

## A glimpse of Andrei Dmitrievich

I FIRST met — or, more precisely, saw — Andrei Dmitrievich in 1951 or 1952. Although I was still a child of 10 or 11, I have never forgotten that meeting.

At the time we were living far from Moscow, in an old Russian town that had been stripped of its name and was impersonally referred to (as it still is) as the 'facility', or the 'mail box'. The town itself wasn't large, and its surrounding fields and forests, rivers and villages were encircled by a ring of several rows of barbed wire and ploughed-up strips of ground. Specially trained, fierce Alsatians roamed between those rows of barbed wire, and watchmen stood guard on towers.

This was the 'zone', yet another name, in this case a local one, by which it was known. People would say, 'beyond the zone', and 'inside the zone'.

But it was not a camp, or even a special research-institute-type prison. Inside that large zone there were numerous small zones where prisoners lived and worked, since everything that was built at this facility was, naturally, built by their hands. But the people who were working on the atomic project were free people — to the extent that people could be free under Stalin — who were merely involved in strictly secret work. Among those who worked on the atomic project under the direction of Khariton and Kurchatov, and under the vigilant supervision of L. P. Beria and the overall guidance of J. V. Stalin, was my father, David Albertovich Frank-Kamenetskii, a physicist.

Our family had come there almost at the very beginning, when the facility had just sprung up, in 1947 or 1948, so at the time of the events I am describing I was already a long-term resident. In

terms of living conditions, we were pretty well off. Our family had been given half of a special, two-storey, comfortable cottage. Although it was a wooden building and not very large, at the time it seemed big to me, as it did, I think, to many others. It was a luxury for those times: five rooms, a large yard and a garden where Papa raised flowers and Mama raised vegetables.

Father liked to have conversations with his fellow workers and colleagues outdoors when the weather permitted. He would lie in the hammock, his visitors would sit nearby, and they would all talk about something or other. Don't get the idea that these were seditious conversations. I think people at the time were afraid of carrying on seditious conversations even with themselves, much less with each other. (But there were exceptions. My father told me that when the 'doctor's affair' got started in 1953 he was on a business trip somewhere having something to do with the atomic project. He was lying in his hotel bed at night, and a full-length portrait of Stalin in his Generalissimo's uniform was hanging before his eyes on the wall at his feet. Father couldn't get to sleep the whole night and, gazing with hatred at the portrait, kept repeating to himself: "You ought to drop dead!". He would smile when he told about this later: "And he listened to me!".)

So, he would talk out in the yard, as I understand it, because the idiotic system of secrecy did not allow people to discuss their work anywhere away from their immediate work place. But scientists cannot help talking about their work, discussing it, thinking about it. They would call 'uranium' 'selenium' and use various other conspiratorial



tricks in order not to attract the attention of the state security officers, who were ever vigilant and ready to initiate a 'case' at any moment. In that way they would deceive them and do their work — even better if they did it in spite of Beria and his hangmen. They were convinced that they were engaged in a very important undertaking; besides, these were people who simply did not know how to work poorly.

And so once a visitor came to see my father. He was tall, very thin and ungainly, dark-haired and much younger than my father. They talked for a long time; meanwhile I was hanging around in the yard. When he left, my father, who had grown intensely pensive, called me over and said: "Remember that man. He's a genius". "Who is it?" I asked. "That's Andrei Dmitrievich Sakharov".

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Sakharov still dominates consciousness of particle physicists.

The scale of Sakharov's thinking on cosmology can be illustrated by his idea of the 'reversal of time's arrow' and of the 'multisheet Universe'. Sakharov accepted the point of view according to which expansion of the Universe is only a stage in an infinite pulsation, with many turning points (on the time axis) of maximal density of matter. For one such point he assumed that time starts to increase not only in the adjoining stage of expansion but also in the adjoining stage of 'contraction' (and therefore this is actually not a contraction but also an expansion). Here, therefore, the arrow of time is reversed. Interchanging stages of contraction and expansion are connected with each other, thus forming a 'multisheet Universe'. This hypothesis, of course, makes one giddy.

Also, there is the important work of

1967 (further developed in 1975) in which gravitation is explained as a result of quantum fluctuations of the vacuum ('induced gravity' as it is called by many authors of subsequent papers). So altogether we have three cosmological papers, based on extremely bold hypotheses, which Sakharov himself included (in 1980) in the list of his six works which he considered most important.

Still another striking hypothesis, put forward in 1984 when he was in exile, assumes that the so-called signature of metric may arbitrarily differ from the one known to us (one dimensional time plus three dimensional space); that is, signatures may differ in different parts of the Universe because of 'phase transitions of metric'. This idea has elements in common with those to be found in papers by A. Vilenkin, and by J. Hartley and S. Hawking.

Sakharov did not include in his list his 1965 paper in which formation of inhomogeneities (stars, galaxies) is explained by quantum fluctuations of metric. The idea was not upheld at that time but a decade later it found supporters. But he did include in it a series of four papers on semi-empirical formulae for baryon and meson masses based on analysis of their quark structure. This is quite a different sphere — elementary particle physics.

### Political evolution

Although Sakharov was never a member either of the communist youth organization or of the party, his political views were in accordance with official ideology almost until 1956, the year Khrushchev revealed Stalin's ferocious crimes. This may seem inconceivable to those in the West but such was the case. One should take into account, first, that the 'scientific'