

▲ **Fig. 4:** Optical image of SN 1987A in the Large Magellanic Cloud, a companion galaxy to our Milky Way Galaxy (taken 28 November, 2003). The ring, believed to be a circular ring with a radius of 0.2 pc observed at an angle, was created by presupernova mass loss. The bright spots on the ring are where the supernova shock front is driving shock waves into the dense ring material. The asymmetric central region is supernova debris heated by radioactive decays. (NASA/Hubble/STScI)

multiwavelength observations since that time have failed to give any evidence for the compact object. The optical emission from the region of the explosion can be attributed to power input by radioactive decays of ^{44}Ti (Fig. 4). Current limits on the luminosity of any compact object are orders of magnitude smaller than the power output of the Crab pulsar, and are lower than expectations for accretion onto a quiet neutron star. Accretion onto a black hole, with low radiative efficiency, is one possibility, but a quiet neutron star with little mass around it cannot be ruled out. Fortunately, the emitting supernova ejecta are becoming more extended and more optically thin with time, so it is just a matter of waiting until the mystery at the center reveals itself.

The increasing power of space and ground-based observatories is giving us the possibility of following through the supernova explosion to the effects of a central compact object and circumstellar interaction around massive stars. These phenomena tell us about fundamental astrophysical issues: the ejection of heavy elements and energy into the interstellar medium and the early evolution of neutron stars. The number of well-observed objects is still small; as it increases, we will have a clearer view of the diverse paths of massive star death.

About the author

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Lithuanian Physical Society

Zenonas Rudzikas, Rasa Kivilšienė

The history of physics teaching and physics research in Lithuania goes back to the sixteenth century, when in 1579 the University was founded in Vilnius, the oldest university in Eastern Europe. Physics was always taught there together with the other natural sciences. The newest achievements in physics were presented to the students with some delay, mainly caused by low speed of travel of the newest scientific literature to this then remote part of Europe.

In 1773 the Rector of Vilnius University, M.Poczobut-Odlanicki, presented a draft for an Academy of Sciences in Vilnius; however, perhaps due to the complicated political situation in that region at that time, the initiative did not become a reality.

In the 19th century physics was taught in the old Vilnius University in a particularly modern way, because at that time there existed especially good contacts of local professors with their colleagues in France, England and other European countries. It also became common to buy modern equipment from these and other countries. The Vilnius University observatory also had strong links with a number of observatories in Western Europe.

The recent roots of the Lithuanian Physical Society (LPS) originated in the Lithuanian Scientific Society (LSS) founded in 1907, when Lithuania was still the so-called North-West Region of the Russian tsarist empire. The core of the LSS consisted of educated Lithuanians of various specialities, physicists and engineers included, who had the desire to collect and preserve the Lithuanian ethnographical cultural artefacts, to contribute to the education of the people, and to build up the national self-esteem. Much attention was paid to collecting data on geology, botany, zoology and other branches of science, to writing and publishing textbooks and popular scientific literature.

The LSS had its own library, its collection of manuscripts, an ethnographic archive, and museum. It also edited the journal "Lietuvių tauta" ("Lithuanian Nation") (1907-1936).

Special attention was paid to writing and publishing textbooks. During 1915-1920 about 100 textbooks for Lithuanian schools were written and published. When the Vilnius region was occupied by Poland in 1920, the LSS became very active in opening the new university in Kaunas, then the temporal capital of Lithuania.

In 1928 the Society of the Students of Physics and Mathematics was founded at Kaunas University, and in 1931 the Lithuanian Society of Natural Scientists. The latter was active up to 1940. It had about 200 members representing the physical, mathematical, chemical, biological, geological and medical sciences.



◀ **Fig. 1:** Emblem of LPS

In 1934 a separate section of physicists and chemists was established in that Society. Povilas Brazdžiūnas was elected its chairman. Later he became the first President of the Lithuanian Physical Society. The main goal of this section was to disseminate the most important achievements in the natural sciences among the population and to consolidate the scientists by sharing their experience in research.

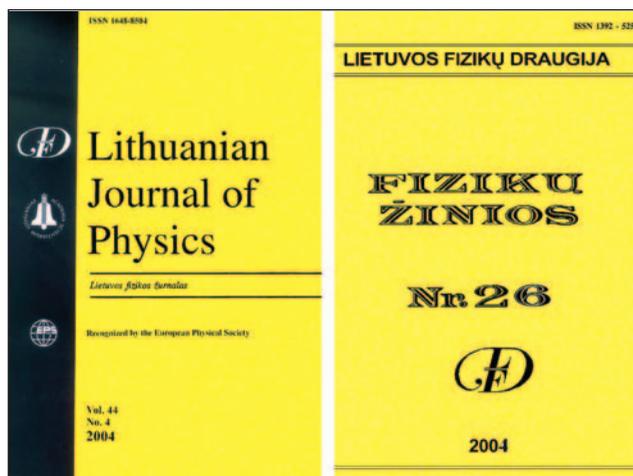
After World War II when Lithuania was incorporated into the USSR, the so-called Republican Meetings of Physicists were organized periodically starting in 1954. Actually they continued the traditions of the former meetings of the Lithuanian natural scientists. Gradually these meetings have become the National Physics Conferences (officially the word “National” was not used...). They were dedicated to the analysis of physics research and teaching as well as to the history of physics in Lithuania. The problems of the foundation of new research institutions, the coordination of physics research, the methodological aspects of physics teaching in secondary and higher schools, the demonstration equipment of physical experiments, the popularization of physics, physics terminology in the Lithuanian language, etc were considered during such meetings.

In 1962, during the 5th National Physics Conference, the idea of the foundation of the Lithuanian Physical Society (LPS) was raised by the founder of the scientific school of modern theoretical physics in Lithuania, Academician Adolfas Jucys, whose centennial jubilee was celebrated in 2004. The LPS was officially founded in 1963, when Lithuania had already been incorporated for 23 years into the Soviet Union. It was the only Physical Society in the USSR, the Union formally consisting of fifteen “independent” Republics. There was no USSR Physical Society, therefore the creation of an official legal Scientific Society, having its own registered Statute, in a separate Republic, was a unique event in the USSR. It had not only scientific, but also certain political significance.

The LPS is older than the European Physical Society (EPS) that was founded in 1968. The first chairman of the LPS was an Academician of the Lithuanian Academy of Sciences, Povilas Brazdžiūnas. He was the founder of contemporary experimental physics in Lithuania and initiated a number of new research directions in Lithuania (semiconductor physics, radiophysics, quantum electronics). He was also the author of a number of physics textbooks in Lithuanian. Under his supervision a very large Lithuanian-Russian-English-German dictionary of physical terms was prepared in collaboration with linguists and published in 1979. Now an updated and even more extended version is under way (including the French language). In it the new achievements in the physical sciences during the last decades as well as the changes in the Lithuanian physical terminology have been taken into account. He has served in this capacity during 1963-1966 and 1968-1986. During 1966-1968 Academician Paulius Slavonas was chairman of the LPS. His main domains of interest were astronomy and history of science.

In 1986-1995 Academician Algirdas Šileika became the chairman of this Society. Under his leadership in 1992 the LPS became a member of the EPS. Since 1995 Academician Zenonas Rudzikas serves as chairman (President) of the LPS.

It may seem that the elected chairmen serve too long. However, it takes time to learn the peculiarities of the activities of such an organization, having no paid staff, and particularly now in the age of globalization and modern information technology that opens new possibilities of international co-operation. However, indeed in future the President must serve not more than two four-year terms.



▲ Fig. 2: Title pages of “Lithuanian Journal of Physics” and its supplement “Fizikų žinios”

In 1961 even before the formal establishment of the LPS, “Lietuvos fizikos rinkinys” (Lithuanian Physics Collection) – the only physical journal in Lithuania – was founded. Before that papers on physics research were published in the “Proceedings” of the Lithuanian Academy of Sciences, in publications of Vilnius University, etc. The papers were published in Russian with the Summaries in Lithuanian and (usually) English. Since 1974 the Journal has been translated into English and published by Allerton Press Inc. under the strange title “Soviet Physics-Collection”. Since 1989 it became the “Lithuanian Physics Journal”.

Since its establishment the LPS has been in charge of this journal and continues its publication. Since 2000 it is published only in English with summaries in Lithuanian. The present title is “Lithuanian Journal of Physics” (6 issues a year, www.itpa.lt/~lfd/Lfz/LFZ.html). Since 2002 it has the rank “Recognized by the European Physical Society”.

Since 1990 the LPS publishes the supplement “Fizikų žinios” (“Physicists News”) to the Journal twice a year in Lithuanian (www.itpa.lt/~lfd/fiziku_zinios/FizikuZinios/html/). There are included popular papers on physics, on physics terminology, information on the activity of the LPS and the EPS, jubilees, etc.

LPS also encourages the publication of physical literature, both pedagogical and popular, even ‘humorous’ physics. Those who would like directly to contact the Board of the LPS are kindly asked to send messages to lfd@itpa.lt.

The Charter of the LPS in the light of the changing political circumstances and the needs of the Society itself was revised and updated in 1972, 1985, 1990 and 1997. These changes were presented to and approved by the majority of its members at LPS conferences. At present the Board of the LPS consists of 21 members. They are grouped into the Organizational, Science, Studies and Publications commissions.

At the beginning of the activity of the LPS physics teachers were among its members, but since 1995 they have established the Association of Physics Teachers. They are organizing separate conferences as well as a number of other initiatives. Nevertheless they coordinate their activities with the Board of the LPS. Moreover, the President of this Association, Saulò Vingeliënò, is a member of the LPS Board. Their website is as follows: www.lfma.ivi.lt.

The main duties of the LPS commissions are as follows.

The Organizational Commission is mainly in charge of the documentation of the membership, archives of the LPS, studies of

the history of physics in Lithuania, international relations, organization of the Board meetings, contacts with the EPS, etc.

The Science (Research and Development) Commission is concentrating its activity on the organization of the National Physics Conferences (since the first meeting of the physicists of Lithuania after World War II already 35 conferences have been organised), participation in European science projects, international agreements, etc. There are now signed co-operation agreements with the physical societies of Poland, Russia, Taiwan and the UK. Similar agreements with the physical societies of a number of other countries are in progress.

The Studies Commission is paying its main attention to the improvement of physics teaching in secondary and higher schools, to writing textbooks in the national language (teaching in schools and universities of Lithuania even during the Soviet period was as a rule in the Lithuanian language), to the organization of conferences on the methodology and history of physics, etc. Several researchers have obtained their PhD degree while investigating the history of physics in Lithuania.

The Publications Commission is concerned with the edition of scientific and popular physics journals, the popularization of the physical sciences, the development of physical terminology, etc.

One may also mention a few other initiatives of the LPS, which may be of interest to readers.

In 1972 the LPS has established the so-called 'physics school by correspondence'. In 1973 it obtained the name "Fotonas" (Photon). The duration of participation in it is four years (the last four years in secondary school). Twice a year its members receive a number of physical problems, which they must solve. Now they can find them and send the solutions by internet. The most successful pupils are invited to participate in the so-called summer

camp of "Fotonas", where they listen to the lectures of known professors, participate in the discussions, etc. After graduating from this school they receive the relevant certificates with the recommendation to study natural sciences (please visit www.fotonas.su.lt/photon.phtml).

The LPS also encourages the organization of the National Physics Olympiads (there have already been organized 52 such Olympiads) as well as participation in the World Physics Olympiads.

Since 1995 there has also been organized the special school of additional training in physics "Fizikos Olimpas" (Physics Olympus), aimed at further improvement in the level of physics knowledge (excellence) of the gifted pupils. Usually the national team of participants in the World Physics Olympiad is formed from the best pupils of this special school.

Every year on the first Saturday of April, Vilnius University Physics Faculty organises the 'Day of Physicists'. Its symbol is Din(o)Saur and its slogan is: "The dinosaurs have become extinct but physicists have survived" (please also visit www.fidi.lt/).

Since 1995 Lithuanian physicists are regularly receiving "Euro-physics News". This physics journal is very useful to feel the pulse of European physics, to be kept informed about the activities of our colleagues in other countries, about international conferences, schools or seminars, about new achievements in physics, etc.

The main challenges of the LPS for the future remain the same as they have been formulated at the foundation of the Society, namely,

- to contribute to the development of research in physics in Lithuania and to encourage the co-operation of physicists from all research and educational institutions of Lithuania;
- to organize National Physics Conferences with the participation of foreign scientists;
- to monitor the quality of teaching of physics on all levels;
- to popularize the achievements of physics among the population, particularly in schools.

However, in the age of globalization and modern information technologies and with its entrance into the EU and NATO, Lithuania faces new challenges and frontiers. Among these are the need to participate in the creation of the European Research Area, to encourage international scientific co-operation, to contribute to the formation of a critical mass of researchers, to pay more attention to interdisciplinary research, to develop practical applications of the results of fundamental research, to improve contacts with industry, to attract girls to study physics, etc. The LPS is ready and willing to participate in the solution of these problems.

About the authors

Zenonas Rudzikas during 1992 - 2003 was elected the Director of the Vilnius University Research Institute of Theoretical Physics and Astronomy. In 1994 he was elected the Academician of the Lithuanian Academy of Sciences. Since 2003 he has been President of the Academy. His research interests are in mathematical physics, particularly in the areas of plasma physics and astrophysics. He is a member of the EPS Executive Committee and the President of the Lithuanian Physical Society.

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◀ Fig. 3: Symbol of Vilnius – Gediminas Tower