

## Robert Arnoldovich Suris (on his 80th birthday)

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December 31, 2016 is the 80th birthday of the outstanding theoretical physicist, head of the Sector of Theoretical Bases of Microelectronics of the Ioffe Institute, Academician Robert Arnoldovich Suris.

Robert Arnoldovich Suris was born in Moscow. He graduated cum laude from the Physico-Chemical Faculty of the Moscow Institute of Steel and Alloys in 1960, as a specialist in ‘metal physics’ and was assigned to the Pulsar Research Institute (Moscow). In 1964, he was transferred to the F V Lukin Research Institute of Physical Problems (Zelenograd, Moscow), where he worked for 24 years as a junior, then a senior, researcher, and then Head of the Theoretical Sector, and Head of the Division. In 1964, he defended his Candidate of Sciences thesis, and in 1974 his Doctor of Sciences thesis. In 1982, R A Suris was commissioned the title of Professor.

Since 1988, he has been Head of the Sector of Theoretical Bases of Microelectronics at the Ioffe Institute of the Russian Academy of Sciences (RAS). From 1993 to 1997, he was Head of the Division of Solid State Electronics at the Ioffe Institute. He taught at the Moscow Institute of Physics and Technology (MIPT) at the Chair of Microelectronics of the Faculty of Physical and Quantum Electronics. He founded and headed the fundamental Chair of Solid State Physics at the Physico-Technical Faculty of St. Petersburg Polytechnic University. At the present time, he is Head of the Chair of Condensed Matter Physics at St. Petersburg Academic University.

In 1997, R A Suris was elected a Corresponding Member, and in 2006 a Full Member of RAS. Among his disciples are 23 candidates and 5 doctors of sciences. R A Suris is a laureate of the 2001 State Prize of the Russian Federation, the 2002 Humboldt Research Award, and the 1998 International Rank Prize. R A Suris takes an active role in scientific and public life. He is a member of the RAS councils on the issues of Semiconductor Physics and Solid State Theory, a member of the Bureau of the Physical Sciences Division of RAS, chairman of the Council of Semiconductor Physics, Theoretical Physics for awarding the degrees of candidate and doctor of physical and mathematical sciences at Ioffe Institute, the Editor-in-Chief of the journal *Fizika i Tekhnika Poluprovodnikov* (*Semiconductors*), a member of the editorial boards of the journals *Uspekhi Fizicheskikh Nauk* (*Physics–Uspekhi*), *Zhurnal Tekhnicheskoi Fiziki* (*Technical Physics*), and *Pis'ma v Zhurnal Tekhnicheskoi Fiziki* (*Technical Physics Letters*), and *Mikroelektronika* (*Russian Microelectronics*).

In recent years, R A Suris has been a permanent Chairman of scientific sessions of the Physical Sciences Division (PSD) of RAS. Within a short time, he managed to breathe new life into these scientific meetings. The distinctive feature of the scientific sessions of PSD RAS, chaired by Robert Arnoldovich, is an exact selection of issues interesting for physicists at



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any given time, as well as acute and lively discussions, which is largely initiated, if not provoked, by the chair of the scientific session. R A Suris is able to choose an interesting topic for a scientific session of PSD RAS and find a proper speaker. His scientific authority and personal attraction enable him to invite both very eminent and not yet well-known but bright scientists as speakers, which has lately brought the PSD RAS scientific sessions nearer in spirit to the V L Ginzburg's famous seminars in the past.

R A Suris is in active collaboration with Russian and foreign scientists from scientific institutions in France, Germany, Switzerland, and Israel. He has many times been an invited speaker at Russian and international scientific conferences. He has been a member or chair of the program committees of many Russian and international conferences.

For his scientific merits, R A Suris has been awarded prestigious Russian and international prizes and governmental premiums, including the Order for Merits to the Fatherland, 2nd degree (1999) and the Order of Friendship (2010).

Robert Arnoldovich Suris is widely known in Russia and beyond for his outstanding results in theoretical solid state physics, solid state nanostructures, and the physical basis of solid state electronics. He is the author of nearly 300 scientific publications and inventions. R A Suris advanced a number of fundamental ideas which have played an important role in semiconductor physics and solid state electronics. He is one of

the pioneers in the theory of semiconductor nanoheterostructures and devices based on them.

In 1971, R A Suris together with R F Kazarinov (who was then a researcher at Ioffe Institute), suggested the idea of an essentially new type of laser, namely, a cascade laser based on a semiconductor superlattice, and formulated its theory. In 1994, such a laser was successfully realized experimentally at Bell Laboratories (USA). For the invention of the cascade laser, R A Suris and Bell Labs researchers (F Capasso, J Feist, and R Kazarinov) were awarded the 1998 International Rank Prize in optoelectronics. Cascade lasers are based on special semiconductor nanostructures, so-called semiconductor superlattices. R A Suris made a fundamental contribution to the theory of electric and optical properties of these structures and devices based on them.

In recent years, he has successfully developed the theory of semiconductor structures with quantum-dot superlattices. We should mention the idea of using such structures to generate weakly decaying Bloch terahertz-range oscillations based on the effect (predicted by R A Suris) of strong suppression of electron scattering in quantum-dot superlattices. In his recent work, he has shown that this effect paves the way for a sharp (two or three orders of magnitude) lowering of cascade laser threshold currents and a substantial increase in their temperature stability. For the studies of semiconductor quantum-well and quantum-dot superlattices and their application in quantum electronics, R A Suris received A F Ioffe Prize of RAS (2005).

R A Suris, together with L V Asryan, formulated the theory of semiconductor lasers of a new generation, namely, quantum dot lasers. These studies were included in the series of papers honored with the State Prize of the Russian Federation (2001).

In 1972, R A Suris and a team of researchers at the Ioffe Institute suggested the idea and formulated the theory of a distributed feedback semiconductor laser, which is now one of the key elements of fiber-optics communication systems.

R A Suris predicted and developed the theory of a previously unknown type of waves in charge-carrier plasma in semiconductors, waves of spatial charge exchange of traps. These waves determine the dynamic properties of IR-range photodetectors and photorefractive media. He proposed the theory of boundary states in metal–insulator–semiconductor structures underlying silicon microelectronics and predicted the possibility of the existence of resonant boundary states at semiconductor heterojunctions. An important role in the development of microelectronics was played by studies undertaken by him and his colleagues of the diffraction theory of image formation in the course of photolithography.

R A Suris and his students are successfully developing important avenues in condensed matter physics, such as the theory of heterostructure epitaxial growth, the theory of flicker noises in epitaxial films of high-temperature superconductors, and the theory of fullerenes.

The distinctive feature of his theoretical work is its direct relation to experiment and, of particular importance, the prediction of new phenomena whose study often becomes an independent area of research. The results obtained by R A Suris foster many experimental studies and technical developments.

Friends and colleagues know that R A Suris declined long ago stopped smoking his favorite pipe and spends part of his summer vacation for fishing on Finnish lakes.

We extend best wishes to Robert Arnoldovich Suris on his jubilee and wish him sound health and further advances in scientific work.

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