

Aleksandr Aleksandrovich Kaplyanskii (on his 90th birthday)

DOI: <https://doi.org/10.3367/UFNe.2020.11.038863>

December 14, 2020 was the 90th birthday of an outstanding scientist in the field of solid state physics and optical spectroscopy, Academician Aleksandr Aleksandrovich Kaplyanskii. A A Kaplyanskii is the author of a number of pioneering studies on semiconductor and dielectric optics and methods for investigating the exciton and impurity states in crystals. He is one of the founders of optical solid-state piezo-spectroscopy.

Aleksandr Aleksandrovich Kaplyanskii was born on December 14, 1930 into the family of an Elektrosila plant engineer, Aleksandr Evseevich Kaplyanskii, and an employee of the Skorokhod factory, Zigrig Gustavovna Gofren. He graduated from the physical faculty of Leningrad State University in 1953.

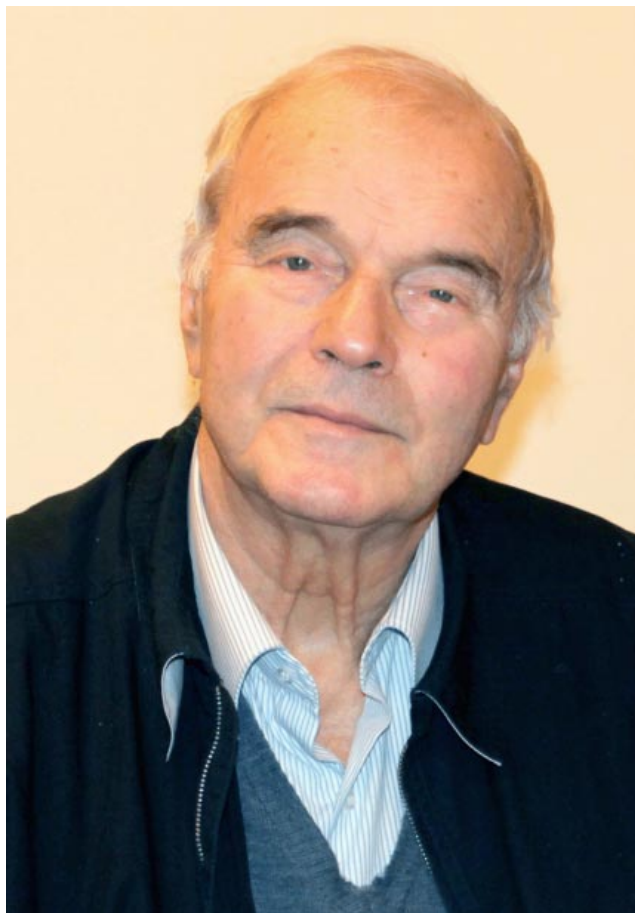
A A Kaplyanskii began his scientific activity under the guidance of corresponding member of the USSR Academy of Sciences, E F Gross. His first study concerned the nature of line spectra associated with exciton excitation in crystals. In 1960, the phenomenon of optical anisotropy of cubic crystals was experimentally discovered by A A Kaplyanskii (through the spectra of cuprous oxide crystals in the exciton resonance region). For the study of excitons in semiconductors, A A Kaplyanskii and his colleagues received the 1966 Lenin Prize.

A A Kaplyanskii was the first to discover and examine the reversible splitting of spectral lines of impurity centers in crystals under their elastic uniaxial deformation ('Kaplyanskii splitting'). In 1975, A A Kaplyanskii (along with P P Feofilov and V N Medvedev) was awarded the USSR State Prize for the development of new methods of investigation of impurity centers and defects in crystals.

In 1973, A A Kaplyanskii (together with Yu F Markov) began a spectroscopic analysis of univalent mercury halogenides. The ferroelectric phase transition was revealed by the Raman spectra and its mechanism was established. The discovered new manifestations of lattice dynamics (with 'soft modes') made mercury halogenides recognized model subjects for studying structural phase transitions in crystals.

The achievements of Aleksandr Aleksandrovich (A A) made a recognized contribution to the study of the fundamental properties of terahertz acoustic phonons for which traditional ultrasonic methods no longer work. In their many-year series of research, A A and his colleagues (S A Basun, A V Akimov, E S Moskalenko, A V Shcherbakov) examined regimes of nonequilibrium phonon propagation, phonon scattering by lattice defects and on the surface, the interaction with electron levels of impurities and excitons, and anharmonic interactions.

In 1983, A A Kaplyanskii and his disciples (S A Basun and S P Feofilov) discovered a new photoelectric phenomenon in impurity dielectrics, namely, a light-induced spontaneous



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formation of stable domains of a strong electric field (in ruby crystals). This study was the beginning of a fundamental series of investigations of photoelectric phenomena in dielectrics and ferroelectrics.

Since the mid-1990s, A A Kaplyanskii has focused on the analysis of the properties of new optical materials such as dielectric media with space-periodic refractive index modulation (photon crystals). A A and colleagues (V N Astratov, Yu A Vlasov, M F Limonov) examined for the first time a synthetic opal—now one of the key materials of photonics—as a photon crystal. Another topical area was the study (together with S P Feofilov) of dielectric-based nano-objects, exhibiting a number of important effects common to nanoparticles, including dimensional quantization of acoustic oscillations of nanocrystals—Lamb modes.

A A's whole scientific biography is inseparably linked with the Ioffe Physical-Technical Institute. Soon after the death of E F Gross (1972), A A had to become head of his laboratory. With his tact, energy, keenness on science, exactness, and invariably benevolent attitude towards his colleagues, A A headed the Laboratory of Solid-State

Spectroscopy for over forty years and trained a great number of talented disciples. For many years, he was also head of the branch department of solid-state physics at the Physical Faculty of Petersburg State University.

A A Kaplyanskii is editor-in-chief of the journal *Fizika Tverdogo Tela (Solid-State Physics)* and a member of the editorial council of the journal *Uspekhi Fizicheskikh Nauk (Physics – Uspekhi)*; for many years, he sat on the editorial boards of the *Journal of Luminescence* and *Comments on Condensed Matter Physics* and on the organizing committees of international conferences on luminescence, phonon physics, defects in dielectric materials, and dynamic processes in the excited state of solids.

In 1987, A A Kaplyanskii was elected a corresponding member of the USSR Academy of Sciences and in 2003 a full member of the Russian Academy of Sciences. In 1999, he was awarded the Order of Honor and in 2010 the Order of Friendship. A A Kaplyanskii received the International Prize for Luminescence Research (1990), the 1997 Humboldt Prize, the 2008 A F Ioffe Prize of RAS (together with S A Basun and B V Novikov), and the 2013 D S Rozhdestvenskii Prize of RAS (together with S P Feofilov and A K Przhevuskii).

The phrase by E F Gross is well known: “Life is more than just science!” A A Kaplyanskii’s example shows without wasting words that the disciple shared in full the opinion of his teacher. Since his school days, A A has been into Alpine skiing. He was one of the first enthusiasts of water-skiing in the USSR and later became keen on lawn tennis. The witty, often brilliantly stylized literary congratulations “on the occasion of” skillfully written by A A have been a success for decades (and are expected by the public!). (Some extant texts were collected and published as a 60-page monograph: A A Kaplyanskii, “Shutki v storonu... druzei” (“Joking on Friends without the Jokes”) St. Petersburg, 2010.) A A is known as an orator who is able to view the subject of a talk in an original light, and as an indomitable motor-car enthusiast. In autumns of bumper-crop years, A A presents half of the Institute with apples from his dacha. (The other half follows this excitedly.)

One cannot but mention A A’s passion for amateur photography. At the dawn of his scientific carrier, A A was engaged in photography: optical spectra were then registered using photoplates, the shots were developed in a dark room, etc. A A is invariably interested in new prospects of digital photography and generally in the fruits of the ‘electron revolution’ that changed our everyday life beyond recognition within only two decades. It should not be forgotten that all this only became possible owing to the advances in semiconductor and dielectric physics—matters to which A A devoted all his talents, thoughts, and entire life.

We give our best to Aleksandr Aleksandrovich on his jubilee and wish him health and great new achievements for the benefit of Science!

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I V Grekhov, A G Zabrodskii, S V Ivanov,
E L Ivchenko, V V Kveder, B V Novikov,
R A Suris, V B Timofeev, I A Shcherbakov*