



**The Abdus Salam  
International Centre for Theoretical Physics**



**2234-11**

**Meeting of Modern Science and School Physics: College for School  
Teachers of Physics in ICTP**

*27 April - 3 May, 2011*

**Science education in Russia**

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Moscow*

*Russian Federation*

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"MODERN SCIENCE EDUCATION" foundation, Moscow, Russia

# **SCIENCE EDUCATION IN RUSSIA**

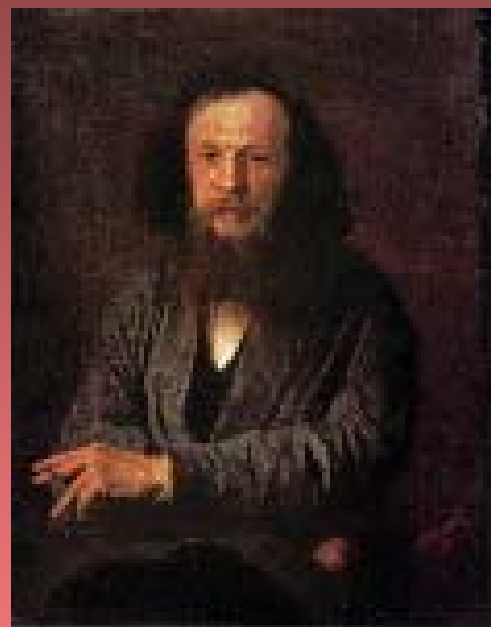
Trieste, 2011

# The main landmarks of science education in Russia

- 1701 the first state educational institutions were organized: navigation, cannon and other ones
- Russian Academy of Sciences in Petersburg established in 1724
- in 1755 Moscow university was founded
- at the beginning of 19 century by M. Speranskyi reforms the education system was distributed by regions and locked on universities; three types of colleges were established : elementary, regional and provincial ones (gymnasium)
- 1872 – the year of foundation of Moscow polytechnic museum



**N.A.Lobachevsky**



**D.I.Mendeleev**

# Russian education before the first World War

**As a result of two centuries development were obtained some positive results:**

- There were 8 universities and about 20 technical colleges with more than 100.000 students.
- In elementary schools, gymnasiums and lyceums there were about 2 mln. Pupils.
- A number of russian technical elaborations became world-renowned, russian scientists and professors were famous, world recognized (such as Lobachevskiy, Mendeleev, Sechenov and many others).

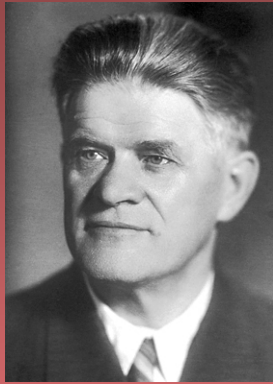
**However,**

it had a number of serious shortcomings caused by socio-economic and political problems. Thus by 1914 70% of russian population was illiterate so it distinguished Russia from leading western countries

## The following factors promoted the hitch to a peak of scientific knowledge:

- 1. Russian elite university education from the very beginning excelled by the profound thoroughness. Initially universities and gymnasiums were discerned as the necessary constituent part of Russian Academy of Sciences. Moreover it is important that absolute majority of famous Russian scientists taught in universities what promoted natural origination and quick maturization of scientific schools.
- 2. Gymnasium education (as well as in real colleges) had no analogs in European education and it meaningfully excelled the European ones by level of knowledge. Russian' elite schools advantageously differed from usual European schools by the width of the scope of studied subjects and by the solidness of their learning. It was difficult to study in these schools, however a result of "overloaded" school programs an erudition of pupils raised - they were potentially future scientists and inventors.
- 3. It is also necessary to point out about the unique practice of tens of university professors and pedagogs of leading technical institutions of Petersburg and Moscow who delivered popular lectures for schoolchildren and they also regularly held studies and seminars in gymnasiums and real colleges.

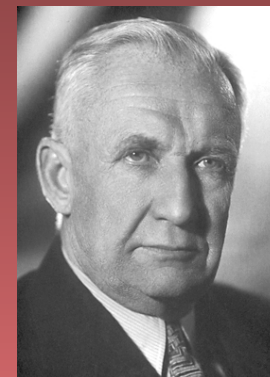
# NOBEL



P. A. Cherenkov



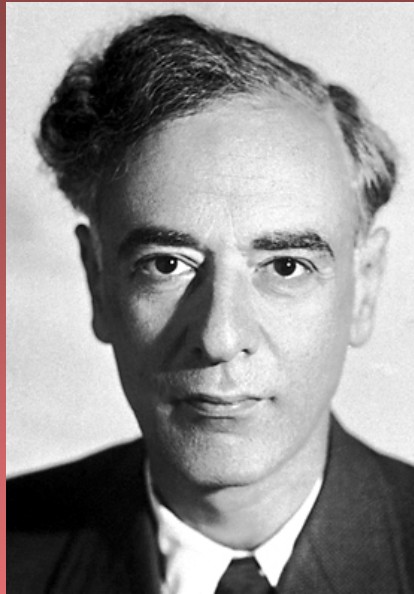
I. M. Frank



I. Ye. Tamm

**1958** - for the discovery and the interpretation of the Cherenkov effect

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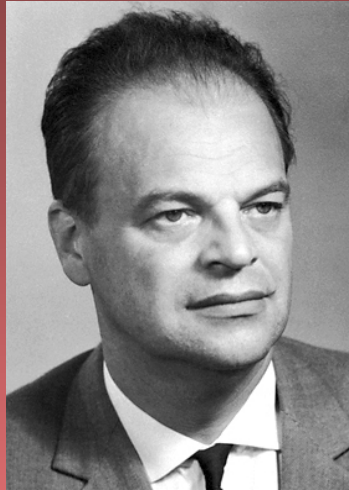


L. D. Landau

**1962** - for his pioneering theories for condensed matter, especially liquid helium



# NOBEL



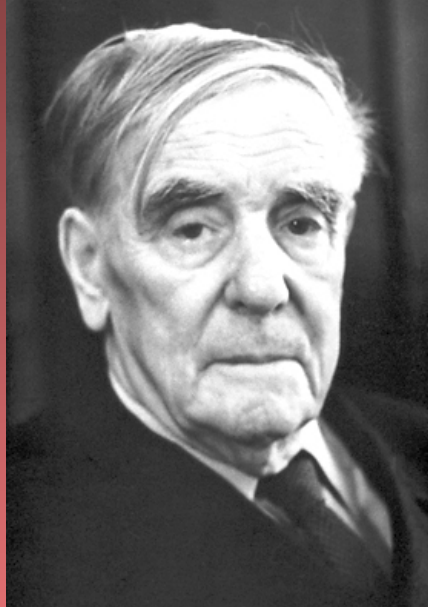
N. G. Basov



A. M. Prokhorov

**1964** - for fundamental work in the field of quantum electronics, which has led to the construction of oscillators and amplifiers based on the maser-laser principle

# NOBEL



P. L. Kapitsa

**1978** - for his basic inventions and discoveries in the area of low-temperature physics

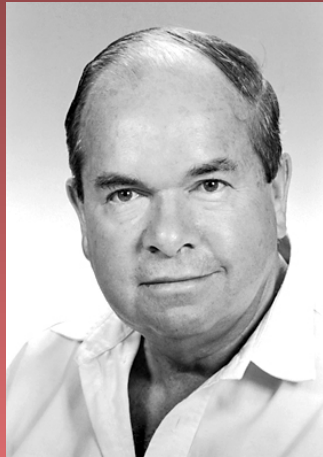
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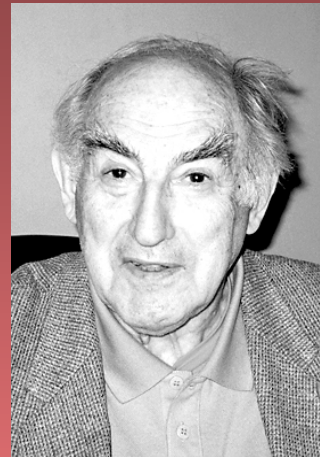
Zh. I. Alferov

**2000** - for developing semiconductor heterostructures used in high-speed- and optoelectronics

# NOBEL



A. A. Abrikosov



V. L. Ginzburg

**2003** - for pioneering contributions to the theory of superconductors and superfluids

# NOBEL

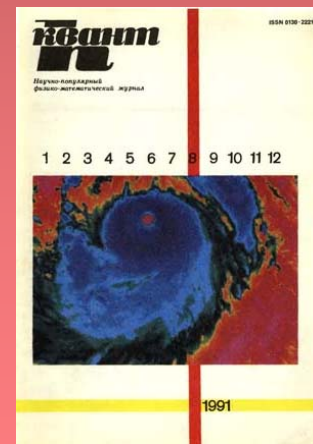
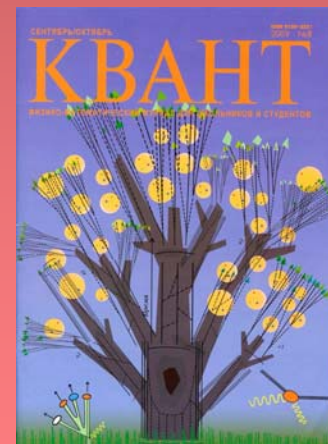
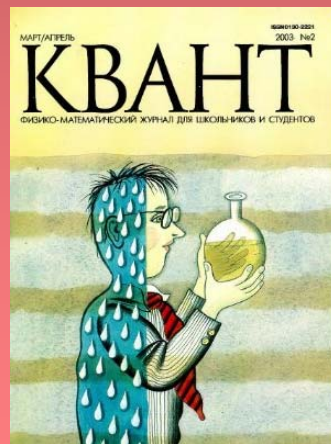
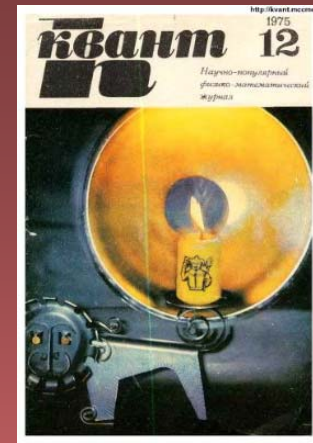
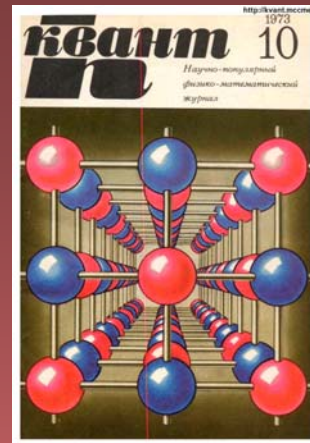
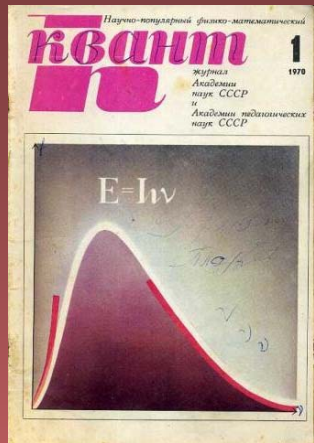


A. Geim



K. Novoselov

**2010** - for groundbreaking experiments regarding the two-dimensional material graphene





**George Soros**

# **International Soros Science Education Program**

**Support for education in the fields of  
physics, chemistry, mathematics,  
biology and Earth sciences  
in Russia  
1994 - 2005**



# Grants to Educators

## Criteria of Selection

### Ω High School Teachers

The best teachers are selected by their students who are currently enrolled in colleges and universities (80,000 students polled annually)

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### Ω Professors

#### Ω Associate Professors

Evaluations are based on the citation index, teaching load, quantity and quality of publications (evaluated using impact factor of journals), and grants received. In all, there are approximately 20 indexes used for computerized selection

Olympiads  
**840,000** participants

Undergraduate  
Students – **8,100**

Graduate&Ph.D.  
Students – **4,630**

## High Schools

## Universities

**89** winners  
of intl.  
Olympiads

**High School  
Students**

**Undergraduate,  
Graduate and Ph.D.  
Students**

**High School  
Teachers**

**Associate Professors  
and Professors**

High School  
Teachers – **27,000**

Associate  
Professors – **2,350**

Professors  
**2,830**

# ISSEP Geography



**2.600 locations and 5.400 high schools**

# Directions of Activities Carried out by Laureates

- ∞ Conferences for High School Teachers
- ∞ Educational Journal
- ∞ Encyclopedia of Modern Natural Sciences
- ∞ Olympiads for High School Students
- ∞ Publishing of the best textbooks for High Schools

# Conferences for High School Teachers

Professors lectured at **450** conferences for high school teachers carried out in **74** cities over the country.

High School Teachers participated in round-table discussions on current Core Curriculum for each discipline at these conferences.

# Educational Journal

Soros Professors wrote review articles on recent scientific achievements for high school, college and graduate students and teachers.

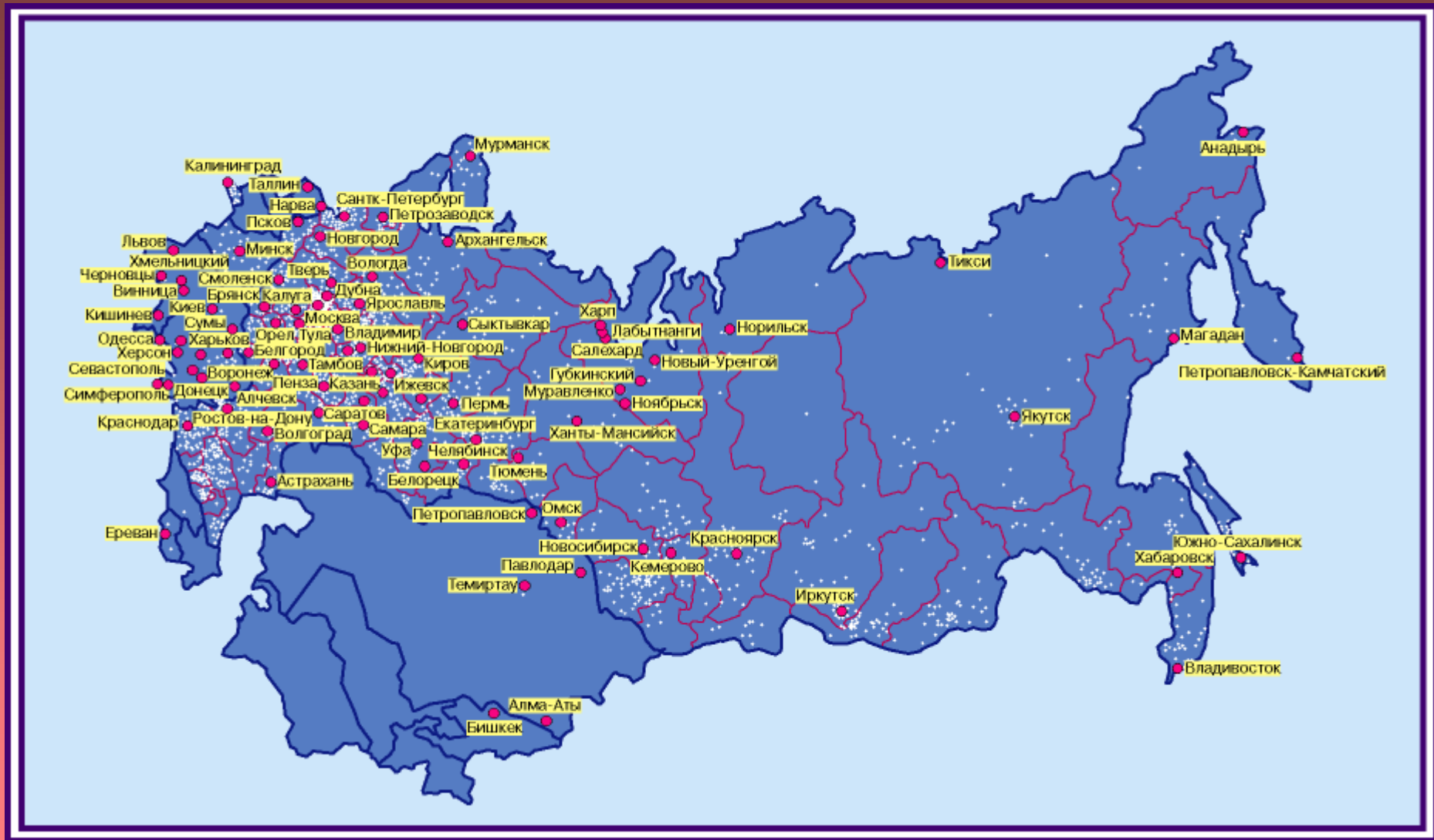
For 6 years 70 issues with 1,100 articles were published, total circulation (free of charge) is 2,000,000 journal copies. All high schools' and universities' libraries were receiving journal monthly.

There is a Georgian version of the SEJ.

# Olympiads for High School Students

Over **840,000** students in **3,500** high schools from **1,350** cities all over the countries solved problems in three rounds of Olympiad.

# ISSEP GEOGRAPHY



**74 cities, where conferences were held**





**Dmitry Zimin**



# Dmitry Zimin foundation “DYNASTY”

## *ALL-RUSSIAN CONTESTS OF HIGH SCHOOL TEACHERS*



# NOMINATIONS OF TEACHERS

AWARD FOR EXTRAORDINARY ENDOWMENT  
IN SCIENCE EDUCATION

**4**  
LAUREATS

CONTESTS

TUTOR FOR FUTURE SCIENTIST

**363**  
LAUREATS

EDUCATOR OF A PUPIL

**30**  
LAUREATS

YOUNG TEACHER

**101**  
LAUREATS



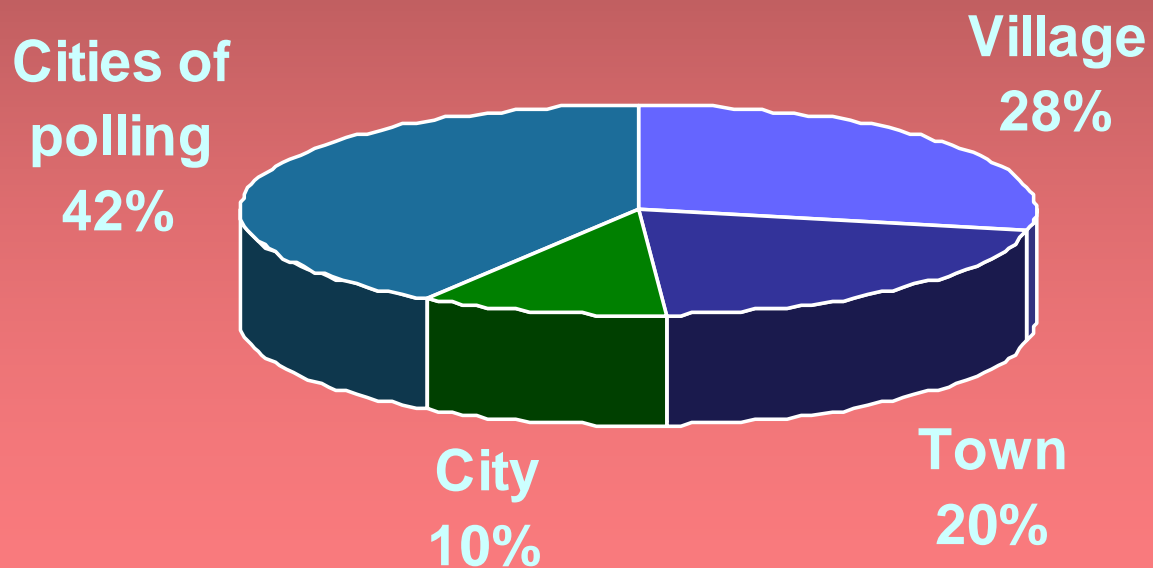
# TUTOR OF FUTURE SCIENTISTS

- ❏ IN THIS NOMINATION TEACHERS-LAUREATS ARE NAMED BY THEIR PUPILS
- ❏ MASSIVE POLLING OF STUDENTS, 53500 STUDENTS FROM 137 UNIVERSITIES AT 61 REGIONS OF RF  
EVERY STUDENT DESIGNATES BEST SCIENCES TEACHER
- ❏ COMPUTER ANALYSIS: DETERMINATION OF A NUMBER OF REFERENCES FOR EACH TEACHER
- ❏ SELECTION: REVEALING TEACHERS WITH MAXIMUM REFERENCES
- ❏ TAKING INTO ACCOUNT A TYPE OF LOCALITY



# TUTOR OF FUTURE SCIENTISTS

## Distribution of laureates by the type of locality





# LAUREATS OF ALL NOMINATIONS





# ALL LAUREATES 2005-2010

■ Chemistry ■ Biology ■ Mathematics ■ Physics

