Physics – Uspekhi **44** (8) 867 – 868 (2001)

PERSONALIA

PACS number: **01.60. + q**

Vladimir Borisovich Braginskiĭ (on his seventieth birthday)

DOI: 10.1070/PU2001v044n08ABEH001065

Vladimir Borisovich Braginskiĭ, an outstanding physics experimenter, and corresponding member of the Russian Academy of Sciences, will have his 70th birthday anniversary on August 3, 2001.

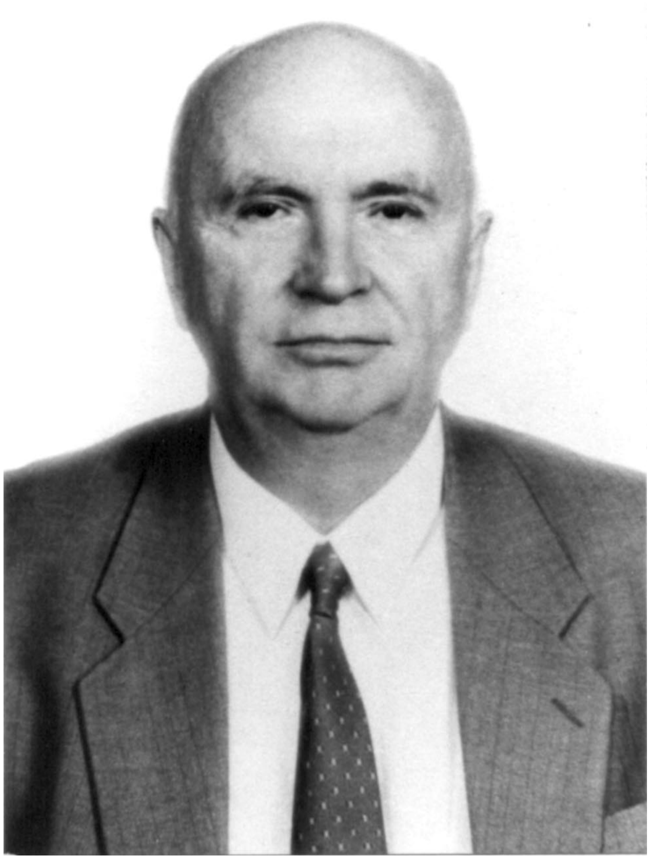
V B Braginskiĭ started his life in experimental physics in 1955 at the physics department of Moscow State University (MSU) where he continued as senior laboratory assistant after his graduation. He stayed with this department and still works there now.

From 1955 – 1964 his field was the phase locking of klystrons and the application of transition radiation to microwave electronics. In 1965 Braginskiĭ was the first to notice a very considerable sensitivity redundancy in experiments with test masses if the signal is the acceleration or acceleration gradient, and if the friction is sufficiently low so that the relaxation time is much greater than the measurement duration. In this case it is possible to detect an energy change in the oscillator that is much lower than the equilibrium thermal energy. V B Braginskiĭ proceeded to demonstrate this in an experiment. He also predicted the limits on sensitivity of quantum origin (generally referred to as standard quantum limits (1967).

From 1964 – 1974 V B Braginskiĭ and his colleagues carried out a number of experiments with test masses. In a search for free quarks with fractional charge he established the equality of the absolute values of electric charges of the proton and electron at the level of 10^{-21} (1970). He also verified the equivalence principle to 10^{-12} at the 0.95 confidence level (1971). It is proper to emphasize that the absence of free quarks demonstrated by V B Braginskiĭ and confirmed by other experimenters provided the main stimulus for developing the gluon model. When working on various experimental techniques for mass probes, V B Braginskiĭ predicted several important effects in this field (such as radiometric instability, rotational pondermotive instability, and light-induced friction).

Developing the quantum theory of measurements, V B Braginskiĭ suggested and provided the theoretical foundation for the principles of a new class of measurements (quantum non-demolition measurements), which made it possible to go beyond the standard quantum limits (1977). Among other things, such measurements allow non-absorbing counting of electromagnetic quanta of radiation. He also suggested a realistic technique for such measurements in the optical range by using the cubic dielectric nonlinearity (1980). In subsequent years, this new measurement class was successfully implemented in several laboratories of different countries in the optical range, and recently in the microwave range as well.

Beginning in 1974, V B Braginskiĭ together with his postgraduates and colleagues in the laboratory devised several new techniques that allowed one to drastically reduce dissipation (increase the Q-factor) in mechanical, microwave and optical resonators. For example, they created dielectric microwave resonators in 'whispering gallery'-type modes with Q-factors above 10^9 (1987) and mechanical pendula with a relaxation time at room temperature of above 5 years and a Q-factor of about 2×10^8 (1998). Several laboratories were able to build secondary frequency standards on the basis of such dielectric resonators with a previously unattainably narrow line width; high-Q mechanical pendulums will be used in suspensions of gravitational wave antennas, achieving the standard quantum limits of the sensitivity of the antenna that would correspond to a metric perturbation amplitude of $h \simeq 10^{-22}$.



Vladimir Borisovich Braginskiĭ

Among other results predicted by V B Braginskiĭ, we must mention the prediction of the fundamental resonance friction generated by zero electromagnetic fluctuations (1991) and the effect of decoherence of wave functions of charged masses, caused by the same fluctuations (1995). Very recently V B Braginskiĭ and his colleagues predicted the existence of a new class of fluctuations of nonlinear origin: thermoelastic (1999) and thermo-refractive fluctuations (2000). These fluctuations are now considered to constitute one of the fundamental factors that limit the sensitivity of gravitational wave antennas.

Uspekhi Fizicheskikh Nauk **171** (8) 909 – 910 (2001)
Translated by V I Kisin

V B Braginskiĭ has published more than 170 papers and written four monographs.

He devotes much effort to teaching. He created several new lecture courses that are very popular with students and teachers.

One of V B Braginskiĭ's distinctive features is his ability to involve the brightest students in research and share his accumulated experience with them. Eight of the students who prepared their PhDs under his guidance have become Doctors of Science, and four of these are physics professors in various chairs of the physics department of MSU. His other students are working successfully in the institutes of the Russian Academy of Sciences and abroad.

The successful research and teaching activities of V B Braginskiĭ earned him the great respect of the physics community. In 1975 the Presidium of the Russian Academy of Sciences awarded him the P N Lebedev Gold Medal. In 1980 he received the F Schiller medal of Iena University. In 1990 he was elected a Corresponding Member of the Russian Academy of Sciences and in the same year obtained the Fairchild Prize (California Institute of Technology, USA); in 1993 he received the Humboldt Prize. In 1995 he was elected to the European Academy, in 1996 he was an invited lecturer at the N Bohr Institute in Denmark, and in 1999 the Angstrom Lecturer of Uppsala University (Sweden).

Vladimir Borisovich Braginskiĭ's colleagues, students and friends congratulate him on the anniversary and wish him good health and numerous achievements in his work.

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