

YANG GAMOV AND HIS KHARKIV FRIENDS AND COLLEGES

Yu. Ranyuk¹, P. Josephson²

¹*National Scientific Center “Kharkiv Institute of Physics and Technology”, Kharkiv, Ukraine*

²*Technology and Society Colby College Waterville, ME 04901 USA*

The article is devoted to 100-years anniversary of prominent scientist of the 20th century George Gamov. On level with the well-known milestones of Gamov’s input to the nuclear physics here are presented fragments from memory books, letters of Sinelnikov’s wife Edna to her sister and old photos concerning young Gamov and his Kharkiv friends Peter Kapitza, Ivan Obreimov, Cyril Sinelnikov.

PACS: 01.65.

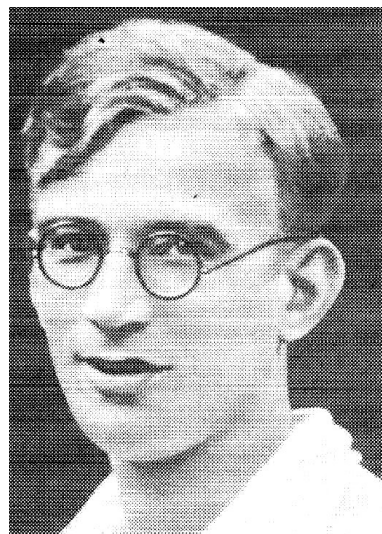
The year 2002 marked 70 years since the spring and autumn of 1932 when a nuclear disintegration experiment was performed applying man made accelerating of protons in Cambridge and Kharkiv respectively.

In 1911 Ernest Rutherford discovered the atomic nuclei and in 1919 firstly disintegrated it with the aid of natural Radium alpha-particles. Research of atomic nuclei with the aid of natural alpha particles had significant drawbacks - low radiation intensity, lack of a possibility to regulate particles energy and others. Niels Bohr wrote: “although the research produced much important data, it became much more readily apparent that insufficient natural alpha particles existed for substantive nuclear research and man made accelerated ions was desirable.” This was all the more reason for an alternative new methodology as the experimentalist presently now better understood. An insurmountable obstacle surfaced with this approach – the imperative necessity of the availability of a source of high electrical tension of several million volts, inasmuch in that time particle acceleration was only achieved with the aid of an electrical field.

This is how it was to that time, until Odessite George Gamov, who as a 24 year old aspirant of Leningrad University did apply the principles of the new wave mechanics to alpha decay phenomena and to calculation of the probable of nuclei penetration by charged particles. According to his calculations the necessary energy levels already revealed themselves as not so large and therefore completely accessible for the experiment. This occurred during 1928 in Gettingen, Germany. The young scientist rapidly informed N. Bohr with his sensational result. Bohr immediately referred him to Rutherford with the aim of present to him results.

Here is how T. Allibone one of Rutherford’s pupils describes the events of that time [1]: “Right at the time in the winter of 1928-29, Russian scientist Gamov arrived in Cambridge, and lectured on a new concept in quantum mechanics-the existence of an energy barrier around the nuclei. I remember when after the lecture we together with Ernest Thomas Sinton Walton descended

down the stairs of the laboratory and approached Sir John Douglas Cockcroft, who was working in the room. Cockcroft was just setting forth into formulae Gamow’s calculations that were able to be obtained at that time for ionic currents-that is 1 mA protons, accelerated with energy of 0.5 MeV so as to explain the probable penetration of protons through energy barriers of boron nuclei.



George Gamow. 1932

Even after factoring in possible losses these calculations stood out as completely acceptable, and within some time he provided Rutherford with an explanatory notation with the proposal of reaching an energy current of 0.5 MeV for proton acceleration, similar to mine, but that existed in a constant current (I worked with the variable current). Walton ceased his attempts at electron acceleration and joined Cockcroft’s approach. As is known, in three years they attained success”.

Here is how Gamow himself remembers [2]:

“Just plainly-Rutherford stated with amazement I had guessed it will lead you to fill up reams of paper with damned formulas”.

“In no case” I replied.

Rutherford invited John D. Cockcroft and Ernest T.S. Walton, with whom he previously discussed the experiment’s possibilities.

“Build me an accelerator of one million electron volts; then without any problems we will smash the lithium atom”,-Rutherford stated. And they built the accelerator. Later, when I was staying in Leningrad and was notified of their success, I sent Cockcroft the following telegram: “Good impact, Johnny; nice protons for golf”.

Now we switch to Kharkiv.

On 16 May 1928 the Government of Ukraine accepted a decision concerning the organizing of the Ukrainian Physics-Technological Institute (UPTI) and already in May of 1929 the new institute resonantly announced throughout the entire world by the conducting of the first all union conference on theoretical physics in Kharkiv [3]. Gamow’s presentation at the conference was the only one that touched of nuclear physics. He presented his already famous work about alpha decay, owing to which he received worldwide recognition.

During the moment of the formation of the UPTI in the Soviet Union, there was no institute, and not even a laboratory, that was entirely dedicated to nuclear physics research. This research was not planned for the UPTI, which was formed as a purely cryogenic laboratory. And by the end of the summer of 1931 here at the institute preparations began for the atomic nuclei disintegration experiment applying artificially accelerated protons. The point here is that similar preparations were already underway in Cambridge.



Soviet arrival in Cambridge (1929). From left: George Gamov, Peter Kapitza, Ivan Obreimov, Cyril Sinelnikov

One of the participant’s in the future experiments, Cirill Sinelnikov who arrived in Kharkiv on 2 June 1930, previously spent two years at the Cavendish Laboratory.

There is no doubt, that he carefully followed the preparatory research steps of Cockcroft and Walton,

initiated by his friend Gamov, who within a year also relocated to Cambridge. Together they traveled by motorcycle all over England.



Ciril Sinelnikov and George Gamov 1929

Why was this particular direction of research at the UPTI begun exactly in August 1931? Unfortunately the institute’s pre-war archives were destroyed by fire during the World war. That is why the only possibility to learn about events of that time-is through taking advantage of the correspondence letters that Sinelnikov’s wife Edna Cooper wrote to her sister in England in August 1931.

2nd August 1931

Darlingest,

We are having Dr. Allibone, from Cambridge, for two days on the sixth. And Gamov wired to say he is coming next week from Leningrad. No body knows why. Then Cocroft and Webster come from Cambridge later, so we shall be very gay until September.

11 August 1931

Darlingest,

Johnny Gamov has returned to Russia and Kharkov, and, being almost a resident in our flat, he’s presented me with this piece of handmade paper, which I immediately educate, to you. He’s just the same, so bored if we don’t do things. The first days were rather jolly and we rushed about to kenos and theatres and for ices, but our pockets don’t run to it for ever, and now I don’t want to spend any more until Cockcroft comes, fortunately Johnny is already bored with Kharkov, and is telegraphing wild messages to Dimus in Leningrad to buy him tickets for a trip down the Volga. As he hopes to go abroad again almost immediately, I don’t see how he can afford it, but that’s his affair. He came home simply desperately in love and planning a home for his future bride, who has almost been persuaded come to Russia, but he’s been here four or five days and is already definitely cooling off. It’s a great pity, because she looks charming, a Swedish dancer, did I tell you all this before, and Johnny might become a more responsible person if married. As far as I can see he’s

come to Kharkov hoping to get all the advantages of the Institute without working for him.

I've just been correcting the thesis he intends to deliver in English at the Conference in Rome, 'orribly learned, didn't understand a word, but if this doesn't sound like Marie Stopes I am a Dutchman "... As the fundamental proton level in radioactive nuclei is very deep, a proton would have to be very highly excited before it could be ejected..."



Left to right: Cirill Sinelnikov, his Bride Edna Cooper, George Gamov 1929-1930

12 August 1931

Darigest,

Our scientific friend, who must be nameless, has just gone off to Leningrad to meet Dimus before going for a trip on the Volga, but incidentally he has decided Kharkov is too dull a place to live in, and in spite of being given a flat, that was prepared for someone else, and being considerably helped with his new foreign passport, by our Institute, he just says he can't stand it and that he's going to Leningrad. I do not know how Kira and Ivan Vasilitch feel about it, but it seems to me a pretty dirty trick, to come and get money and all he can for nothing, and then show his hells.

20 August 1931

Dearest Old Thing,

I'm busy because Cockroft and Webster are dining here to-morrow. Kira is happy they are here. Though neither of us ever want to live in England, we did enjoy Cambridge days and it is great to renew our Cambridge friendships like this.

26 August 1931

Darling,

Our English visitors have been and are going away to-day, Cockroft and Webster and two other physicist and seven or eight other scientific people with two wives, not two each! My room could hardly hold them all. But after the first "Reception" they didn't all come at once, only three or four at a time. They have been very kind. They took us to dinner at their hotel, and to Dinamo for ices, in between rushing round "doing" Kharkov. ... I may say everybody is very impressed

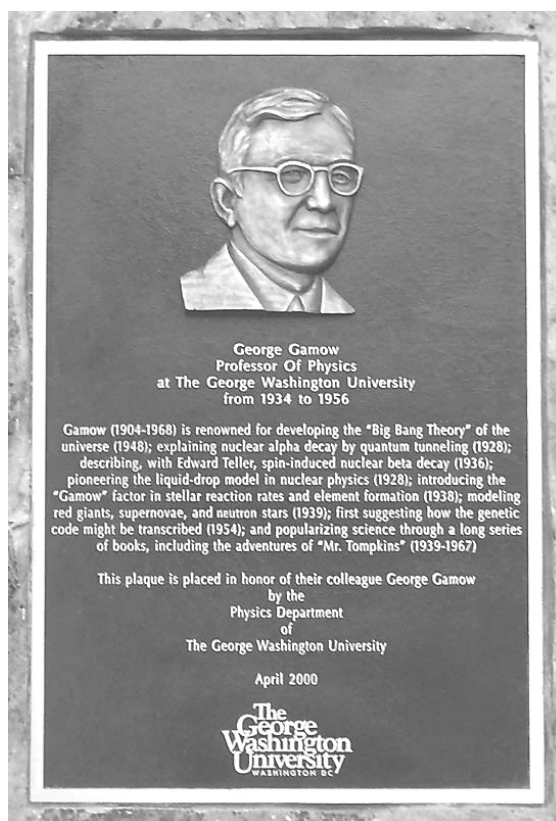
with our Institute and says it's wonderfully clean and well organized, better then Cavendish. So you see it can't be so bad.

Your Bunny

Edna's letters that relate to Gamov cannot be accepted as purely false. Not because it was her fabrication, but because, George was a big comedian, practical joker, and skillful at playful shenanigans. Edna Alfredivna's letters may leave an impression that Gamov came to Kharkiv only to cheer up the scholarly "UPTI-nski" ladies that for him was indisputably luckily successful. One speculates whether he really only came there for the sake of this.



Geo Gamow with a model of DNA in Berkeley, spring, 1954



Plaque erected in honor of Gamow at George Washington University

Maybe we should not doubt that he met and spoke with physicists, whom he knew well after Leningrad and Synelnykov after Cambridge, and the topic of discussion was concerning research relating to atomic nuclei fission. Truthfully a question arises as to the activities of the “Cambridgites who landed” en masse at the institute in August 1931? And why would Gamow presuppose his visit, so that from one side, to be physically present in Kharkiv, and from the other, not meet with anyone of them. We surmise that these very visits by Gamow to Kharkiv were in the capacity of a consultant to UPTI, in so far as Edna Alfredivna in her letter for some reason writes frequently about money. And there should be no doubt that owing to Gamow’s initiative and assertiveness is what led to the beginning of atomic nuclei fission research both in Cambridge and in Kharkiv. Joffe stated this just in time [5]: “Gamow’s theories opened the path to the penetration of the nucleus”.

Truthfully, at the institute no one mentioned this. There is nothing strange about this, as Gamow was “not returning”. To recall and mention any contacts with him-look!-even mentioning his name was dangerous. And when the time finally came there was no one left to mention him. Strangely there was not even a mention of his role in any newspaper publication on the occasion of the atomic nuclei fission in 1932, a year which was very richly successful.

Jill the daughter of Synelnykov tells how her mother always mentioned Gamow with great warmth. She talked about Gamow’s and Synelnykov’s close friendship and how they both traveled by motorcycle across almost the entire English countryside. George

very much facilitated that Edna’s and Kira’s musical evenings in Cambridge-that she played the violin, and he accompanied her-in the end culminated in matrimony.

In 1951 Cockcroft and Walton received the Nobel Prize “for the transmutation of elements through man made particle acceleration”. Our great compatriot received no recognition in this award, although he, such as no one else, genuinely earned the award.

In 2000 a monument was erected in honor of Gamow on the grounds of George Washington University in Washington, DC. Inscribed are his fundamental scientific achievements.

We also hopefully expect a similar monument will be erected in Kharkiv in 2004 on the occasion of the 100th anniversary of the birth of our distinguished compatriot.

REFERENCES

1. T. Allibone. *Rutherford, Royal Society Club and Royal Institute*. From the book Rutherford – scholar and professor. From the publication of academician Peter L. Kapitza. Science. Moscow. 1973.
2. George Gamow. *My world line. An informal autobiography*. The Viking Press, New York 1970.
3. Theoretical physics conference Kharkiv in 1929 // *Ukrainian physics papers*. 1930, № 2, p. 116.
4. *I married a Russian*. Letters from Kharkiv edited by Lucie Street. London, George Allen & Unwin Ltd., 1946.
5. Joffe A.F. *Atomic nuclei today*. Lessons, lecture presented 19 February 1934 in the 1 MGU club.-M.; L., 1934, p. 31.

МОЛОДОЙ ГАМОВ И ЕГО ХАРЬКОВСКИЕ ДРУЗЬЯ И КОЛЛЕГИ

Ю. Ранюк, П. Джозефсон

Статья посвящена 100-летию юбилею блестящего ученого 20-го столетия Георгия Гамова. Наряду с известными вехами гамовского вклада в ядерную физику представлены фрагменты из книг воспоминаний, письма жены Синельникова Эдны к сестре и старые фотографии, касающиеся молодого Георгия Гамова и его харьковских друзей Петра Капицы, Ивана Обреимова, Кирилла Синельникова.

МОЛОДИЙ ГАМОВ ТА ЙОГО ХАРКІВСЬКІ ДРУЗІ І КОЛЕГИ

Ю. Ранюк, П. Джозефсон

Статтю присвячено 100-річному ювілею блискучого вченого 20-го століття Георгія Гамова. Поряд з відомими віхами гамівського вклада в ядерну фізику представлено фрагменти з книг спогадів, листи дружини Синельникова Едні до сестри та старі фотографії, що торкаються молодого Гамова та його харківських друзів Петра Капиці, Івана Обреїмова, Кирила Синельникова.