

On the Eightieth Birthday of Sergei Nikolaevich Bagayev



Academician Sergei Nikolaevich Bagayev, an eminent physicist and science organiser, director of sciences at the Institute of Laser Physics (ILP), Siberian Branch (SB), Russian Academy of Sciences (RAS), was 80 on 9 September 2021.

S.N. Bagayev was born in Novosibirsk. In 1964 he graduated from the Novosibirsk State University with a degree in physics. Sergei Nikolaevich started his research career already in 1963 at the Institute of Radiophysics and Electronics (IRE), SB, USSR Academy of Sciences (UAS). After IRE reorganisation, in 1965–1978 S.N. Bagayev worked at the Institute of Semiconductor Physics, SB, UAS, where he went all the way from a research assistant to head of a laboratory. In 1975 Sergei Nikolaevich defended his candidate of science dissertation under the scientific supervision of the future academician and first director of ILP SB RAS, Veniamin Pavlovich Chebotaev, with whom he was linked by friendship and fruitful scientific cooperation for many years. In 1978 the Department of Laser Physics, where S.N. Bagayev worked, moved to the Institute of Thermophysics, SB, UAS. In 1983 he defended his doctoral dissertation, became the head of the department, and then the deputy director of the institute; in 1990 Sergey Nikolaevich was elected a corresponding member of UAS and a member of RAS in 1994.

S.N. Bagayev is a specialist in the field of quantum electronics and laser physics, author and co-author of more than 800 scientific papers and 28 patents. He was the first to observe and study the recoil effect and the anomalous Zeeman effect on vibrational–rotational transitions of molecules. He experimentally developed a method for obtaining ultra-narrow optical resonances of saturated absorption using optical selection of slow molecules in their interaction with a resonant laser field. Bagayev stood at the origins of a new scientific direction – high-resolution optical spectroscopy, free of the quadratic Doppler effect. Under his guidance, IR lasers with a radiation line width of 0.07 Hz and long-term frequency instability at a level of 10^{-15} were created, which became the basis of the world's first optical clocks. He largely contributed to the creation of a femtosecond optical clock and showed the possibility of increasing the accuracy of frequency measurements to 10^{-17} – 10^{-18} .

Thanks largely to Chebotaev and Bagayev's joint efforts, 1991 was the year of the birth of ILP SB RAS in Novosibirsk. S.N. Bagayev became its deputy director and in 1992, he became its head. In the 1990s, S.N. Bagayev's immense capacity to work and activity played an important role in ensuring that ILP's creative team persisted and progressed. Sergei Nikolaevich was an initiator of establishing a state science and technology programme concerned with fundamental metrology and became head of the programme's council. He organised efficient cooperation with a number of leading foreign laboratories and countries of the Commonwealth of Independent States. At ILP SB RAS, Bagayev supervised international programmes concerned with the precision spectroscopy of hydrogen and muonium atoms and the indium ion.

Today, under his scientific guidance, researchers at ILP conduct basic and applied studies concerned with a wide range of issues in laser physics, optics and spectroscopy. An optical frequency standard based on the quadrupole transition of a single ^{171}Yb ion localised in space and having a long-term frequency instability of $\sim 10^{-17}$ was created for the first time in Russia. In terms of the set of parameters, the frequency standard has no domestic analogues and is at the level of the best world samples. Work is underway to produce experimental samples of onboard optical clocks with a frequency instability of 10^{-16} – 10^{-17} for a new generation of GLONASS.

S.N. Bagayev actively participates in the training of young scientists. He is professor and head of the Department of Quantum Electronics at NSU. His scientific school in the field of ultra-high resolution laser spectroscopy has received wide recognition; among his students there are 10 doctors and more than 30 candidates of science. S.N. Bagayev is a member of the Presidium of the SB, RAS, and the Bureau of the Physical Sciences Division, RAS; chairman and member of a number of scientific councils and commissions in RAS, editorial boards of Russian and foreign scientific journals; deputy chairman of the council of RAS for Defense Research and member of the scientific and technical council of the military industrial complex; chairman of the organising and programme committees of many international conferences and seminars; and chairman of the doctoral dissertation council at ILP SB RAS.

For his scientific and organisational achievements, S.N. Bagayev was honoured with important domestic and international awards: RF State Prize (1998), the Order of Friendship (1999), V.A. Koptug Prize (SB, RAS and the National Academy of Sciences of Belarus, 1999), the Order of the Legion of Honour (France, 2004), the P.N. Lebedev Memorial Gold Medal (RAS, 2006), the Order for Merit to the Fatherland 4th class (2006) and 3d class (2012), a European Physical Society Prize (2013), and RF Government Prize (2019).

Colleagues and friends heartily congratulate Sergei Nikolaevich on his eightieth anniversary and wish him robust health and new achievements in his tireless multifaceted activities.

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