmetry of the Universe, predicting proton decay (in the opinion of AD, it was his best purely theoretical work; this work influenced the formation of scientific opinion in the following decade), on the cosmological models of the Universe, on the relation between gravity and quantum fluctuations of a vacuum, etc.

During these years, his public activity also increased. In early 1970, together with V Turchin and R Medvedev, he wrote the Memorandum on Democratization and Intellectual Freedom. After a few months, he initiated an appeal to release Grigorenko and Zh Medvedev from the hospitals for mental diseases. The letter in defense of Medvedev was also signed by theorists of the Theory Department — Renata Kallosh, Yury Gol'fand, and me. And we were greatly surprised when Medvedev was released after 19 days. This victory inspired AD.

In October 1970, AD went to Kaluga on the trail of *samizdat* activists Pimenov and Vail', where he got acquainted with a human rights activist, Yelena Bonner. In November, he, along with Chalidze and Tverdokhlebov, founded the Committee on Human Rights.

At this time, AD invited me suddenly to his home. The door to the flat was ajar. Seeing my surprise, he said that he had nothing to hide. He told me about a letter in defense of participants of the 'airplane case'. I did not sign this letter. Feeling very awkward with AD, I gave him then three reasons: one must not endanger the lives of other people for personal aims; the participants and details of this case were unknown to me, and I had no reliable immunity against the administration's repression. It seemed to me that AD himself was not deeply convinced. He probably anticipated the appeal of his new acquaintance, Y G Bonner, who was interested in this case. Somehow or other, a collective letter was not written. AD himself wrote a telegram to Brezhnev and a letter to Podgorny, asking them to lighten the sentences on the participants in the airplane case.

6. Lucy is "my second and better life". The Nobel Peace Prize

A radical turn of Sakharov's fate was his marriage to Yelena Georgievna Bonner, who became his adorable friend and whom he needed so much. AD, like people close to her, called her Lucy. She concentrated Sakharov's activities on the advocacy of individuals' human rights. But it seemed to me that he should have restricted himself to and concentrated on writing a series of articles and talking about global questions affecting humankind and our country, which he did very carefully and with profound thought. His actions in the advocacy of individuals and on some particular questions were sometimes, in my opinion, too vulnerable for orthodox criticism and took from him much time, energy, and nerves. Once, during a reception in I E Tamm's family devoted to his memory, I told Yelena Georgievna about this. She exclaimed: "I always talk to him about this!" However, I felt that it was very important for AD to achieve a victory in any, even a small, human rights case. And he achieved it, but what a price he paid!

Despite his ideological disagreement with Sakharov, during the height of Sakharov's human rights activities and the Soviet media campaign against him, Solzhenitsyn nominated Sakharov for the Nobel Peace Prize in 1973, which AD received two years later. This prize was given through Sakharov's wife, who travelled abroad at this time for medical treatment. It is surprising that Zh Medvedev and Zel'dovich expressed their negative attitude to his receiving this prize, the latter expressing it not only orally but also in written form.

At the same time, the new family and FIAN introduced some order into Sakharov's life. He regularly visited Tuesday and even Friday seminars at the institute and briefly resumed writing reports in his diary [6]. I looked over his notes concerning forty-one seminars and present here only two of them, which contain, along with his summaries, his remarks concerning the reports and a note about the seminar with the report by AD himself.

"7 February 1978, Tue. FIAN — Zakharov's report — a phenomenological theory based on chromodynamics and dispersion relations for describing resonances in the region

$$2m_\pi \ll \sqrt{t} \ll 1.5M_N$$

by using the hypothesis

$$\langle 0|F^a_{ik}F^a_{ik}|0\rangle = \mu_1^4\,,$$

$$\langle 0|\psi^b_\mu \bar{\psi}^b_\mu|0\rangle = \mu_2^3\,.$$

(The finite value of these vacuum expectations, in my opinion, does not follow from chromodynamics invariant with respect to the scale transformation, while the spontaneous break of the scale transformation will give rise to 'scale' goldstones which are not observed in nature.)

25 April 1978, Tue. Volodya Ritus reported at FIAN his work on radiative corrections to the electron Lagrangian function in a strong electromagnetic field (by the proper time method in ε, η variables (the fields in the system where $\mathbf{E} \| \mathbf{H}$) there is the term $\Delta m \sim -|\mathbf{E}|$) ($\sim -|\varepsilon|$). I said that a term of this type opens up the possibility of solving the confinement problem (see my note of 20 April to which I did not refer).

Igor Tyutin also reported on phase transitions in a gauge field, considered in 't Hooft's paper."

In reality, my work (I took it to the *JETP* editorial office in two days) was devoted to the electron mass operator in a strong electromagnetic field, which is closely related to the double-loop Lagrangian function of this field, which I considered in 1975 and 1977.

The idea to which AD wanted to refer was written on 22 April, not on 20 April. Here it is:

"22 April 1978, Sat. ...I have an idea, possibly very stupid, that the formation of a 'string' is related to the interaction of the form $|E_i|\varphi_i^2$,

E_i is the electric-like field SU_3,

φ_i is the Higgs type field, i.e., $\langle\varphi_i\rangle \neq 0$.

In the string, the phase transition occurs to $\langle\varphi_i\rangle = 0$.''

Further events are curious. On the first of May, AD called me and asked me to come promptly to his home in Shchukino to talk about my work. I begged: ''AD, it's May first, I have other plans. Let's postpone it until 3 May.'' I managed to persuade him, but all the same we also discussed the essence of the matter. This is reflected in AD's diary as:

''1 May 1978, Mon. I had a long telephone talk with Volodya Ritus about his and my ideas. Not everything is clear.

2 May 1978, Tue. All day I was busy trying to obtain the term $\varphi\varphi|\varepsilon|$ by the Fock–Schwinger method. Unsuccessful attempts. The next day (3/V) I had a long talk (for 3 hours) with Volodya and established that his effect is $\alpha_x E_x$, which is of little interest for me.''

I do not understand the formula $\alpha_x E_x$. It seems that AD obtained it for his non-Abelian case when I left. My formula for the electron mass shift in the electric field ε was

$$\Delta m = -\frac{1}{2}\,\alpha\beta m\,, \qquad \beta = \frac{\hbar|e\varepsilon|}{m^2c^3} \ll 1\,,$$

α is the fine-structure constant, β is the acceleration in units of $mc^3/\hbar$. It is important here that we are dealing with a uniformly accelerated electric charge — a source of the vector field. For a uniformly accelerated scalar charge (a source of the scalar field), the mass shift is absent, i.e., the shift explicitly depends on the spin of the intrinsic field of the charge.

AD continued to work on his idea, and after a month a new note appears in his diary:

''31 May 1978, Wed. ...The calculation of the $A\varphi^2$ interaction in the limit linear in the field gives zero.''

And here is the note about AD's own report at a Friday seminar:

''13 October 1978, Fri. I gave a talk, ''Baryon asymmetry of the Universe'' at FIAN. Many gusts were present (Zel'dovich, Okun, Komar, and others). Unfortunately, my estimates were not quite right yet. According to Ioshimura, the effect is $\sim q^{-1/2}$. I argued that $q^{+1/2}$, while it should be — independent!!! (I understood this on 21/X!).''

7. Exile to Gorky

Our military invasion of Afghanistan led to the sharpest turn of AD's fate. After his interview for *The New York Times* about the situation in Afghanistan and its remedy, and a TV interview for ABS, AD was detained without trial in Gorky and deprived of all his governmental awards. All of us, including our rulers, should have been grateful to AD for his brave condemnation of this war against the country and its people, who were friendly to us.

Deprived of contacts with foreigners and people needing human rights advocacy, AD could concentrate now on his scientific work. But the question of obtaining permission for Liza Alekseeva and Yelena Georgievna herself to travel abroad arose. AD's decision to obtain this permission by hunger strikes was wrong, in my opinion, and I shared the words of many people close to him that ''Personal happiness cannot be bought by the sufferings of a great man.'' In particular, during my second visit to Gorky, I also asked AD to at least postpone the hunger strike because of rumors in Moscow about the illness of the General Secretary (indeed, Andropov died on this day and Chernenko succeeded him, but the postponed hunger strike solved nothing).

Unfortunately, hunger strikes, forced hospitalizations, and agonizing force-feedings were continued, and, as a result, we had what we had.

Theorists from our Theory Department often visited AD. Unfortunately, these visits were purely informative. Here are AD's notes about two of them that he found the most interesting [7]:

''30 March 1986, Sun. Wrote 10 questions that I want to ask Kallosh and Vasil'ev, but do not know whether I can understand their scholarly answers.

2 April 1986, Wed. Today Kallosh and Vasil'ev were at my place. Renata talked interestingly about a superstring, although I did not understand many things and for this reason to listen to her was very fatiguing.

21 May 1986, Wed. Volodya Fainberg and Arkady Tseitlin came to see me. I had a very interesting talk with Arkady. He rejects the string interpretation in terms of the induced gravitation and uses the interpretation based on the σ model. There is something in this approach: I will think about it. But as a whole, in my opinion, he is wrong. I told them about Weisskopf's opinion. Volodya is also in some doubt.''

And here are sad reflections on a holiday.

8. One day in the life of Andrei Dmitrievich

''4 May 1986, Sun. Easter Sunday. In the morning I celebrated Easter, having cracked another Easter egg and boiled cocoa. It is awfully cold in my home. I am sitting in a red knitted sweater put on over another sweater. Went to buy some bread and vegetables (there are no products in the shops, even beets are absent, the shops being quite empty. I bought a bottle of apple juice).

I went quickly over many articles, selecting those that I need to attempt to understand (some of them I have already tried to understand many times). Unfortunately, I should confess that it is already beyond my powers to master the entire superscience at the required level. I have failed to do it for 5 months, having all the required articles. Of course, I do not have some primary articles, but this is not the basic argument. The major cause is that I have missed many things, beginning from 1948. In addition, having returned to FIAN in 1969, I was not working at physics with the required consistency and was distracted by many things. I attended only Tuesday seminars and did not work in the field of modern physics (gauge fields, quantum field theory as a whole, the new cosmology, especially supersymmetry) and could not do it. In fact, only in Gorky has such an opportunity arisen for me; however, many things still distract me (especially in recent years, but earlier as well), but the main thing was that my strength and the freshness of mind were already insufficient. I should say that in my youth, in the 1940s, field theory was also difficult for me, although it was then only in its infancy. And what tens of sharp minds have done with it in these 40 years! Absolute miracles. I felt it especially strongly in the last few months. Of course, I will survive it as a man with a quite stable mentality, happy in my personal life, self-critical enough, and ready to be content with what has been done. But in some respects this is nevertheless a great intellectual tragedy for me!!! I will attempt, however, to do something on the 'roadside', something in my declining strength. Yes, I need a strong will and bravery. I should look the facts in the face and should work. I

should not spread myself thin and should accomplish my work.

It is +5 °C outside, and +14 °C at home. I am going to make supper (0:20 a.m.).''

9. "You could be happier"

On returning from exile to Moscow and being elected to the Congress of People's Deputies, critical, nervous times came again for AD. It was sad to see his lanky figure on a tribune with lifted hands and clenched fists, as if a weighty cross was seen behind him, as if malicious shouts of 'crucify him' were heard.

After his speech on 2 June about the criminal war in Afghanistan, I called him at his home. The telephone line proved to be unexpectedly free and AD himself picked up the phone. I began at once to calm him, expressing my support. He said that he was calm, felt that he was right, and had already long ago become accustomed to such an attitude toward him. Yelena Georgievna asked him who was calling. We talked for some time and I calmed down myself.

Only after AD's death did I learn something new, unexpected, and even contradictory in this modest and unusual man.

It appears that he was a good connoisseur of Pouchkine, seeing him as a kindred spirit who helped him to perceive himself.

It appears that after Stalin's death, he wrote a letter to his wife (knowing that letters from KB-11 were read): ''I have the impression of the death of a great man, and I am thinking about his humanity.'' However, I remember our sober conversations about possible changes in our country and his words about the governmental machine that is too inertial to change anything.

It appears that he designed a 100-megaton thermonuclear torpedo and substantiated its use in a conversation with Admiral Fomin, who called this idea a 'cannibal' project.

Yelena Georgievna sincerely related many new and candid things about her relationship with AD [6–8]. Her revelations only confirm the correctness of Solzhenitsyn's impressions [2, 8, 9].

The three volumes of AD's diaries [6–8] contain a list of almost 2300 names of people mentioned in there. Most of them needed the help of AD and he, together with Yelena Georgievna, did the best he could to help them. But, unfortunately, a considerable part of these people treated him as consumers, weakening his ideological and moral positions, compared to the hard position of Solzhenitsyn.

Was AD happy? Probably yes. But then return and read again what he writes on 4 May 1986. This is written by a Laureate of the Nobel Peace Prize — the highest prize in the direction where his fate turned him. So, was he happy?

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