

PERSONALIA

PACS number: **01.60.+q**

Igor Dmitrievich Novikov (on his 80th birthday)

DOI: 10.3367/UFNe.0186.201601f.0105

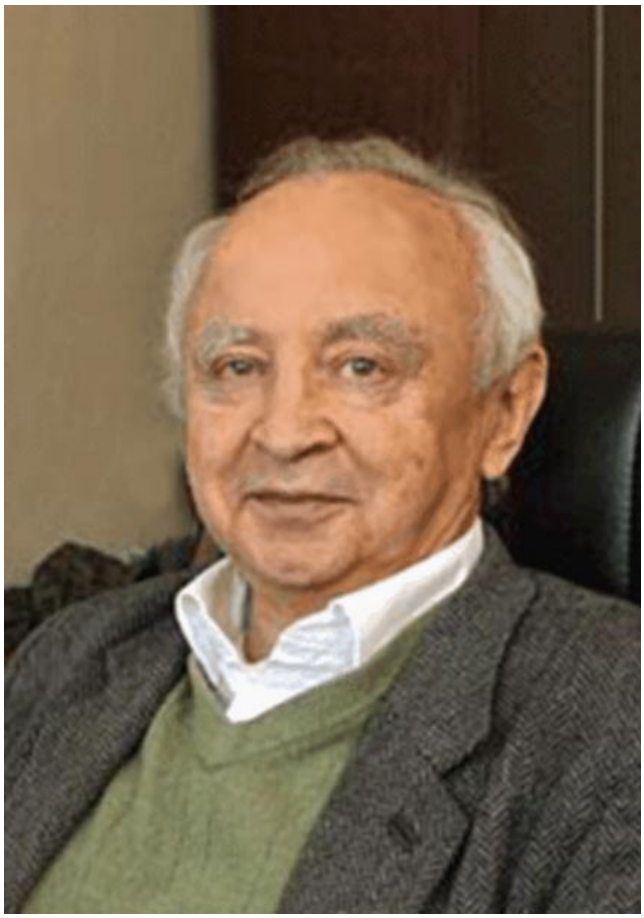
10 November 2015 was the 80th birthday of one of the most prominent Russian astrophysicists, Corresponding Member of the Russian Academy of Sciences (RAS), Member of the Royal Astronomical Society and the Belgian and Royal Danish Academies of Sciences, Igor Dmitrievich Novikov. He has devoted almost sixty years to research work, and during all these years I D Novikov has been one of the most authoritative experts in a new area of astronomy — relativistic astrophysics — whose foundation and development were due to his much effort.

Igor Novikov was born in Moscow on 10 November 1935. He finished Moscow secondary school No. 292 with a Gold medal. In his school years, he began studying astronomy at the Moscow Planetarium. In 1954, I D Novikov entered Moscow State University (MSU) and graduated from there in 1959 with an honors diploma, after which he took a postgraduate course at the Sternberg State Astronomical Institute of MSU under the guidance of A L Zel'manov, defending his Candidate of Sciences thesis in Physics and Mathematics, "Spherical gravitational fields in GR" (in 1963). Soon after that he defended his Doctor of Sciences thesis, "Early stages of cosmological expansion" (in 1970).

In the years from 1963 to 1990, I D Novikov worked at the Institute of Applied Mathematics of the USSR Academy of Sciences, and at the Space Research Institute (SRI) of the USSR AS where, from 1980, he headed the Department of Relativistic Astrophysics at the Division of All-Wave Astronomy guided by the outstanding astrophysicist I S Shklovsky. After I S Shklovsky's death (in 1985), following the proposal of Academicians V L Ginzburg and L V Keldysh (research scientists at the Physical Institute of the USSR AS — FIAN) and Director of SRI R Z Sagdeev, it was decided to transfer the Division of All-Wave Astronomy from SRI to FIAN (in 1990) and unify it with the Pushchino Radio Astronomical Observatory. This unification was called the Astro Space Center (ASC) of FIAN.

In 1991, I D Novikov was elected Professor of Astrophysics at the Copenhagen University and, from 1994 to 2004, on the invitation of the Danish Academy of Sciences, he was Director of Theoretical Astrophysics Center in Copenhagen, remaining a research scientist at ASC FIAN. At the present time, he is Deputy Director of the ASC FIAN. In 2000, Igor Dmitrievich was elected Corresponding Member of the RAS. I D Novikov was awarded The Eddington Medal of the Royal Astronomical Society, Friedmann Prize of RAS, International Viktor Ambartsumyan Scientific Prize, and many other international prizes.

I D Novikov took an active part in designing and preparing the space missions RadioAstron and Planck, and in processing data from the WMAP observations. He is author of more than 300 publications devoted to different aspects of relativistic astrophysics. The books by Ya B Zeldovich and I D Novikov, *Relativistic Astrophysics* (1967), *Stars and Relativity* (1971), and *The Structure and Evolution of the Universe* (1975), and by P Naselsky, D Novikov, and I Novikov, *The Physics of Cosmic Microwave Background* (2006), remain topical to the present time, and the extensive monograph *Black Hole Physics. Basic Concepts and New Developments* written by I D Novikov in co-authorship with V P Frolov (issued three times in 1986, 1989 and 1998) has for already 20 years been one of the best both in clarity of presentation and completeness of coverage.



Igor Dmitrievich Novikov

Along with scientific monographs, I D Novikov has written several brilliant popular books, the main ones being *The River of Time*, *Black Holes and the Universe*, *How the Universe Exploded*, and *The Discoverer of the Big Bang Universe*.

Through the years, he has brought up a number of scientists, including doctors and candidates of science who

Uspekhi Fizicheskikh Nauk **186** (1) 105 – 106 (2016)
DOI: 10.3367/UFNr.0186.201601f.0105
Translated by M V Tsaplina

go on working actively in the field of relativistic astrophysics both in Russia and at European and American institutes. At the present time, the 'School of Novikov–Lukash' at ASC FIAN continues preparing cadres for work in various fields of astronomy and relativistic astrophysics.

I D Novikov's scientific activity began in 1959 with the study of the properties of 'black holes' around which many different myths were roaming already at that time. In his dissertation, I D Novikov very clearly separated facts from conjectures and laid the firm foundation for modern insight into the sophisticated system of processes proceeding inside and in the vicinity of black holes. For the past half century, this enigmatic problem has transformed into a special branch of relativistic astrophysics covering the work of hundreds of observers and theoretists and the data from many powerful telescopes. This field of astrophysics contains numerous interesting and still unsolved problems, and I D Novikov remains one of the main experts in this area.

From 1960 to 1980, Ya B Zeldovich and I D Novikov elaborated the basic principles of the modern theory of black holes. Thus, it was shown in 1965 that a collapse of rotating bodies with small deviations from spherical symmetry leads steadily to the formation of black holes, and the first estimate of the quasar mass was obtained. In 1966, it was predicted that black holes can be observed as sources of X-ray radiation from binary stars, and the main properties of the processes proceeding in these systems were revealed. The space–time structure inside black holes and the laws of its evolution were ascertained in 1978, and observational restrictions on the existence and properties of relic black holes were established the same year. In 2005, I D Novikov developed the theory of advective accretion discs around black holes.

The physics of black holes has thus far been the favorite field of relativistic astrophysics for I D Novikov, but the range of his scientific interests is much wider, also covering cosmological problems, including fantastically interesting problems of the uniqueness of the Universe and possible contacts with 'other universes'. These questions require development of the physics of 'wormholes' — bridges in space and time which were already discussed by Einstein, Rosen, and Wheeler, but have not yet been found in observations. Much of I D Novikov's work carried out in recent years is devoted to these issues.

An extensive series of I D Novikov's studies is connected with observations and the thorough research of relic radiation of the Universe. Widely known is his 1964 paper (with A G Doroshkevich as co-author) pointing out the possibility of observing relic radiation and how to do it. The paper was published a year before its discovery by A Penzias and R Wilson (in 1965).

In his 1977 papers, he considered the problems of interaction between gravitational waves and relic radiation. A number of papers by I D Novikov are devoted to processing and interpreting observations of fluctuations of relic radiation temperature and polarization. In 1999, an original geometrical method was developed for an analysis of fluctuations of relic radiation polarization, and from 2003 to 2007 I D Novikov took an active part in developing and incorporating progressive methods for the analysis of observations of fluctuations of relic radiation temperature and polarization.

A considerable part of I D Novikov's work has been devoted to gravitational instability, the formation of galaxies, galactic clusters, and the observed structure of the Universe. In particular, one of the first models of galaxy formation within the framework of a 'hot' universe was proposed in 1967, and one of the first hidden mass models was developed in 1980.

In 1974, he took part in the design of an electromagnetic detector of gravitational waves.

In speaking about the breadth of I D Novikov's scientific interests, we should point out a whole class of issues that characterize him as a scientist also uniquely involved in science fiction. This work is devoted to scientific discussions of phenomena whose discovery in the near future is problematic, like his work on 'time machines' (including those written together with the American scientist K Thorne), the creation of a 'Lab Universe', the theory of the internal structure of black holes, and a search for conditions for the existence of stable 'wormholes' in the Universe. We should also mention the popular self-consistency principle formulated by him, which resolves paradoxes associated with journeys through time in the framework of Einstein's General Relativity.

Without the work of I D Novikov, the scientific world would be more dull and uninteresting. And with all our heart, we wish Igor Dmitrievich health, scientific longevity, and never-fading fantasy.

G S Bisnovatyi-Kogan, A G Doroshkevich, L M Zelenyi, N S Kardashev, N N Kolachevsky, B V Komberg, D A Kompaneets, V N Lukash, G A Mesyats, Yu N Pariiskii, V A Rubakov, A M Cherepashchuk