

Anatolii Mikhailovich Cherepashchuk (on his 70th birthday)

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Anatolii Mikhailovich Cherepashchuk, a brilliant Russian astronomer, Full Member of the Russian Academy of Sciences (RAS), and Director of the P K Shternberg State Institute of Astronomy of Moscow State University (GAISH MGU in *Russ. abbr.*) celebrated his 70th birthday on 7 July 2010.

Anatolii Mikhailovich was born in Syzran on 7 July 1940. His mother worked as nurse at the Syzran division of emergency medical service. His father, a lieutenant in the artillery, was killed in action in 1941, at the very outset of the Great Patriotic war with Nazi Germany.

Anatolii Mikhailovich's professional progress was outstanding: from amateur astronomer at a Syzran school to professor and director of the largest astronomy institute at Moscow State University (MGU). In half a century of active research he obtained results that made him well known to the international community working on the physics of stars, close binary stellar systems, relativistic objects, and active galactic nuclei.

In 1972–1973, at the dawn of the era of X-ray astronomy, A M Cherepashchuk and his coworkers carried out groundbreaking work studying the optical variability of X-ray binaries. He proposed the currently widely used method for evaluating the orbital inclination of an X-ray binary system from the observed ellipticity effect of the optical star, and gave one of the first estimates of the mass of the black hole in the Cygnus X-1 system. He discovered the optical eclipses of a unique object SS433 — ‘the puzzle of the century’ — and gave evidence that this object represents a massive X-ray binary system at an advanced stage of evolution and has a super-critical accretion disk precessing around the black hole. The investigation of SS433 carried out by A M Cherepashchuk led to the identification of a new class of galactic objects, now known as microquasars. He developed effective methods of calculating the light curves, line profiles, and radial velocity curves of X-ray binaries in the framework of complex, nontraditional models; he developed methods for the interpretation of radial velocity curves that still have no analogues anywhere in the world. A M Cherepashchuk, together with disciples of Academician A N Tikhonov, developed methods for solving inverse problems in astronomy. Applying these methods, A M Cherepashchuk suggested reliable estimates of the masses of a number of black holes and neutron stars in X-ray binaries.

In 1971, in collaboration with V M Lyutyi, he discovered the retardation effect of changes in the profile of broad emission lines relative to the variability of the continuous spectrum of active galactic nuclei. The measurement of this retardation provided an opportunity to estimate the distance



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from the central black hole to the enveloping gas clouds. A search for the retardation effects in many galaxies was later added to the program of the NASA's Hubble Space Telescope. Now the study of the variability of the lines and the search for retardation effects have evolved into a new research field in studying the structure of the nuclei of active galaxies and determining the masses of supermassive black holes by the echo mapping technique. This method was used to determine the masses of dozens of black holes in galactic nuclei whose masses fall within $10^6 - 10^8$ solar masses. Dozens of masses of stellar black holes and neutron stars in binary systems were measured in the same way. This gave rise to a new area of relativistic astrophysics—the demography of stellar black holes—which studies statistical relationships between black holes, stars, and galaxies of different types.

Professor A M Cherepashchuk does a great deal of teaching. For many years now he has presented a special course ‘Close binary stellar systems’ at Moscow State University. About twenty of his students have earned CandSc degrees, and four have earned DSc degrees. He has published over 300 scientific papers and several monographs.

Anatolii Mikhailovich's most important scientific work has been published in the following monographs and articles:

(1) A V Goncharkii, A M Cherepashchuk, A G Yagola *Numerical Methods for Solving Inverse Problems in Astrophysics* (Moscow: Nauka, 1978);

(2) A V Goncharkii, A M Cherepashchuk, A G Yagola *Ill-Posed Problems in Astrophysics* (Moscow: Nauka, 1985);

(3) A V Goncharkii, S Yu Romanov, A M Cherepashchuk *Finite-Parameter Inverse Problems in Astrophysics* (Moscow: MGU Publishing House, 1991);

(4) A M Cherepashchuk, N A Katysheva, T S Khruzina, S Yu Shugarov *Highly Evolved Close Binary Stars: Catalogue* (Amsterdam: Gordon and Breach, 1996);

(5) A M Cherepashchuk "Search for black holes" *Physics – Uspekhi* 46 335 (2003).

A M Cherepashchuk is not hiding in his ivory tower: he successfully combines great amounts of academic work with extensive scientific-organizational and popularization activities. As GAISH MGU director, he is totally insistent on the need to create a modern astronomical observatory at Moscow State University, which is so necessary for raising young specialists in astronomy. He is Vice Chairman of the RAS Learned Council on Astronomy and chairs one of its sections, and also heads one of the leading scientific schools in Russia on the physics of close binary stellar systems. He is a member of the organizing committee of the commission of the International Astronomical Union, a member of the Royal Astronomical Society, and Vice President of the European Astronomical Society. He is one of the most active proponents of the revival of the Moscow Planetarium.

For many years, Anatolii Mikhailovich has been Deputy Editor-in-Chief of the RAS *Astronomical Journal*, and has sat on the editorial boards of the journals *Nature*, *Earth and Universe*, and the international journal *Astrophysics and Space Science*. Anatolii Mikhailovich's vigorous activities to promote astronomical knowledge are widely known. He is a tireless warrior against fake science and militant ignorance, which inundate the pages of mass media and television. His popular books on astronomy and the physics of black holes became bestsellers, and went through several reprints.

Anatolii Mikhailovich Cherepashchuk has State awards and medals for his achievements in science and in training cadres for astronomy: Order of Honor (2005), Order of Friendship (1999), and the medal In Memory of the 850th Anniversary of Moscow (1997). In 2008, he was awarded the State Prize of the Russian Federation in science and technologies. In 2002, the RAS conferred upon him the A A Belopolskii prize. He is the winner of Lomonosov Prizes of Moscow State University for teaching activities (2001) and for research (1988), and still earlier won the Lenin Komsomol Award for his series of works on inverse problems in eclipsing binary stars (1974).

Anatolii Mikhailovich is one of the organizers and active participants of many activities of the RAS Scientific Council on Astronomy. When managing his team, he is a master of stimulating its activity, willingly takes on the work of resolving key issues, and is invariably cheerful and resourceful, and always encouraging and optimistic. Correspondingly, while the members of the Council wish Anatolii Mikhailovich all the best from the bottom of their hearts on this wonderful jubilee and hope that he makes new creative contributions to science, they wish him at the same time the generation of new organizational ideas, energy, and enthusiasm in serving his beloved astronomy — all the factors that

are key elements so much needed by the astronomical community in our complicated times, something that was habitually heaped on this community by Anatolii Mikhailovich.

We sincerely wish Anatolii Mikhailovich Cherepashchuk, his family, and his friends health and happiness!

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