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Preface

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Preface

**The 5th G. Gamow Odessa Astronomical Summer School:
*Astronomy and Beyond: Astrophysics, Radioastronomy, Cosmology
and Astrobiology***

The Odessa Astronomical Summer Schools started in 2000 with the main goals of stimulating scientific research at the crossroads of astronomy and other sciences and of attracting young people to research. After the international scientific conferences on the occasion of the 90th (1994) and 95th (1999) anniversaries of the birth of G. Gamow were held in Odessa, it was agreed to start the Odessa Astronomical Summer School and to name it after G. Gamow. The subjects and style of the Summer School were to be, as far as possible, in harmony with G. Gamow's 'style' of scientific research, in which the most interesting scientific ideas and concepts originated at the crossroads of different lines of investigation.

Gamow possessed the talent of a wonderful manager of key scientific problems and exploration, gathering together leading researchers and creating a informal ambience of inter-communication and discussion; this fact is reflected in the name of the Summer School: *Astronomy at the Interfaces between Sciences: Astrophysics, Cosmology and Astrobiology*. From the very beginning the dates for the Summer Schools were chosen so that they were immediately followed by the international Odessa scientific conferences. Consequently, in the course of the years the term 'astrochemistry' found its way into the Summer School programme and the conference section topics were taken into account.

The range of ages of participants of the Summer School has always been rather wide; every participant could report his or her scientific results to the section 'Actual problems of modern astrophysics'. Young participants would give poster presentations to the whole audience.

The 5th G. Gamow Odessa Astronomical Summer School *Astronomy and Beyond: Astrophysics, Radioastronomy, Cosmology and Astrobiology* was held on 15–20 August 2005 in the grounds of the recreational camping 'Chernomorka' Odessa I.I. Mechnikov National University (ONU).

The Summer School was co-organized by the Department of Astronomy and the Astronomical Observatory, ONU, the Ukrainian Astronomical Association (UAA), the Institute of Radio Astronomy, National Academy of Sciences, Ukraine (IRA NANU), the Eurasian Astronomical Society and the Odessa Astronomical Society.

The 2005 Gamow Summer School programme was dedicated to the 140th anniversary of the foundation of the Odessa (formerly the Imperial Novorossiysk) University, the 125th

anniversary of the birth of A. Ya. Orlov, and the International Year of Physics held in honour of the 100th anniversary of Einstein's discoveries.

The chairman of the Summer School's Scientific Organizing Committee was V.A. Smyntyna (Rector of ONU), and the vice-chairmen were V.G. Karetnikov (Head of the Department of Astronomy, ONU), N.G. Bochkarev (Sternberg Astronomical Institute, M.V. Lomonosov Moscow State University) and M.I. Ryabov (senior researcher, Odessa Observatory, IRA NANU).

Among the members of the Scientific Organizing Committee were S.M. Andrievsky (Department of Astronomy, ONU), V.S. Ivanitsina (Department of Microbiology, ONU), A.A. Konovalenko (IRA NANU) and Ya.S. Yatskiv (President, UAA). The scientific secretary of the Scientific Organizing Committee was S.M. Melikiants.

The Conference programme traditionally consisted of a number of lectures and presentations by participants of the Summer School.

One distinguishing feature of the 2005 Summer School was the inclusion in its programme of the section on radio astronomy in which scientists from all the organizations related to the Ukrainian very-long-baseline radio-interferometer URAN took part. This section had special meaning, because it was held in the year of the 50th anniversary of the beginning of radio-astronomy research in Ukraine and of the 20th anniversary of the foundation of the IRA NANU.

The Ukrainian Scientific School of Radio Astronomy was founded by S. Ya. Braude (1911–2003) (National Academy of Sciences, Ukraine). All the components of the system URAN (with the base maximal length of 1000 km) were built under his personal supervision.

The Gamow Summer School was opened on 16 August 2005 with the lecture entitled 'The 140th anniversary of the I.I. Mechnikov Odessa National University' by the Pro-rector for Research Policy, V.A. Ivanitsa. The next lecture was entitled 'The 125th anniversary of the academician, Professor A.Y. Orlov, the eminent scientist, science organizer and popularizer of science' by V.G. Karetnikov. A. Ya. Orlov was the Head of the Odessa Astronomical Observatory and the Head of the Department of Astronomy, Novorossiysk University, from 1912 to 1934.

However, Orlov's enthusiastic activity was not restricted to Novorossiysk University; he needed a global scale. He studied the motion of the Earth's poles, made gravimetric investigations and carried out seismic activity research, all topics of scientific research that are of special importance nowadays. The geography of his activities is really exciting, e.g. St Petersburg, Moscow, Odessa, Kiev, Poltava, Tartu, Sorbonne, Goettingen, Tomsk, Irkutsk and the Far East, but it is impossible to list all the places.

Orlov's life was full of scientific events that could be the main item in the biographies of several scientists. For example, there were periods in his life when he was the head of five observatories at the same time.

So a new section on geodynamics was incorporated into the Summer School programme; it might remain there and become traditional. The last talk of the opening session of the Summer School was entitled 'Gamow's days in Odessa' by M.I. Ryabov. Since 1994, when the 90th anniversary of Gamow's birth was celebrated at Odessa University, the name of Gamow keeps appearing in the mass media in connection with conferences and workshops in Odessa.

A memorial plaque is installed on the walls of the main building of Odessa University. The first in a series of lectures on geodynamics, entitled 'Modern theory of the Earth's nutation', was given by a representative of Orlov's scientific school, Ya.S. Yatskiv.

Later the author of the widely known monograph *Atmospheric Processes and Rotation of the Earth*, N.S. Sidorenkov, from Rosgidromet gave a lecture entitled 'Physics of the Earth's rotation instabilities' to the same section.

Four lectures were given to the section on geodynamics and astrobiology and, in particular, the lecture entitled 'Radio astronomy of decametre waves and geophysics: point of contact' by O.A. Litvinenko, Head of the Odessa Observatory, IRA NANU.

The closing lecture for the section on geodynamics and astrobiology was the lecture entitled "'Space weather" and its effects in the atmosphere and biosphere' by M.I. Ryabov, senior researcher of Odessa Observatory, IRA NANU. In total in the section on geodynamics and astrobiology, four lectures were presented.

A.M. Cherepashchuk (Sternberg Astronomical Institute, Moscow University) opened the section on astrophysics with the lecture entitled 'Etymology of black holes'. At present we know of 20 black holes of stellar mass in binary systems, 300 supermassive black holes in galaxy centres, and three black holes of stellar mass found by means of microlensing. The lecture summarized the actual concepts on the nature and types of black hole in the Universe.

A lecture by A.A. Minakov (IRA NANU) entitled 'Peculiarities of the statistical analysis of microlensing effects in restoring the parameters of quasars and mass distribution in lensing galaxies' was also given to the section on astrophysics. A.A. Minakov is the co-author (with P.V. Bliokh) of the monograph *Gravitational Lenses*. It is in fact one of the first monographs dealing with the gravitational lensing by galaxy clusters, isolated galaxies and even stars.

In his lecture entitled 'Magnetorotational instability in magnetorotational supernovae', S. Moiseenko (Space Research Institute, Russian Academy of Sciences) reported the results of computation of magnetorotational processes in neutron stars, supernovae and pulsars. In total, the section on astrophysics consisted of 11 presentations.

The section on radio astronomy was started with a lecture entitled 'Perspectives of the development of radio astronomy at low frequencies' by A.A. Konovalenko (IRA NANU). The lecture gave a review of the new prospects of the development of low-frequency radio astronomy that would open up when the 10^6 m² system LOFAR is working.

A lecture entitled 'Radio spectroscopy studies at the Sternberg Astronomical Institute' by G.M. Rudnitsky (Sternberg Astronomical Institute) was given to the same section.

At present, radio spectroscopy is a powerful method of investigating the chemical composition and dynamics of the interstellar medium. A lecture entitled 'Giant pulses of pulsar radio emission' by A.D. Kuzmin from Pushchino Radioastronomical Observatory attracted great interest from the audience. As Kuzmin was not present at the Summer School, the lecture was read by O. Ulyanov (IRA NANU).

All the scientific teams working with radiotelescopes of the URAN system reported the respective results of their research. A total of 12 presentations was given to the section on radio astronomy. The section on cosmology consisted of a total of seven scientific presentations.

The conference was attended by about 50 participants from Russia, Ukraine, Moldova and Austria. The Summer School participants approached the administration of Odessa University with the proposition of perpetuating the memory of the eminent Ukrainian scientist A.Ya. Orlov by installing a memorial plaque on a wall of the main building of the University (2 Dvorianskaya Str., Odessa).

M.I. Ryabov
Co-Chair of the Scientific Organizing Committee