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Alexander Nikolaevich Deutsch on the occasion of his 120th anniversary

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The year 2019 is the year of the 120th anniversary of Alexander Nikolaevich Deutsch (1899–1986), the Pulkovo astronomer, doctor of physical and mathematical Sciences, Professor, who for many years was the head of the Department of photographic astrometry and stellar astronomy of the Main Astronomical Observatory, Russian Academy of Sciences (GAO RAS), the supervisor and teacher of several generations of Pulkovo astronomers and employees of other observatories.

This article presents the scientific and social activities of A.N. Deutsch. Archived data is provided that evidence his participation, along with other Pulkovo employees, in the salvation of the property and scientific Fund of the Pulkovo Observatory during the great Patriotic war, as well as in the work to restore the Observatory.

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Keywords: Pulkovo Observatory, photographic astrometry, library star catalogues, minor planets

1 Brief biography of A.N. Deutsch. Early years

Alexander Nikolaevich Deutsch was born on December 31, 1899 in a military family in Reni (now in the Odessa region of Ukraine). In that same city, which in our time, thanks to Alexander Nikolaevich, gained cosmic status, he spent the early years of his childhood.

The father of the future astronomer, Nikolai Osipovich Deutsch, who came from a family of Volga Germans, served in the 30th infantry regiment of Poltava. He was a career military officer, graduated from the Ryazan infantry school, then, Quartermaster courses, participated in the First World War, then voluntarily joined the Red

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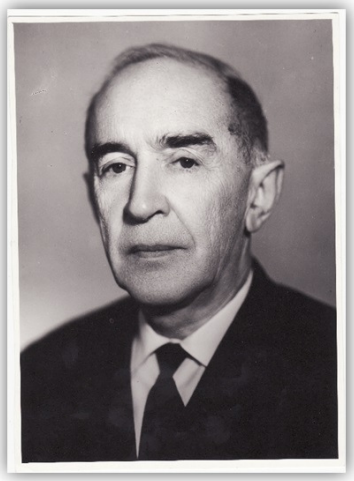


Figure 1 A.N. Deutsch (1899–1986).

army. From 1922 to 1925, he was the head of the Military economic Academy of the Red army and Navy and later engaged in teaching.

Alexander Nikolaevich's mother – Lucretia Anastasovna Dimitriadi, who had Greek and Romanian roots in her family, was the daughter of the Mayor of Reni – Anastas Ivanovich Dimitriadi. She received a good education having studies at, and graduated from, a gymnasium in Galac (Romania).

In connection with the military duty of Nikolai Osipovich, his whole family moved to Saratov in the early 1900s. In Saratov, Alexander Nikolaevich Deutsch graduated from gymnasium and entered the faculty of physics and mathematics of Saratov University. In May 1919, Alexander Nikolaevich was mobilized to the Red army, where he served as a clerk in the Supply Department of the 4th army of the Uralfront, and then as a clerk in the Saratov provincial military Commissariat. In October 1920, Alexander Nikolaevich came to Petrograd and entered the Workers' and Peasants' Red Army Military economic Academy as a laboratory assistant. At the same time, he taught elementary mathematics in the preparatory Department of this Academy. He was finally demobilized in January 1923. In 1924, Alexander Nikolaevich graduated from Petrograd University, and his further activities for many years were closely associated with Pulkovo Observatory.

2 Work in Pulkovo. Pre-war period (1923–1941)

In 1923, Alexander Nikolaevich Deutsch began to work at the Petrograd (then Leningrad) branch of Pulkovo computing Department (Bureau). There, under the guidance of Professor Naum Ilyich Idelson, Deutsch worked until 1925. In particular, he took part in a large work to calculate the positions of the satellites of Saturn. Then he moved to the Pulkovo Observatory as a computer scientist.



Figure 2 A.N. Deutsch and S.K. Kostinsky, 1930.

At Pulkovo Observatory, Deutsch was supervised by Sergey Kostinsky, one of the founders of the Russian astrophotography, Professor and later a corresponding member of the USSR Academy of Sciences. Alexander Nikolaevich often remembered his teachers with gratitude, especially singling out N.I. Idelson and S.K. Kostinsky.

Sergey Konstantinovich passed on to A.N. Deutsch the best traditions of the national astrophotographic school. There is a tape recording of A.N. Deutsch's speech at a GAO seminar with recollections of the beginning of his scientific activity at Pulkovo in the 1920s and his scientific surroundings (see [1]). A.N. Deutsch also still had time to meet A.A. Belopolsky, G.A. Tikhov, and the Director of the Observatory A.A. Ivanov. In the speech he also talked about the work at Pulkovo of young talented scientists – N.A. Kozyrev and V.A. Ambartsumyan.

From the very beginning of his work at the Observatory, A.N. Deutsch took part in observations with a normal astrograph, and also he performed measurements on the Repsold device and the blink comparator, and further processing of the obtained photographic material. He took a creative approach to his work, making suggestions with reference to the observation process and processing methodology. He was the first in Pulkovo to suggest the use of the "Cartes du Ciel" and Schlesinger method for data processing. A.N. Deutsch's works dealt with determination of the exact positions of minor planets and their photometric characteristics.

One of the first A.N. Deutsch's papers (published in 1926) dealt with the results of observations of the minor planet Ceres, see [2].

Alexander Nikolaevich was an active observer not only with the Pulkovo normal astrograph, but also with other instruments. In 1929, while at the Simeiz Department of the Pulkovo Observatory, he discovered a small planet – asteroid No. 1148 Rarahu on the base of the images taken with the Crimean double astrograph [3]. At the same time, while observing at Crimea, he discovered several new variable stars.

A.N. Deutsch participated in a number of expeditions for observations of total solar eclipses: in 1927 (Sweden), 1936 (Omsk), 1945 (Sortavala). He also took part in

the work to determine geographical coordinates and in early 1930s obtained the exact longitude of several points on the territory of the USSR, including the longitude of Tbilisi and Sverdlovsk, which he determined while participating in an expedition led by the Pulkovo astronomer M.M. Musselius, see [4].

In 1931–1932, A.N. Deutsch, in collaboration with E.G. Perepelkin, obtained proper motions of 3184 stars in Kapteyn selected areas, from +75° to +60° declination, see [5].

In 1935, for the set of works, Alexander Nikolaevich Deutsch was awarded the degree of PhD in physics and mathematics.

In 1936, after the death of S.K. Kostinsky, A.N. Deutsch took the leadership of the group of photographic astrometry at Pulkovo astrophysics department.

Hereinafter, Alexander Nikolaevich continued to work on the determination of proper motion of stars at Kapteyn selected areas. The bulk of the work was completed in 1940 resulting in the production of a catalog of proper motions of 18 thousand stars (see [6]).

The first epochs of the catalog were still obtained by S.K. Kostinsky, the second epochs were recorded by A.N. Deutsch. In the process of working with catalog data, he was able to show that the apex of the weak stars differs significantly from the standard one. On that basis, A.N. Deutsch arrived at a number of conclusions about the spatial distribution of stars in the Galaxy, confirming, in particular, the hypothesis of the existence of a Local system of stars.

He discovered a white dwarf, as well as a new branch of faint dwarfs, two magnitudes below the main sequence on the Hertzsprung–Russell diagram. In addition, he obtained the dynamical parallaxes of faint stars, which were of great importance for the determination of the distance of these objects. This work was successfully defended by him as doctoral thesis at a meeting of the Academic Council at Leningrad University on June 24, 1941, on the third day of the Great Patriotic War.

3 The war and destruction of the observatory

In the summer of 1941, A.N. Deutsch, along with other Pulkovo people, organized the dismantling and evacuation to Leningrad of some astronomical instruments and the extensive archive of photographic plates. In October, he participated in the evacuation of the books that survived in the destroyed Observatory library. In July, astronomers had to stop observing and prepare for evacuation. In August, the staff left the Observatory and moved to Leningrad.

From the very first days of the war, A.N. Deutsch joined an initiative group of 15 people who, under the leadership of Pyotr Pavlovich Dobronravin, assisted our aviation by calculating the time of the Sun and Moon rising and setting and twilight beginning and end. In his article “Pulkovo Observatory for the front in the first days of the war” [7], P.P. Dobronravin mentions that in connection with his trip to the solar Eclipse in Central Asia, he had to hand over his brigade leadership to A.N. Deutsch.

Pyotr Pavlovich also writes that the work continued in the blockaded Leningrad for several more months and “was stopped somewhere in the winter, when starving, frozen people just could no longer work properly.” This document shows that people

worked, up to literally the last hour. We also know now that, unfortunately, just at the beginning of the winter of 1941–1942, some of the Observatory's employees had already perished of starvation and hardships caused by the blockade.

On September 12, Pulkovo was bombarded and attacked by the enemy for the first time. On September 18, 1941, Nazi tanks and motorized infantry were stopped one and a half kilometers south of the Pulkovo Observatory.

From the recollections of Tatyana Vasilyevna Krat [8]: *"Astrometrists found themselves in the blockaded Leningrad, while the astrophysicists left for Tashkent and Alma-Ata to observe the solar Eclipse on September 21, 1941."* And, further, she writes that due to the absence of the Director *" his functions were performed by a senior researcher, Alexander Nikolaevich Deutsch. Many residents of Pulkovo moved to an academic hostel at the Petrograd Side. The blockade has begun."*

A.N. Deutsch performed the duties of the Pulkovo Observatory Director from September 19, 1941 to April 1, 1942, as stated in the corresponding orders of the Director of the Observatory, S.I. Belyavsky: No. 155 for 1941, "On the appointment of A.N. Deutsch as acting Director" and No. 20 for 1942, "On the transfer of A.N. Deutsch to the former position of senior researcher" (see the archive of the GAO [9, 10]).

Thanks to the efforts of the Observatory staff and library employees (V.R. Berg, A.N. Deutsch, N.N. Pavlov, E.I. Winterhalter and their voluntary assistants), the glass and scientific libraries, as well as a number of measuring devices, were saved. About the selfless work of the Pulkovo library head E.I. Winterhalter, see the article by V.E. Bubnevich [11].

From the recollections of A.N. Deutsch [12]: *"October 1941. The military command notified the Academy of Sciences in Leningrad of the destruction of the Observatory and asked them to take measures to save the books of the world's richest astronomical library that had survived in the basements of the main building."* Then he writes about the tragic state of the Observatory and the measures taken to save the library: *"We went down to the clock basement, where the books of the Pulkovo library were placed at a depth of 5 meters under the ground... With difficulty we found a box of rare books and incunabula. The soldiers carried it to a truck at the foot of the mountain."*

It is known that in the following days, by order of the head of the Political Department and the Presidium of the Academy of Sciences authorized person, academician Leon Abgarovich Orbeli, means were provided for the transportation of valuable equipment, incunabula and other library books.

Brief diary entries of Viktor Rudolfovich Berg, entitled "the Last Days of Pulkovo" [13], have been preserved. There is the following entry about one of the nights spent on the territory of the already destroyed Observatory: *"Myself, Deutsch, Kurilev went to Pulkovo, brought a box of incunabula, took measures to protect what remained of the library..."* (night from 13/X to 14/X) [13].

During the blockade the following staff members died: N.V. Zimmerman, F.F. Renz, V.R. Berg, V.A. Elistratov, graduate student A.A. Ilinich, mechanic V.A. Messer, optician N.G. Ponomarev.

A.N. Deutsch and his family stayed in the besieged city until February 20, 1942. At the end of January 1942, A.N. Deutsch, who was in a serious state of health, was taken to a hospital located in the Astoria hotel. Subsequently, the evacuation of the

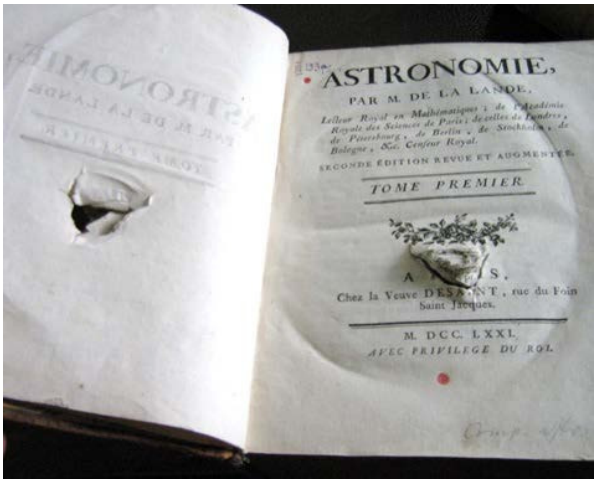


Figure 3 "Astronomy" by Laland – a book from the Pulkovo library, punctured by a shell fragment.

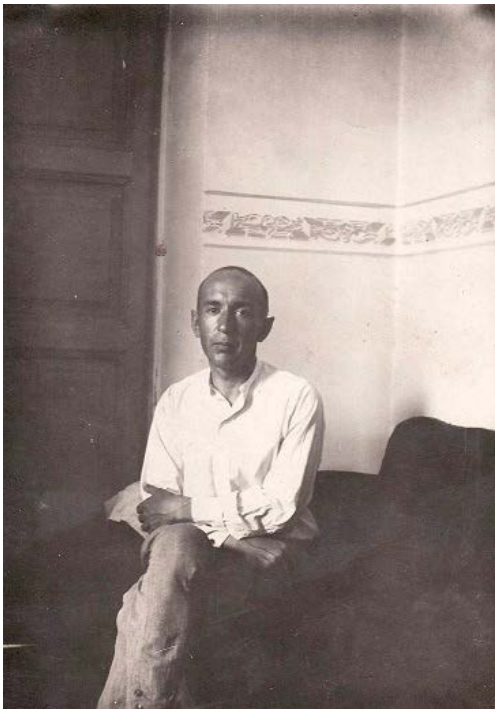


Figure 4 A.N. Deutsch in Tashkent, 1942.

staff members and their respective families was organized. In the night from 19 to 20.02.1942, at the head of a group of 16 staff members of GAO, A.N. Deutsch and his family were evacuated from Leningrad to Tashkent.

Alexander Nikolaevich and other Pulkovo people have always retained a sense of gratitude to the staff of the Tashkent Observatory, who helped them and their families to bear the hardships of military life. In Tashkent, A.N. Deutsch began to observe with a normal astrograph and to give lectures on mathematics and astronomy at the Tashkent University and the Pedagogical Institute. In 1942, A.N. Deutsch completed and, in 1947, published the material of the catalog of proper motions of 18 thousand stars and the annual parallaxes of weak stars obtained from the motions [14].

We should also mention the work of A.N. Deutsch, dedicated to the determination of a ship location from observations of the Sun, separated by a short period of time, the theoretical part of which he began to prepare in Tashkent in 1942.

Even before the war, starting from 1932, Pulkovo astronomers V.R. Berg, A.N. Deutsch and M.M. Musselius taught the basics of nautical astronomy to cadets of the Naval school named after Frunze. A.N. Deutsch, in addition to giving lectures, conducted practical classes, participating, during his vacation, in school sailing over the Baltic Sea. It is known that at various times, besides A.N. Deutsch, V.R. Berg, V.V. Kavraisky, B.P. Khlyustin, and B.A. Orlov were also engaged in the development of observations of this kind. The difficulty was that observations of the sun separated by a short period of time, led to two Somner lines intersecting at an acute angle, consequently reducing the accuracy of the determination of the ship position.

However, in war time, when it was not always possible to keep long intervals between observations, one of these methods might be the only one possible, and it was important to examine it from different points of view. The method of A.N. Deutsch at the recommendation of V.V. Kavraisky was tested on the Caspian Sea. The ship's position error did not exceed ±3 miles, which at that time provided a satisfactory accuracy. The corresponding article was published by A.N. Deutsch in 1945 in the journal "Notes on Hydrography" [15].

4 Restoration of the Observatory and resumption of work

Plans for the restoration of the Observatory were discussed even during the war. The Academy of Sciences engaged the Observatory staff members in this process. At the order of the head of "Akademproekt" academician A.V. Shchusev of 30.08.1944, A.N. Deutsch was invited to take part in designing GAO restoration [16].

Works on the restoration of the Observatory started in 1947. They were headed by the Leningrad Department of project management of the Academy of Sciences under the leadership of corresponding member of the Academy of architecture of the USSR, Professor V.L. Hoffman. In 1949, the master plan was worked out in detail and specified by the architect-artist V.I. Yakovlev. During all of these years, A.N. Deutsch participated in this work as a scientific consultant.

Under the supervision of A.N. Deutsch the normal astrograph was reconstituted with the old lens of the Henri brothers in 1948 and regular observations were resumed. An astronomical double camera (AKD) was also installed in Pulkovo and, in Nikolaev, a zone astrograph. In the 1950s A.N. Deutsch, together with his Pulkovo colleagues made an effort to install a 26-inch refractor which remained in use for almost 60 years in Pulkovo for observations of double stars, large planets and their satellites and other objects. Homogeneous and high precision series were accumulated and more

than 20,000 astronomical photographic plates were received. With the help of the observations on this instrument, the exact positions of about 400 binary stars were obtained and for 60 of them orbits were calculated.

Alexander Nikolaevich always kept acquainted with the latest scientific achievements. In the late 1950s, after the launch of the First Artificial Earth Satellite, he developed a method for the determination of the Earth satellite vehicle (ESV) coordinates [17] and attended the courses for ESV observers organized in Pulkovo.

A.N. Deutsch's work "Galactic Nuclei", published in 1966, made it possible to draw preliminary conclusions about the physical nature of these objects [18]. E.A. Dibai in his paper "Non-Stationary Phenomena in Galaxies" [19] emphasizes the priority of A.N. Deutsch in detecting (simultaneously with the Polish astronomer Pakholchik, who worked in the United States) changes in the brightness of Seyfert galaxies. In the article [18], A.N. Deutsch gives an example of such a phenomenon in the galaxy NGC 5548, which has been observed for several years on a normal astrograph.

A significant contribution to establish the inertial coordinate system was the idea of B.P. Gerasimovich and N.I. Dneprovsky, about determining the absolute proper motion of stars relative to galaxies, put forward in the early 1930s and carried out by A.N. Deutsch.

At the 8th General Assembly of the International Astronomical Union, held in Rome in 1952, A.N. Deutsch presented a report [20] on the necessity of observations of selected extragalactic nebulae in order to determine the absolute proper motions of stars by photographic means.

He suggested that telescopes of the normal astrograph type should be used in both the Earth hemispheres to photograph selected sites with galaxies. For many years, Alexander Nikolaevich was the head of this work carried through at four Soviet and seven foreign observatories. Following the plan of Deutsch, catalogues of absolute proper motion of stars were issued in Holosievo, Moscow, Tashkent, Saint Petersburg and Shanghai. On the basis of these catalogs, work was performed in Kiev to combine and study the summary photographic catalog GPM (Rybka, Yatsenko, 1997) [21].

At Pulkovo, the first catalog containing the absolute proper motion of 14,600 stars in 85 areas of the Northern sky based on observations with the Pulkovo normal astrograph was the catalog Pul-1, compiled by N.V. Fatchikhin (1974) [22].

Later, the Pulkovo "Catalog of 59,766 absolute proper motions in 149 fields of the sky" – Pul-2 (Bobylev, Bronnikova, Shakht, 2004 [23]), was produced. It included the average star coordinates in the ICRS system for the epoch J2000.0 and the original absolute proper motion of stars. The observations were carried out with the Pulkovo normal astrograph. 700 galaxies from the list of extragalactic nebulae compiled earlier by A.N. Deutsch, V.V. Lavdovsky and N.V. Fatchikhin were used for absolutization.

Data from the Pul-2 catalog were used to control the proper motion of Hipparcos stars by putting them into the inertial coordinate system. This research served as the basis for V.V. Bobylev's doctoral thesis [24]. By comparing the Pul-2 and Hipparcos catalogues, he determined the components of the residual rotation vector of the Hipparcos catalog relative to the system of extragalactic coordinates: $\omega(x, y, z) = (-0.98, -0.03, -1.66) \pm (0.47, 0.38, 0.42)$ mas/yr.

Pul-3 was also obtained, the first large stellar catalog containing the precise Equatorial coordinates of 58,483 stars. The catalogue was also based on the photographic observations with the normal astrograph of the Pulkovo Observatory. This catalog

was included in the theses of M.Y. Khovrichev (2003) [25]. For most of the Pul-3 catalog stars fainter than 12 m, equatorial coordinates in the ICRS system suitable for high-precision astrometric work were obtained for the first time. Also, the values of the components of the angular velocity vector of rotation of the system (catalog Pul-3 ICRS) relative to the inertial system (catalog Pul-2) were obtained from the differences in the proper motion of faint stars up to 16.5 m.

At the initiative of A.N. Deutsch, the Leningrad optical and mechanical Association produced a D.D. Maksutov system meniscus telescope, which was installed by Soviet astronomers for observations in Chile. With this instrument the first epochs of 150 Southern sky areas with galaxies, 3 plates for each area were obtained. This work was interrupted in 1973 due to the complicated political situation. Currently, efforts are being made by the Russian and Chilean sides to resume the joint work with this telescope.

A.N. Deutsch's work on the study of the double star 61 Cygni and his hypothesis about the invisible satellites of that star are widely known [26, 27]. These works initiated observations at Pulkovo of stars with invisible satellites. Currently, 61 Cygni remains one of the most promising objects for observations from space in order to detect low-mass satellites of the components of this binary system (see the recently published article by Kervel et al. [28]). Arney's article [29] emphasizes that due to the specific features of K5V, K7V spectral class of the components of this star, observers have an increased opportunity for getting a "biosignal" – namely, evidence of the presence of corresponding organic components in the atmosphere of an exoplanet.

5 Social and pedagogical activities of A.N. Deutsch

The international astronomical community highly appreciated the scientific and organizational activities of A.N. Deutsch. For two terms, 1961–1964 and 1964–1967, he held the post of the President of the International Astronomical Union the Commission of No. 24 "Photographic astrometry", and, later, for a number of years, practically until the end of his scientific activity, from which he retired due to poor state of health, A.N. Deutsch was a permanent member of the organizing Committee of the Commission and an active member of the IAU [30].

In total, Alexander Nikolaevich published more than 130 scientific articles.

The chapters "Photographic astrometry" and "Double stars" he had written for the Pulkovo "Course of astrophysics and stellar astronomy" are widely known. A.N. Deutsch taught at Leningrad University from 1936 to 1981 and delivered relevant courses including a course "Approximate calculations" to student astronomers. Throughout his life, Alexander Nikolaevich generously passed his knowledge and experience in conducting scientific research to the young people. 22 of his post-graduate students successfully defended their PhD theses. It should be noted that despite his being overwhelmingly busy, Alexander Nikolaevich considered it his duty to participate in the laborious work of processing observations and measuring photographic plates.

For his abnegated work for the benefit of science, A.N. Deutsch was awarded the Order of Lenin, the Order of the Red Banner of Labor, two orders of "Badge of Honor" and many medals. Alexander Nikolaevich was a very responsive person. As a



Figure 5 General Assembly of the IAU, 1958, left – K.N. Tavastsherna, in the center – A.N. Deutsch, to the right – Andre Danjon (President of the IAU 1955–1958).



Figure 6 Professor A.N. Deutsch and academician A.A. Mikhailov (Director of the Pulkovo Observatory from 1947 to 1964).

member of the Moscow district Council of workers' deputies, he helped many people. He was always concerned about issues related to the fate of the Observatory, including ecology, the state of the Pulkovo Park, which is evidenced by his work as Chairman of the Pulkovo Society for Protection of Nature.

Alexander Nikolaevich found time to answer letters from amateur astronomers. He had contacts with school students and teachers of his hometown of Reni. In spring 1986, the last year of his life, during the school holidays, children with teachers came to visit him. Despite his ill health, Alexander Nikolaevich warmly received them and organized for them a tour around the Observatory.

Alexander Nikolaevich told in the autobiographical notes that he wrote in the last years of his life, about his life in a large and close-knit family in the house of

his maternal grandfather, in Reni, the city of his childhood. There he also mentions his cousin, the famous historian and philologist, Aristide Ivanovich Dovatur. Aristid Ivanovich was engaged in scientific and teaching activities in Leningrad, but in 1935 "in order to clear the city of socially alien elements" A. I. Dovatur was exiled to Saratov for 5 years. During all the difficult years for Aristide Ivanovich, A.N. Deutsch gave him his support and assistance.

"Now Reni is transferred to the sky," writes Alexander Nikolaevich about his hometown [31]. *"In 1968, a new minor planet was discovered at the Crimean astrophysical Observatory by the astronomer L.I. Chernykh, who at my request gave it the name Reni – under the number 1792.*

I received an honorary certificate in 1972. This honor applies equally to Aristide – the greatest expert in classical philology in our country. Under other circumstances, he would at least have been a corresponding member of the Academy of Sciences."

Fellow countrymen of Alexander Nikolaevich and Aristide Ivanovich cherished their memory with gratitude. In 1989, a memorial plaque dedicated to them was installed on the wall of the house they used to live in. Now on the map of the city of Reni, not far from the streets named after Mayakovsky, Pushkin, cosmonauts Gagarin and Leonov, Marshal Timoshenko and others famous people, the Deutsch Street and Dovatur Street may be found.

Alexander Nikolaevich often recalled his years of work in Pulkovo and told young collaborators about his senior colleagues, as well as about the Pulkovo astronomers who suffered during the years of repression and during the war. He wanted them to be remembered.



Figure 7 Department of photographic astrometry of the GAO, 1976. From left to right, I row: H.I. Potter, I.I. Breydo, L.S. Koroleva, V.V. Lavdovsky, A.N. Deutsch, Z.I. Kadla. II row: A.A. Kiselev, L.V. Zhukov, N.N. Klyuchnik, N.F. Bystrov, T.P. Kiseleva, A.M. Eremina, G.D. Kolosova. III row: O.N. Orlova, N.A. Shakht, N.M. Bronnikova, O.A. Kalinichenko, G.V. Panova, O.M. Mikhailova, V.N. Frolov, B.A. Firago.

Within the article presented here, we were not able to fully cover all the multifaceted scientific and social activities of A.N. Deutsch. Unfortunately, we also did not have the opportunity to describe in more detail the surroundings of Alexander Nikolaevich, but we tried to recall here those with whom he worked for the benefit of astronomical science and with whom he experienced tragic and heroic moments in the history of the Pulkovo Observatory.

In conclusion, we would like to thank the GAO RAS librarians E.E. Kozlova and D.V. Markova, as well as the GAO RAS archive employees T.V. Soboleva and M.V. Soboleva for their assistance in the work on this article.

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Unfortunately, one of the authors of the article, M.A. Petrova (the youngest daughter of A.N. Deutsch), died after a serious illness in May 2020.

Marina Alexandrovna Petrova (Deutsch) (1941–2020) survived the blockade winter of 1941/1942 in Leningrad. At the end of February 1942, together with her parents Alexander Nikolaevich and Alexandra Mikhailovna Deutsch and her elder sister Olga, she was evacuated to Tashkent as part of a group of employees of the Pulkovo Observatory with their families.



Figure 8 M.A. Petrova (Deutsch), 1989.

After the war, the family of A.N. Deutsch returned to Leningrad, and then to Pulkovo. In 1969, Marina Alexandrovna graduated from the Faculty of Philology of the Leningrad State University with a degree in German philology, as a translator and teacher of the German language. For over 50 years she had been working at Pulkovo Observatory, first as a laboratory assistant and an engineer, then from 1989 to 2018 as assistant director of organizational affairs. She also served as the technical secretary of the Scientific Council of the GAO RAS.

Marina Alexandrovna was a highly cultured, sympathetic person, always ready to help those who turned to her. She often shared her memories of Pulkovo with the observatory staff. Her stories about Pulkovo's history and the unique documents provided from the family archive helped to create this article. And in the memory of all who knew her, she will forever remain their good friend and adviser.

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