



Implementation of the recommendations of the Scientific Council's 93rd and 94th sessions

V.G. Kadyshevsky

95th session of the JINR Scientific Council
15 January 2004

Contents

- Highlights of 2003
- JINR's Scientific Programme in 2004
- Latest news in brief

Programme - Microsoft Int...

Адрес: http://www.jinr.ru/Prog_SC94-e.htm

JINR Joint Institute for Nuclear Research

ABOUT ■ NEWS ■ INFORMATION ■ STRUCTURE ■ ACTIVITIES ■ FACILITIES

PROGRAMME

94th session of the JINR Scientific Council
Dubna, 5 - 6 June 2003

5 June 2003

1. Opening of the session	V. Kadyshevsky
2. Information on the decisions of the March 2003 session of the JINR Committee of Plenipotentiaries	V. Kadyshevsky (PPT, 21,8 Mb)
3. Comments to the Programme of JINR's Scientific Research and Development for 2003–2009	A. Sissakian (PPT, 6,069 Mb)
4. Appointment of the Expert Committee for elections at this session	
5. Appointment of the Editing Board for drafting the Council Resolution	

Laboratories:

BLTP
FLNP
FLNR
DLNP
VBLHE
LPP
LIT

Subdivisions:

DRRR
UC
AYSS
PD
STLib

Готово Интернет

ОБЪЕДИНЕННЫЙ ИНСТИТУТ ЯДЕРНЫХ ИССЛЕДОВАНИЙ
НОВОСТИ ОИЯИ

ISSN 1549-4741

JINR NEWS

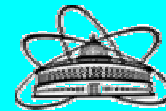
JOINT INSTITUTE FOR NUCLEAR RESEARCH



ДУБНА

4
2003

DUBNA



JOINT INSTITUTE FOR NUCLEAR RESEARCH

2003-237

A.I. Malakhov

**THE RESULTS OF 2003 AND THE RESEARCH PROGRAM
OF THE VEKSLER AND BALDIN LABORATORY
OF HIGH ENERGIES**

Report to the 95th Session
of the JINR Scientific Council
January 15-16, 2004

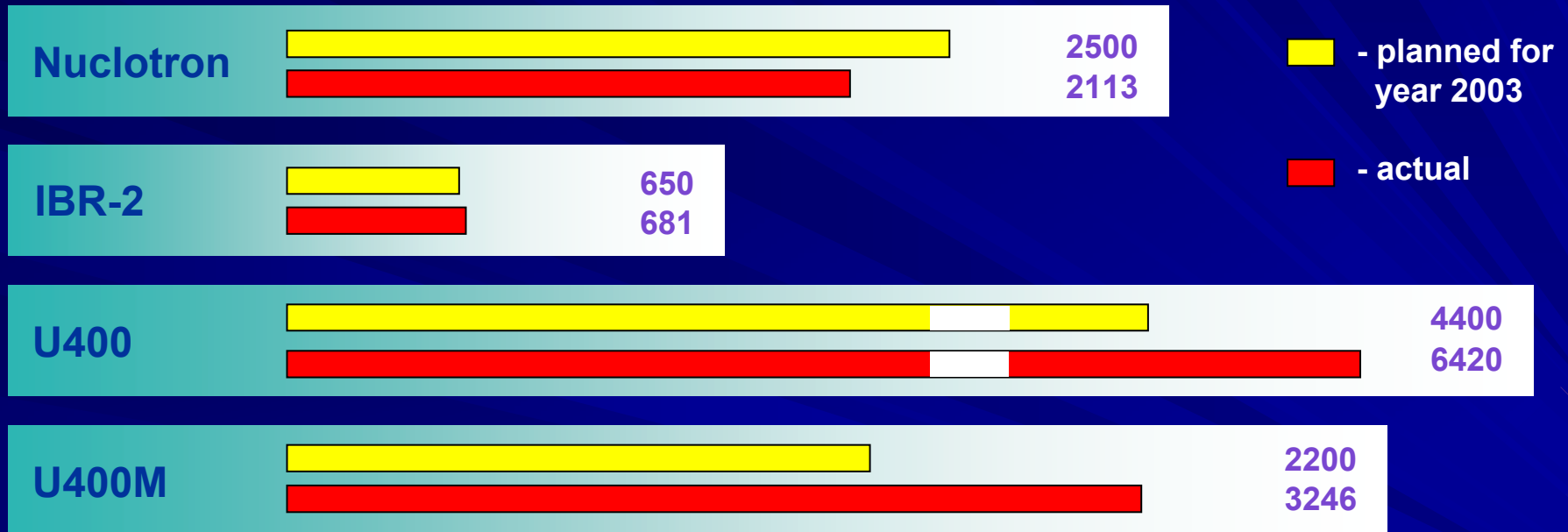
Dubna 2003

50th anniversary of the Veksler-Baldin Laboratory of High Energies



Operation of JINR facilities in 2003

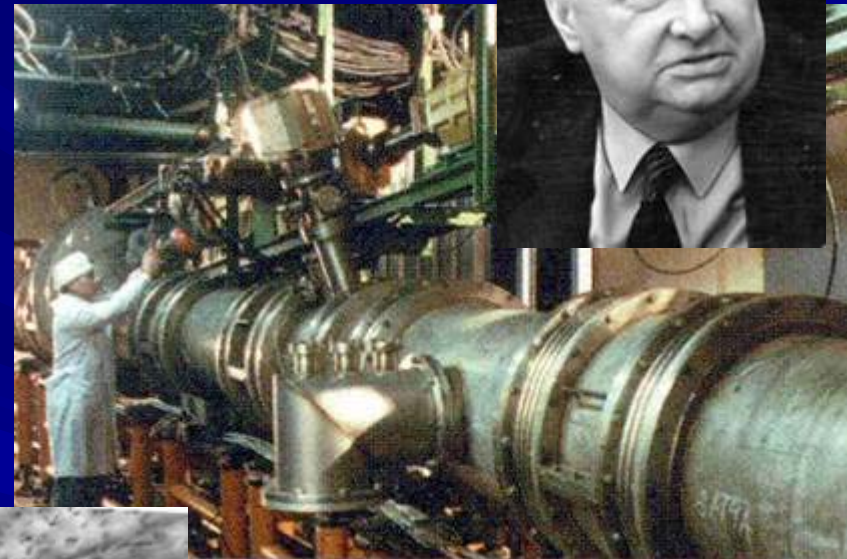
Basic Facilities



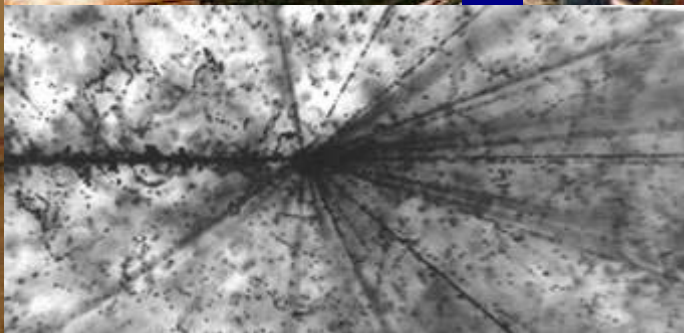
Facility operating by users' request



Veksler-Baldin Laboratory of High Energies



Krion-2



Obtaining in June 2003 of the multicharged ion beam of Fe^{24+} at the Nuclotron gives a new quality for this accelerator

Physics at the NUCLOTRON in 2003



Internal beam exp.

External beam exp.

SCAN-1

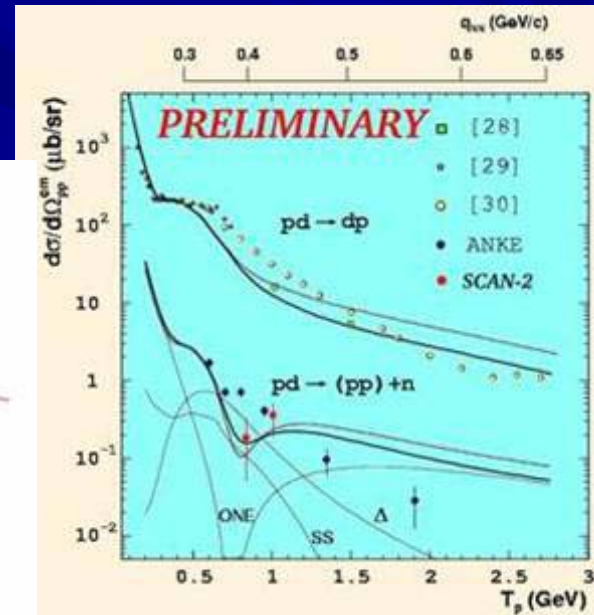
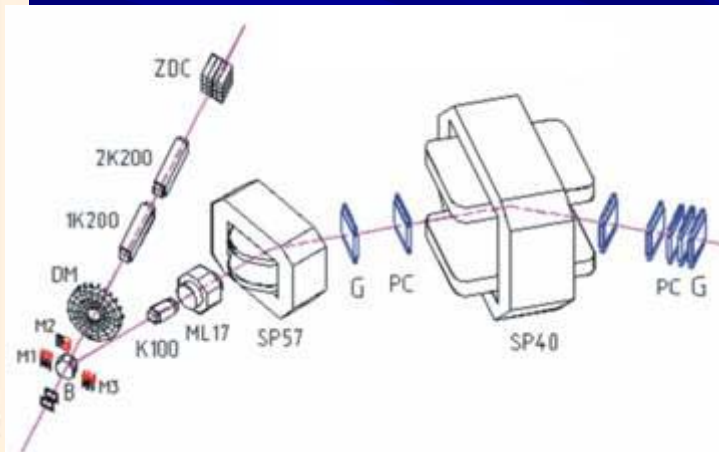
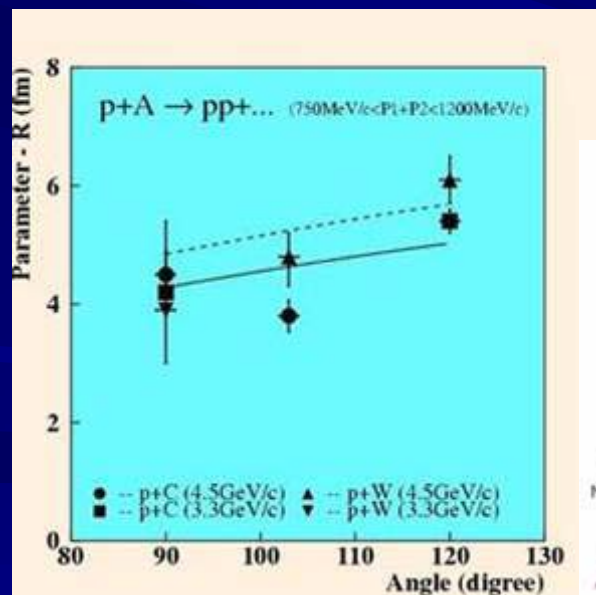
The radius of cumulative particle emission is slowly growing with increasing measurement angle

SCAN-2

Preliminary results of cross section of the reaction $d+p \Rightarrow (pp)s+n$

Polarized beam

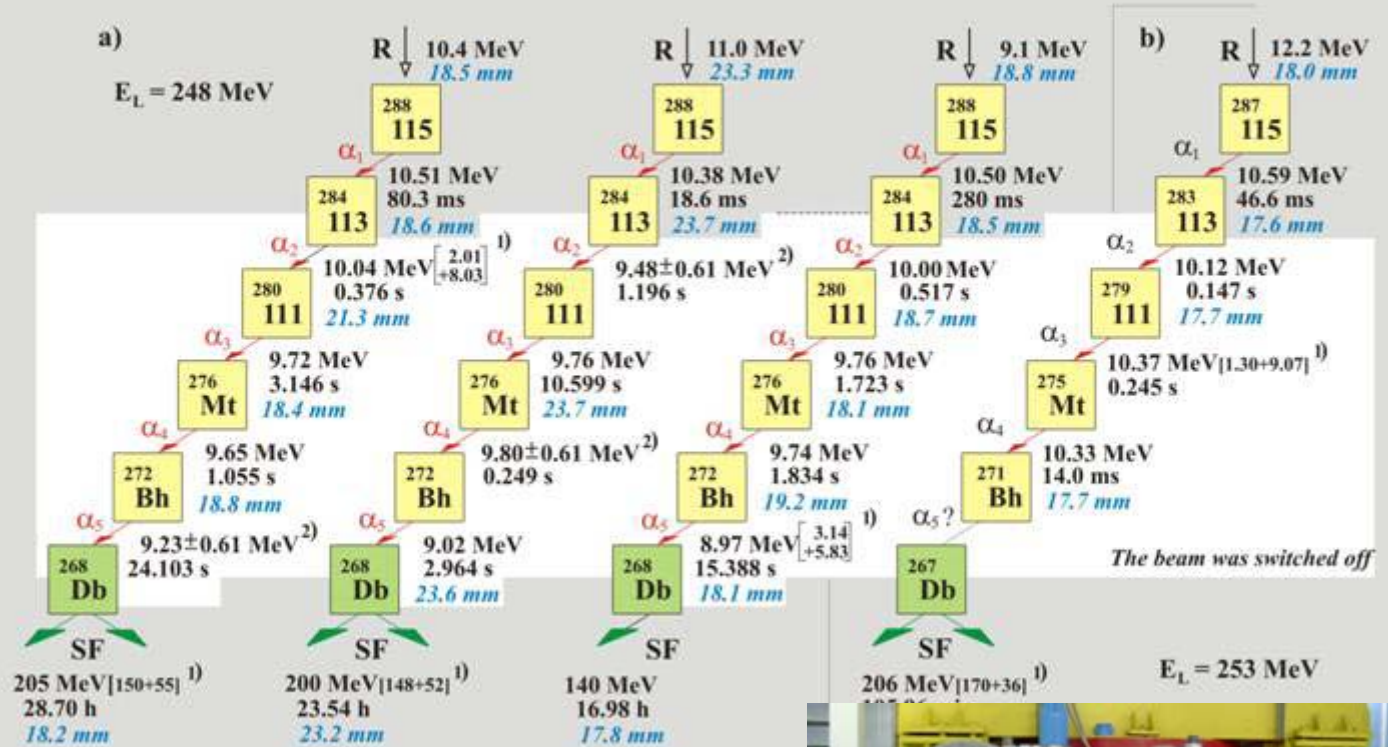
MARUSYA





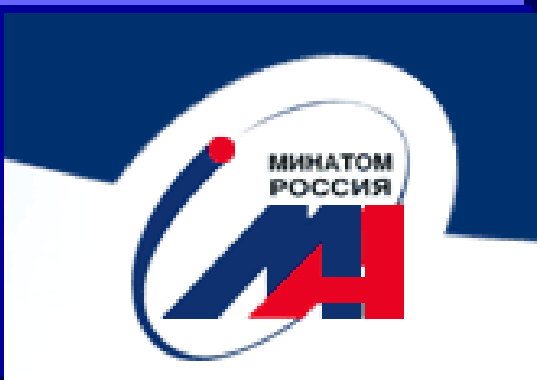
Acad. Yu. Oganessian

Decay chains of element Z=115 observed in $^{243}\text{Am} + ^{48}\text{Ca}$ Reaction



Professor P. Steyn (South Africa),
President of IUPAC, at JINR.
Dubna, 27 September 2003



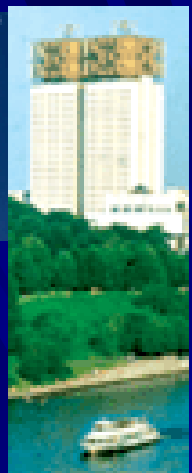


Ministry of Atomic Energy of RF

**A. Rumyantsev
Minister**



**Russian Fund
for Basic Research**



**U.S. Department
of Energy**



**Federal State Unitary Enterprise
"State Scientific Centre of Russian Federation –
Research Institute of Atomic Reactors" (Dimitrovgrad, Russia)**

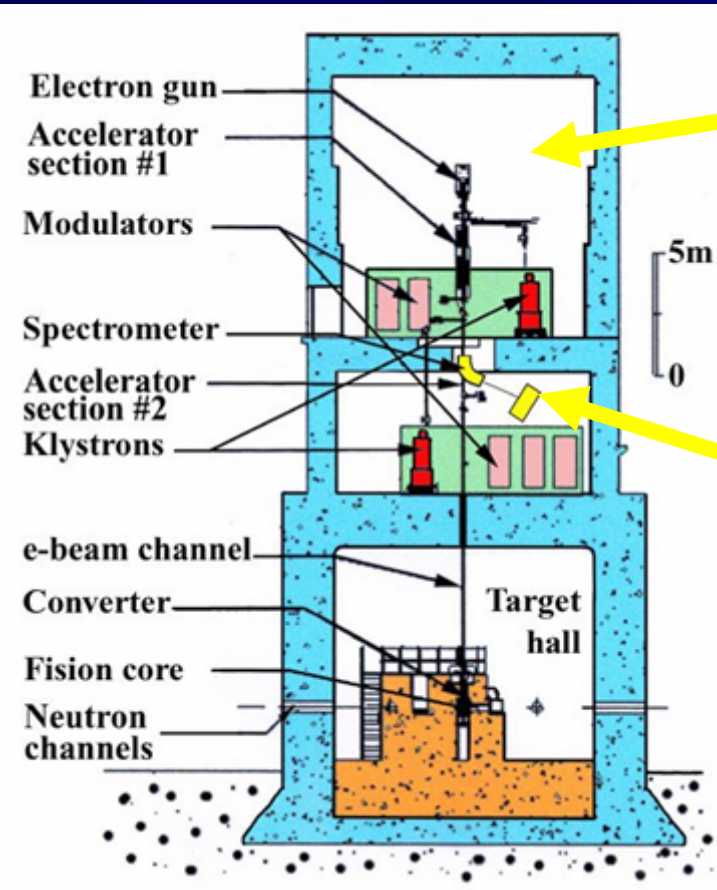
IBR-2

- “Mayak Plant” completed the manufacturing of the fuel elements for IBR-2M.
- The financial support of Minatom (10 million roubles) for the IBR-2 reactor modernization was contributed timely and in full volume.
- JINR funded the modernization of IBR-2 in the volume of 285 k\$ (114%, planned for 2003), that compensated partially the debt accumulated in 2000-2002.



The production and testing of all subsystems for the movable reflector MR-3 was completed.

IREN



Installation of the supporting elements for a new linac



IREN



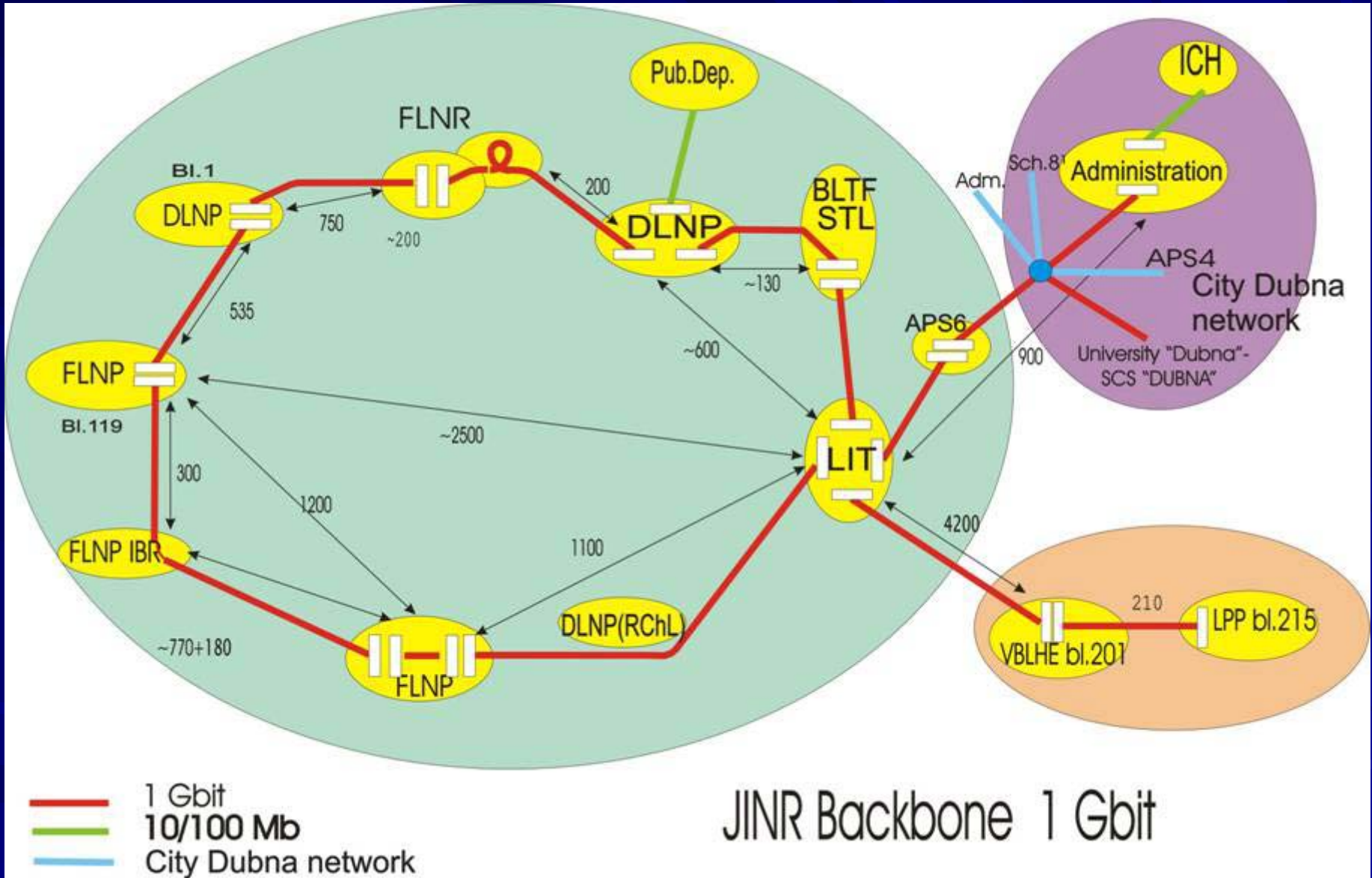
RUSSIAN RESEARCH CENTRE
KURCHATOV INSTITUTE



РОССИЙСКИЙ НАУЧНЫЙ ЦЕНТР
"КУРЧАТОВСКИЙ ИНСТИТУТ"

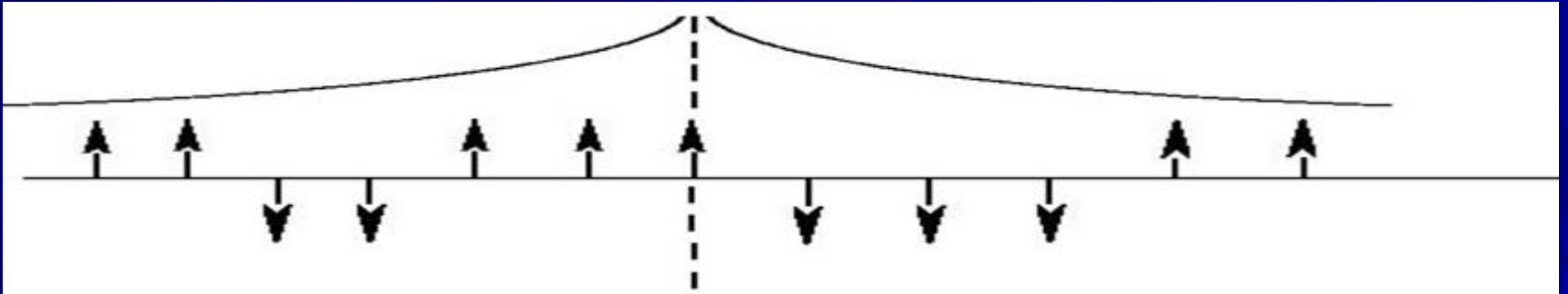


Acad. Evgeny Velikhov, President of Russian Research Centre
"Kurchatov Institute", visited JINR on 6 January 2004



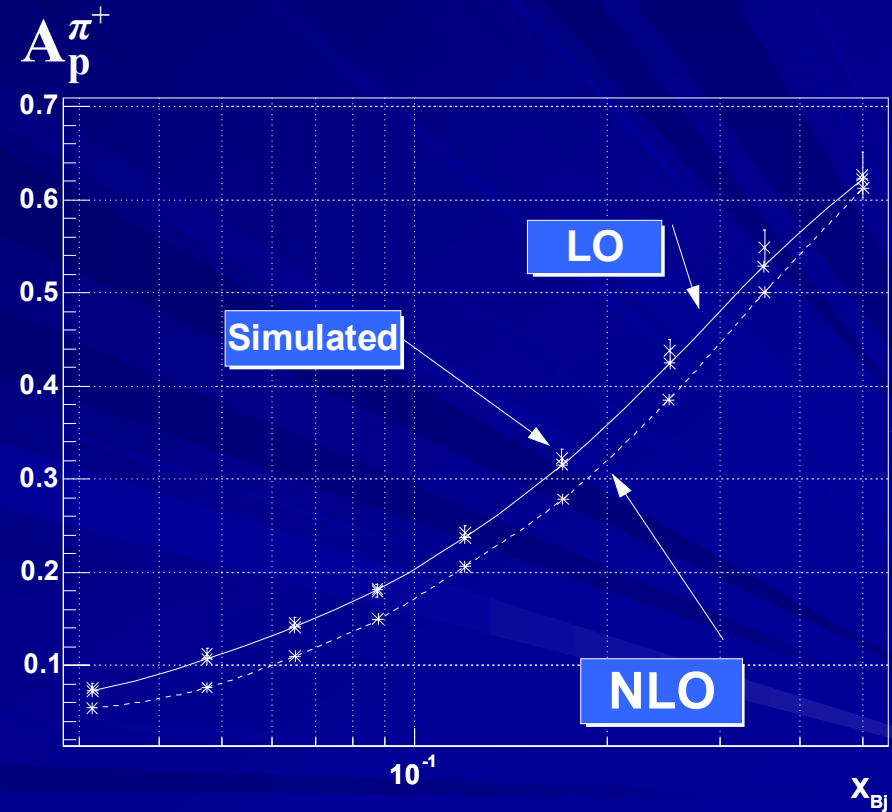
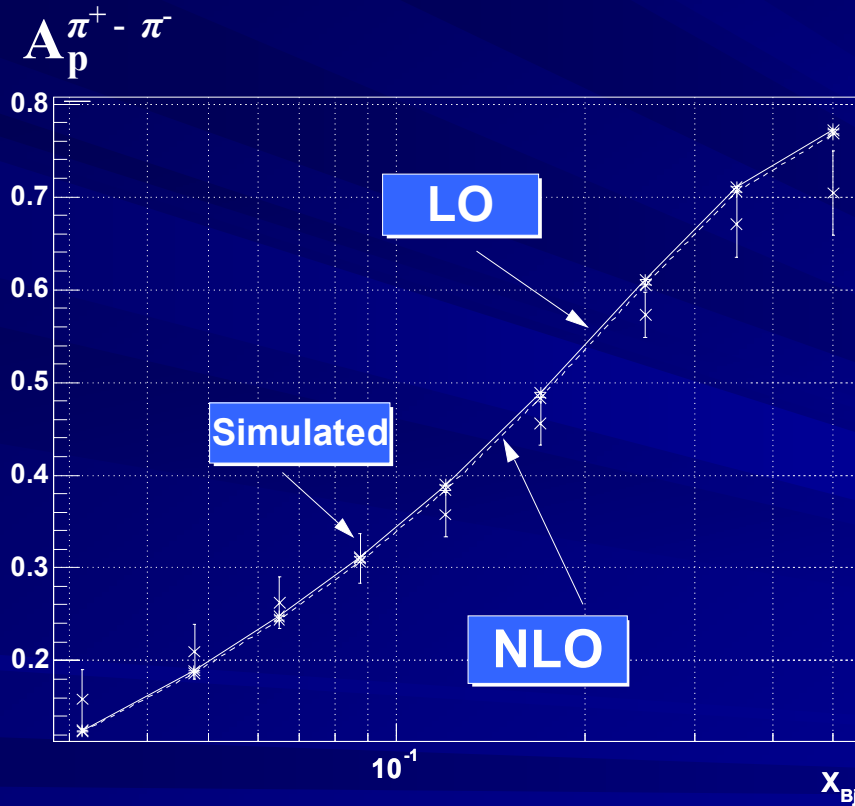
JINR Backbone 1 Gbit

Inozemtsev's System

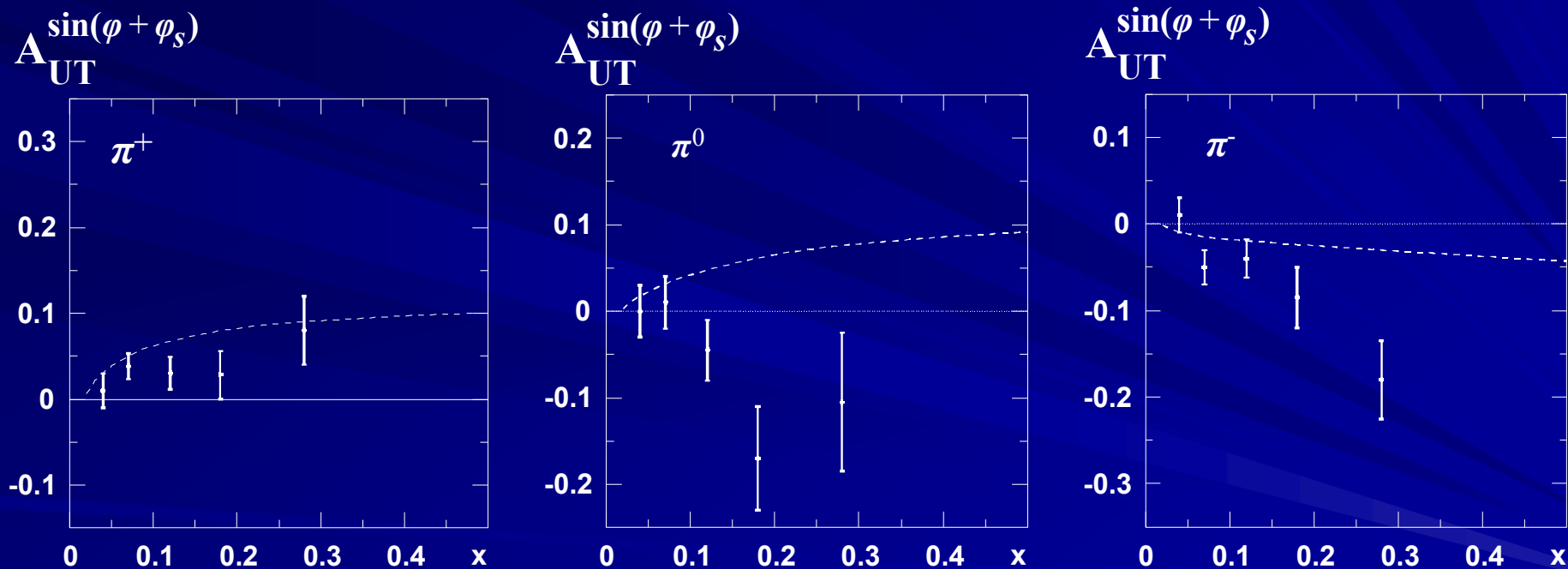


Quantum-spin chain with a long-range interaction.

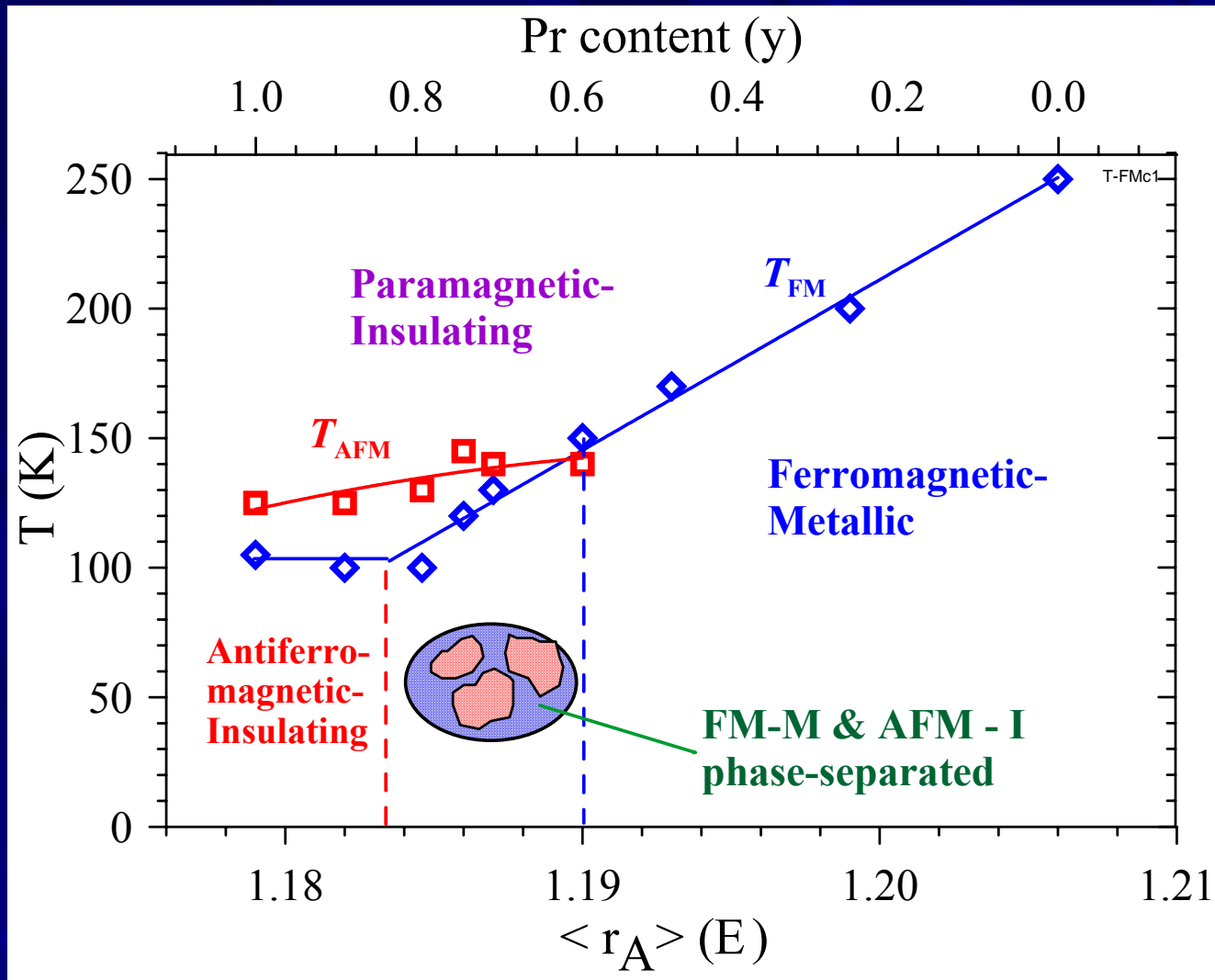
The Polarized Semi-Inclusive Deep Inelastic Scattering



The Single Spin Azimuthal Asymmetries in Pion Production



Preliminary data from HERMES (DESY)

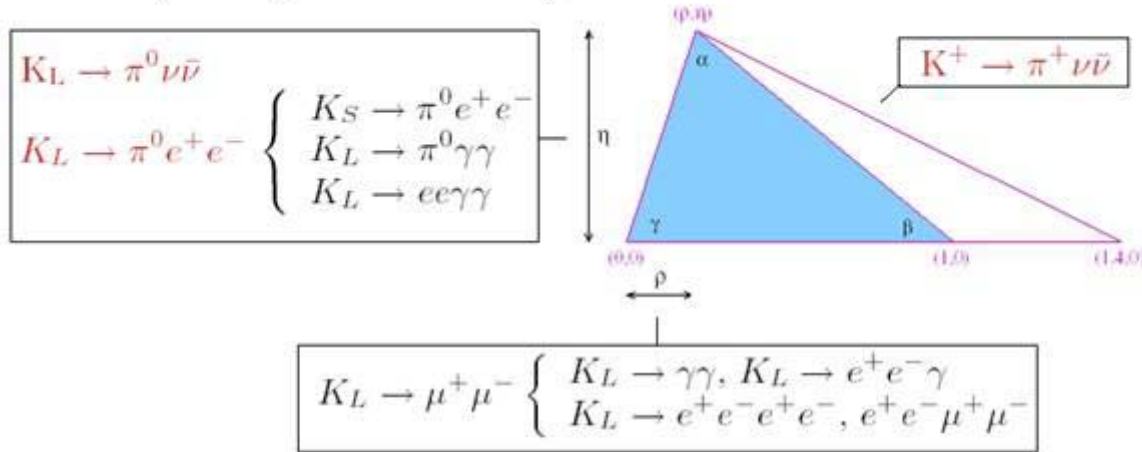


Phase diagram for $(\text{La}_{1-x}\text{Pr}_x)_{0.7}\text{Ca}_{0.3}\text{MnO}_3$: border homogeneous FM-metallic and AFM-insulating states are separated by an inhomogeneous mixture of them.

First observation of the decay $K_S \rightarrow \pi^0 e^+ e^-$

CP violation in rare kaon decays

A unitarity triangle in the kaon system :



$K_L \rightarrow \pi^0 \nu \bar{\nu}$ and $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ are theoretically clean

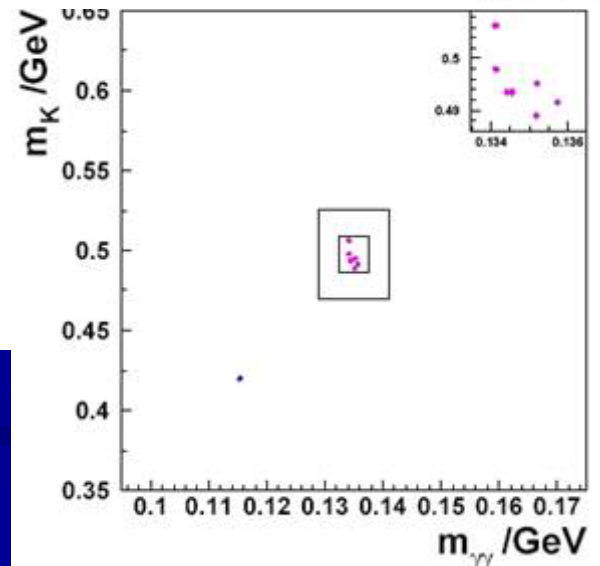
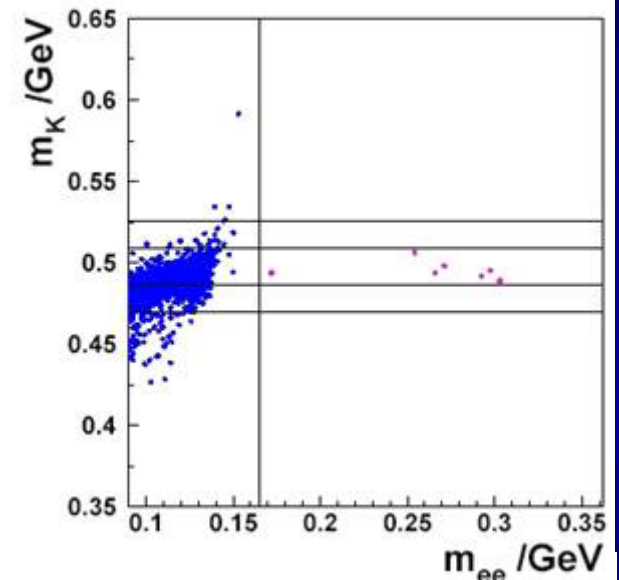
Theoretical error 2-5 %

Together determine unitarity triangle

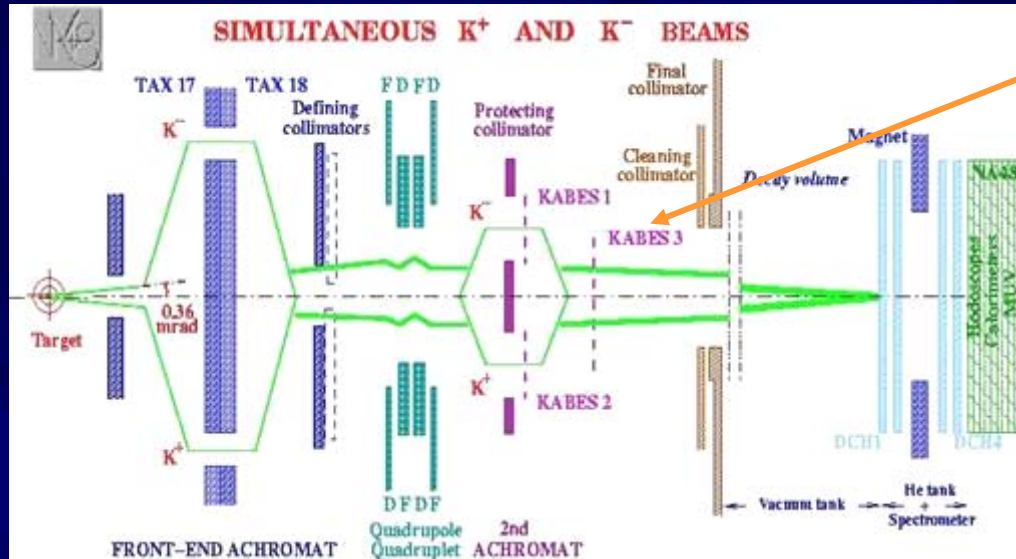
Extremely difficult experiments

$K_L \rightarrow \pi^0 e^+ e^-$ experimentally more constrained (limited by background)

$$\text{BR}(K_S \rightarrow \pi^0 e^+ e^-) = (5.8_{-2.3}^{+2.8}(\text{stat.}) \pm 0.8(\text{syst.})) \cdot 10^{-9}$$



Study of direct CP-violation at the NA48/2 experiment (SPS at CERN)



KABES Read-Out



KABES

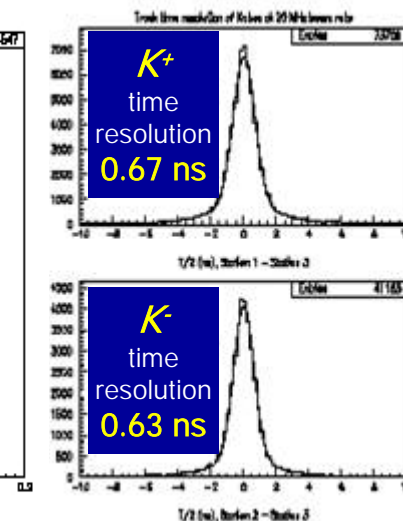
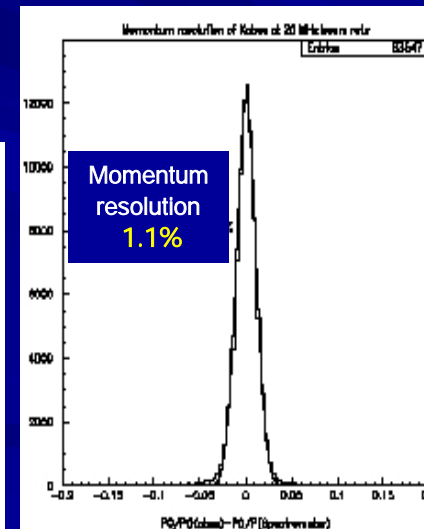
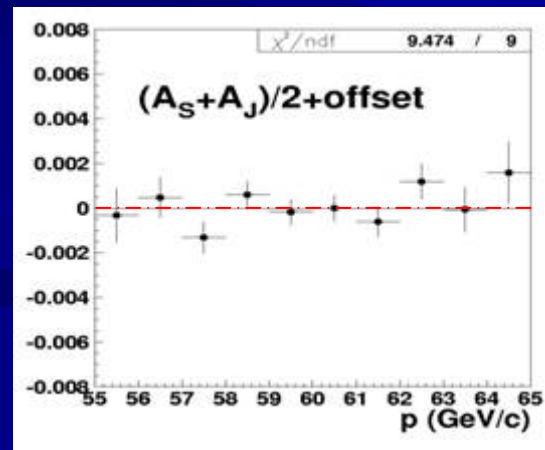
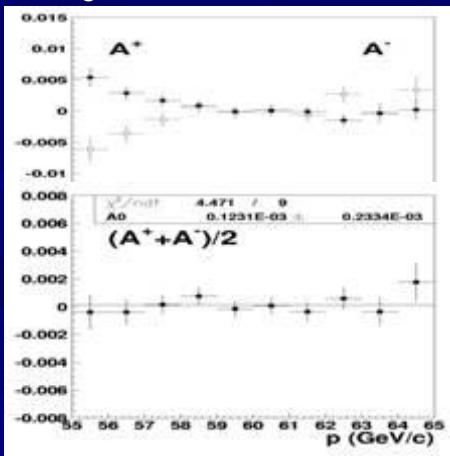


Direct CP violation

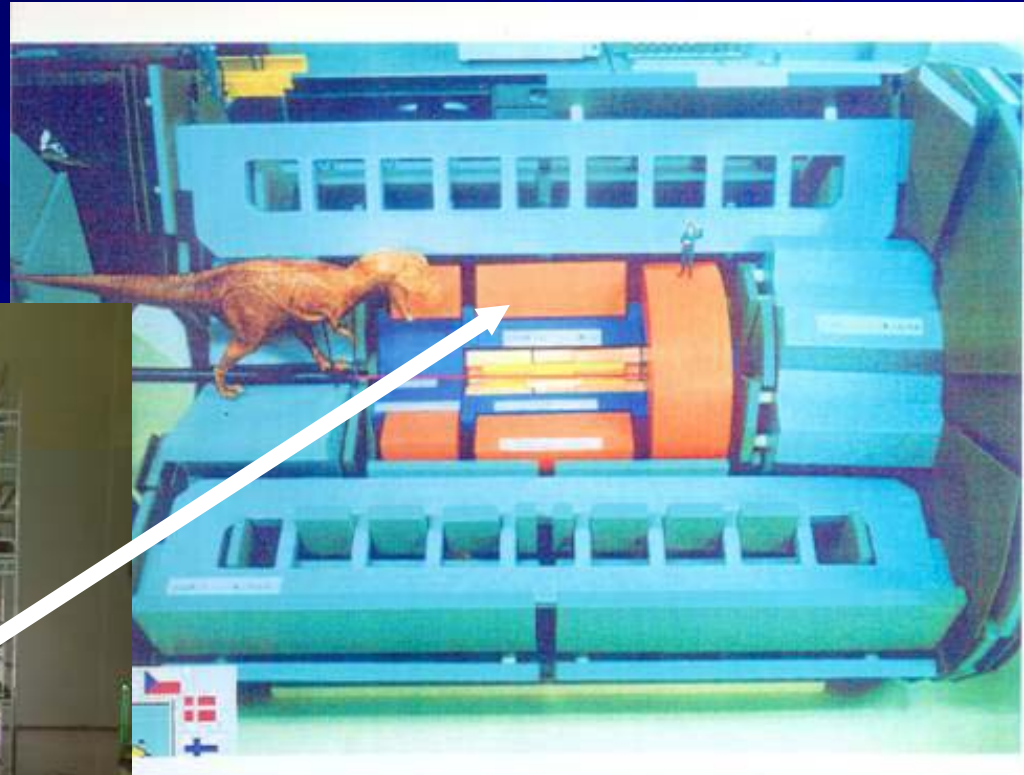
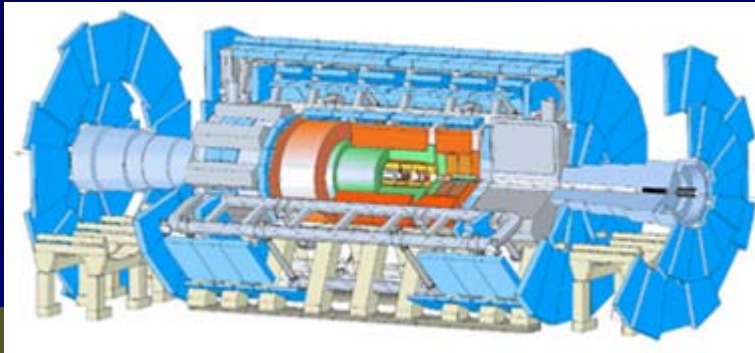
in $K^\pm \rightarrow \pi^\pm \pi^+ \pi^-$, $K^\pm \rightarrow \pi^\pm \pi^0 \pi^0$

$\delta(A_g) \approx 10^{-4}$ (limited by statistics)

$$A_g = \frac{g^+ - g^-}{g^+ + g^-}$$

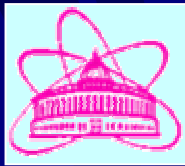


JINR's participation in ATLAS



64th module for the Barrel part of the Tile Calorimeter at ATLAS was installed on 30 October 2003.

Manufacture of CMS Calorimeter Mechanics



HE Calorimeters Assembly in SX5 at CERN



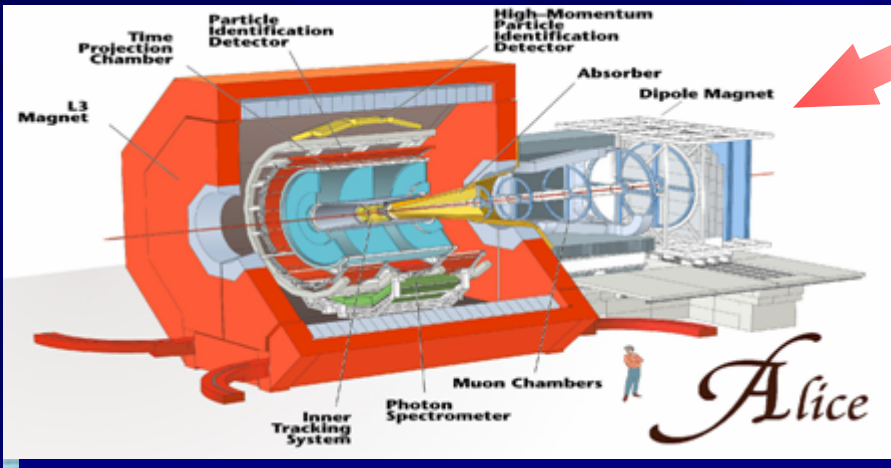
HE+1
Assembled in
September 2003



HE-1
Assembled in
November 2002

JINR's participation in ALICE

The iron yoke of the ALICE dipole magnet:
28 modules, 840 tons,
3 m in length, 7 m in width and 9 m in height



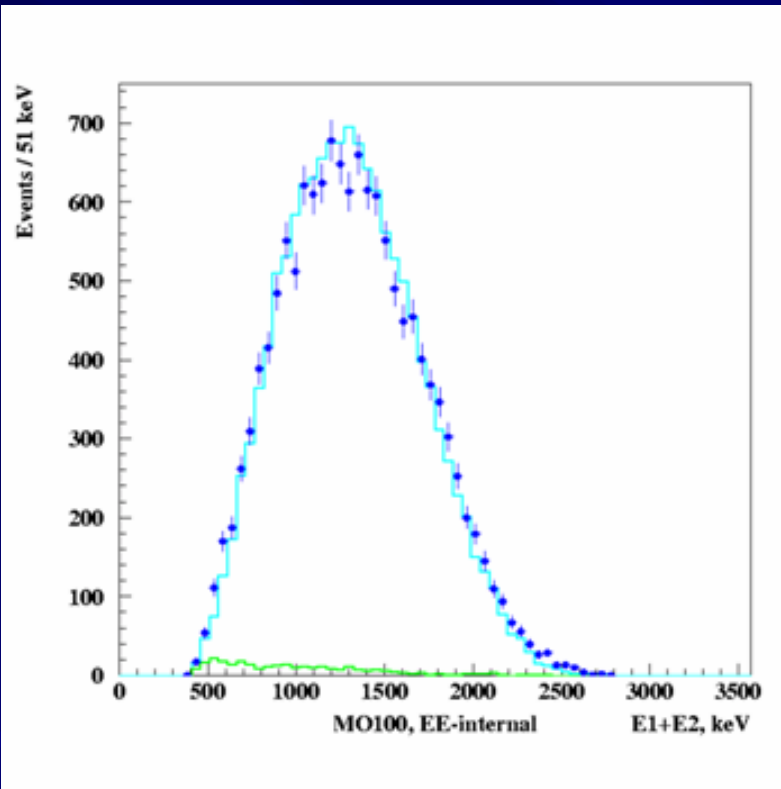
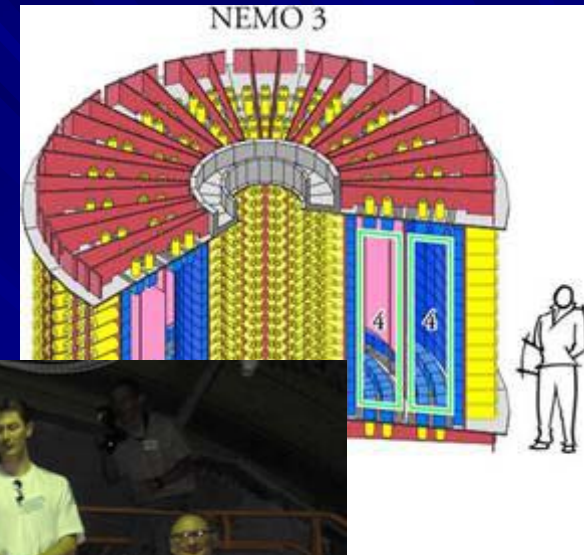
Dubna • Savelovo

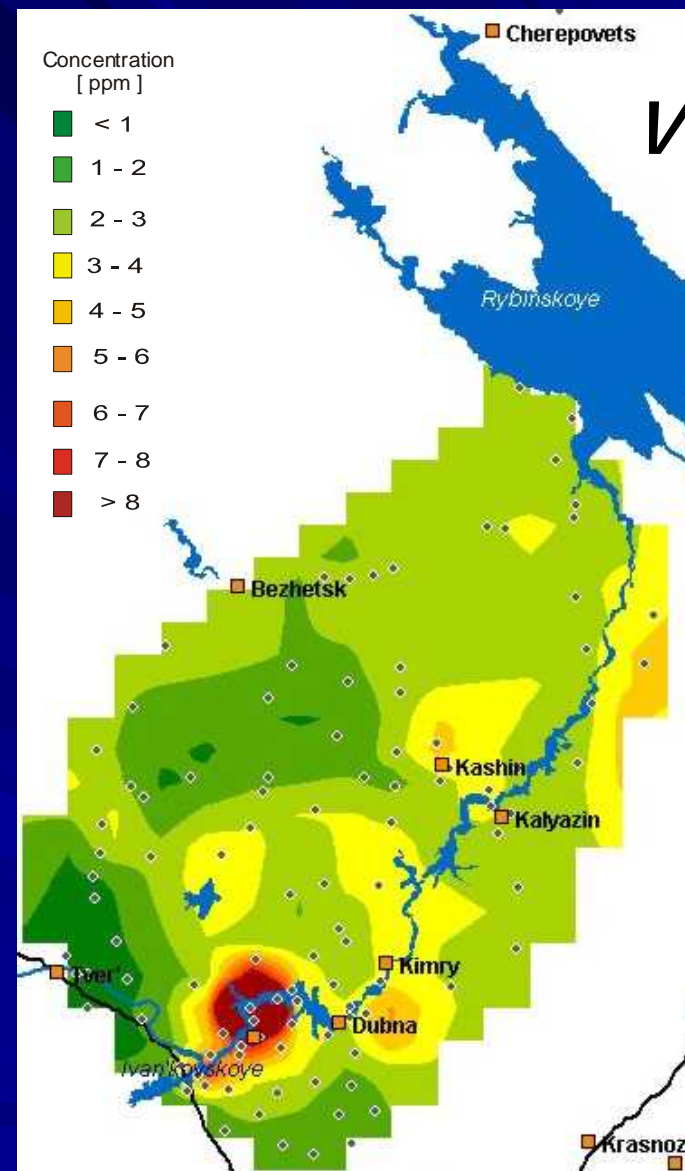
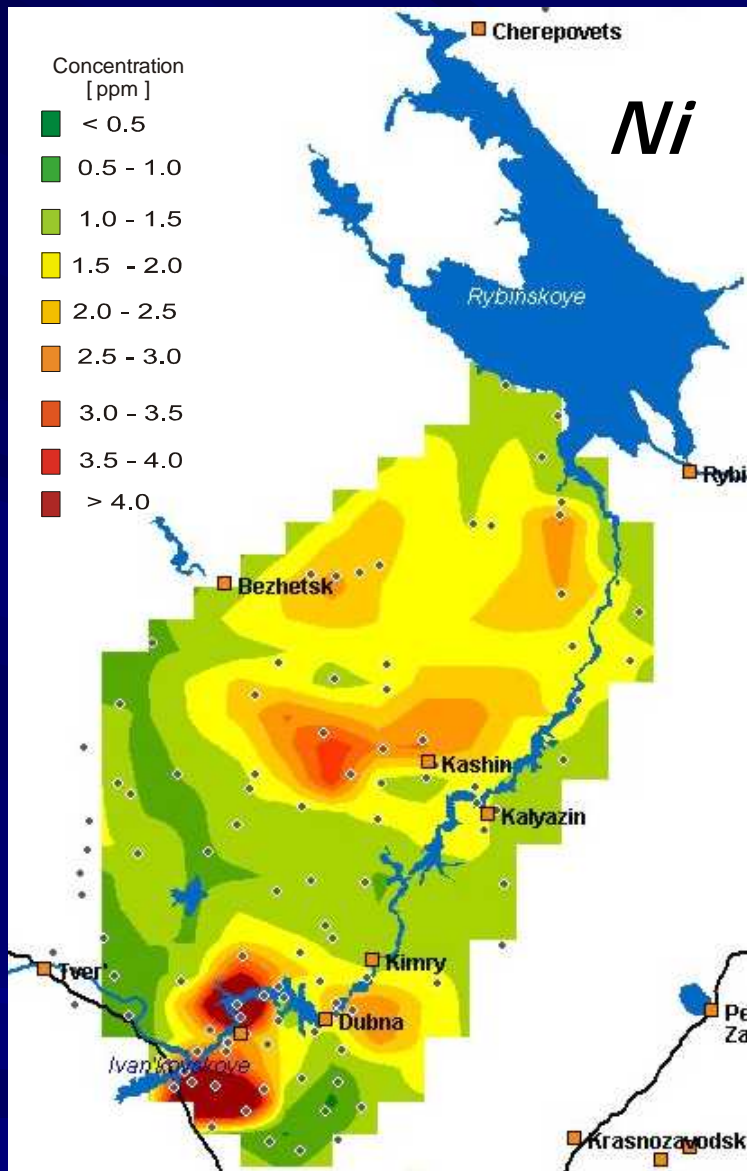


CERN

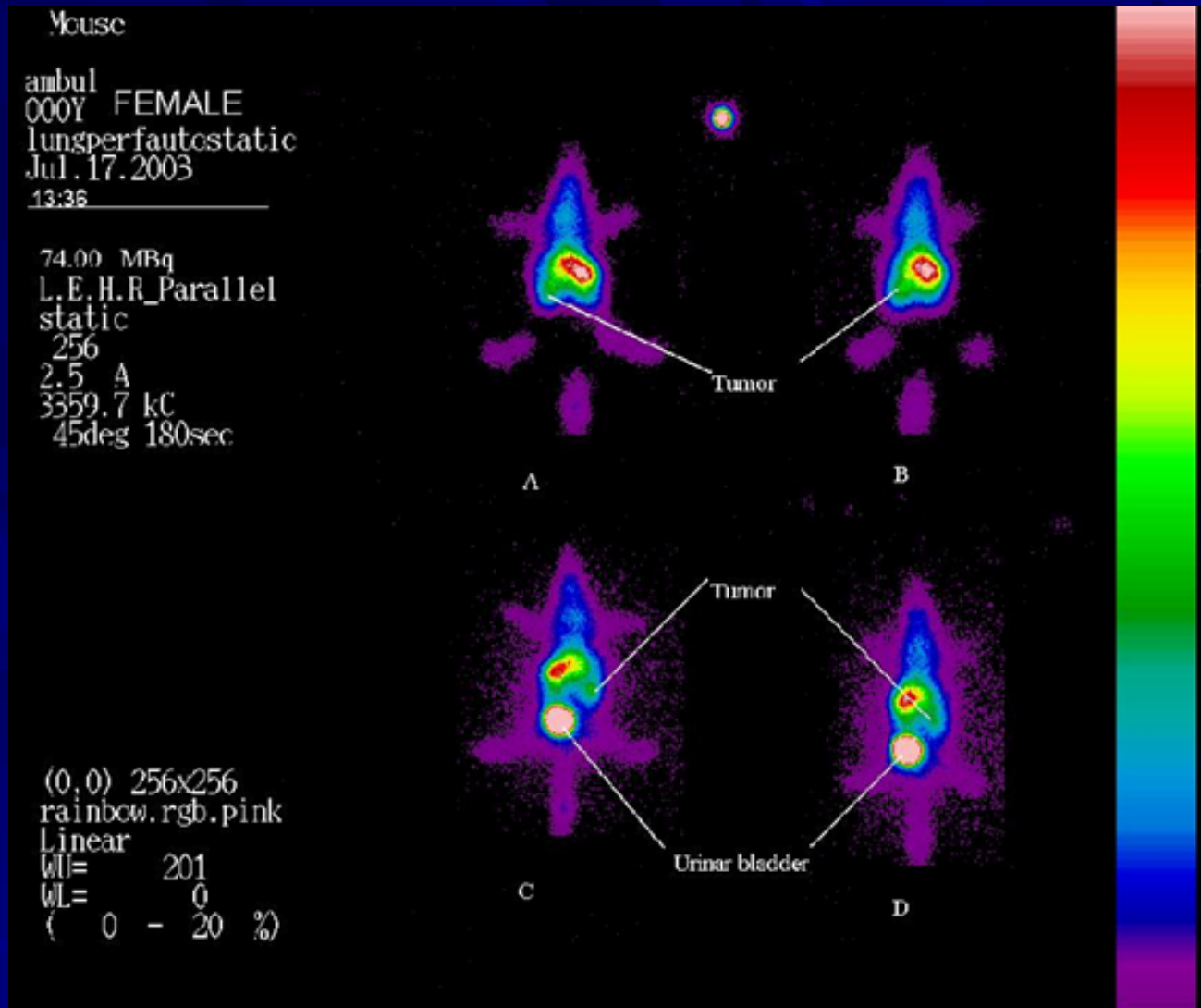


NEMO-3



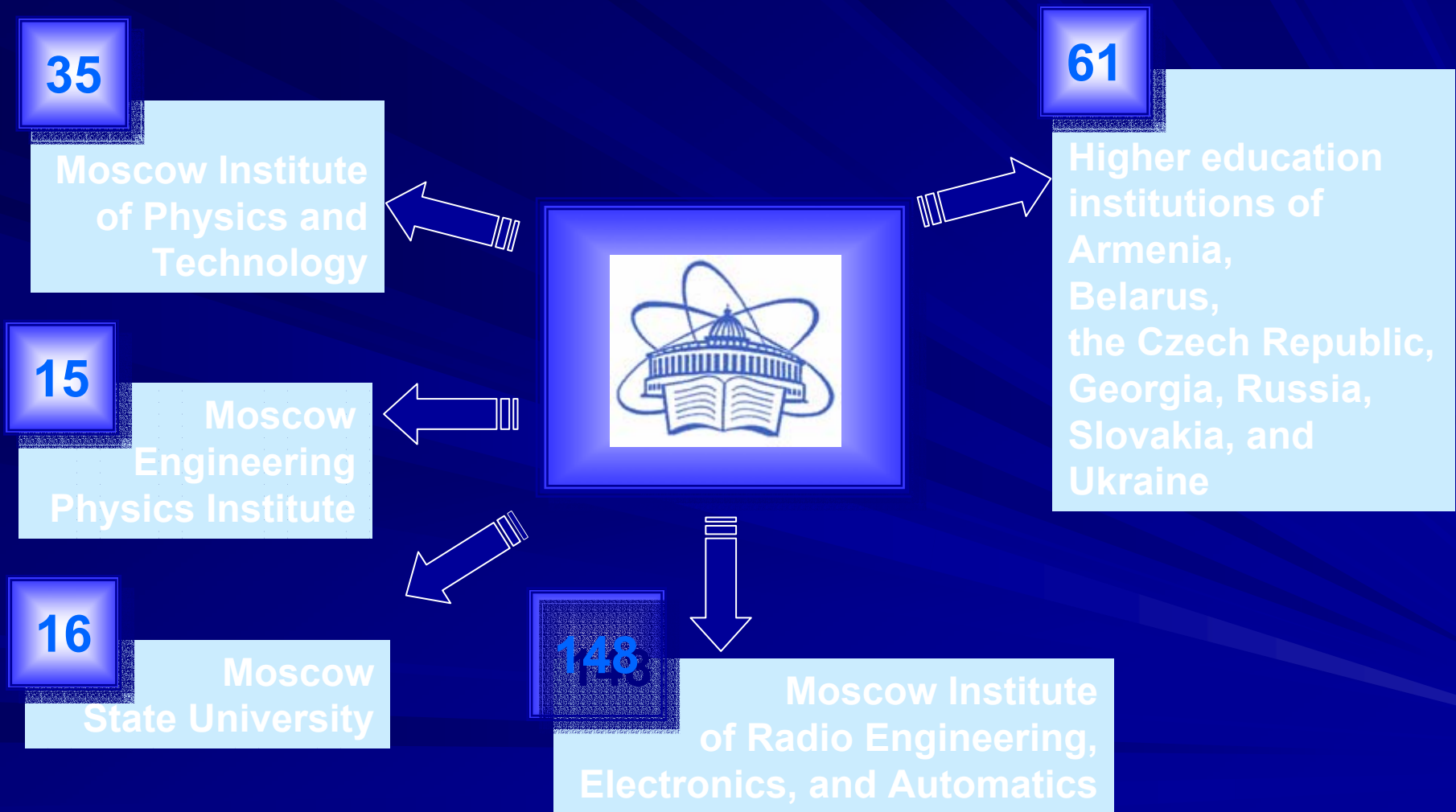


Distribution maps of nickel and vanadium in Central Russia.



Accumulation of ^{131}I -MTB in tissues of tumour-bearing mouse

Students at the University Centre





European School of High Energy Physics



**Tsakhkadzor, Armenia,
24 August - 6 September 2003**



Second International Summer Student School in Memory of Bruno Pontecorvo

7 - 18 September, 2003, Alushta, Ukraine

Neutrino Physics



SECOND INTERNATIONAL SUMMER STUDENT SCHOOL 19 - 30 JUNE, 2003, POZNAN, POLAND



NUCLEAR PHYSICS METHODS AND ACCELERATORS IN BIOLOGY AND MEDICINE

Joint Institute for Nuclear Research, University Centre
Adam Mickiewicz University (Poznan, Poland),
Czech Technical University (Prague, Czech Republic)



Joint Institute for Nuclear Research, University Centre
Adam Mickiewicz University, Poznan, Poland
SECOND INTERNATIONAL SUMMER STUDENT SCHOOL
19-30 June, 2003
Poznan, Poland

NUCLEAR PHYSICS METHODS AND ACCELERATORS IN BIOLOGY AND MEDICINE

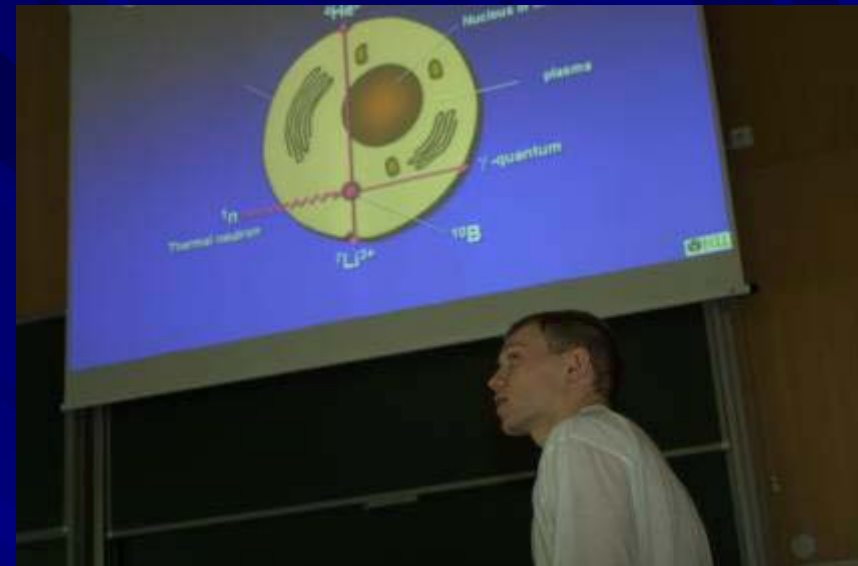
ORGANIZING COMMITTEE
A. Jankowski (Poznań), G. Kucharski (Poznań),
W. Nazarek (Poznań), G. Ostrowski (Poznań),
V. Ryzhov (Prague), R. Szwed (Poznań),
V. Vlach (Prague), W. Zeman (Poznań)

TOPICS:
Nuclear Medicine
Radiation Physics in Medicine
Fundamentals of Ionizing Radiation Dosimetry
and Radiobiology
Accelerator Complexes in Medicine
Electron, Photon, and Hadron Radiotherapy
Modern Imaging Technologies for Medicine
Ionizing Radiation in Medicine
and Other Applied Fields

ADVISORY COMMITTEE
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W. Nazarek (Poznań), G. Ostrowski (Poznań),
V. Ryzhov (Prague), R. Szwed (Poznań),
V. Vlach (Prague), W. Zeman (Poznań)

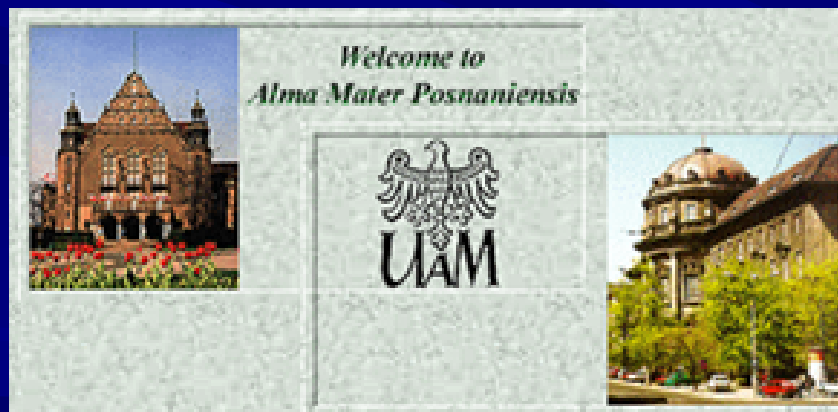
Supported by:
JINR, Czech Republic, "Regeneron 2003", Czech Technical University,
Prague, Federal Programme "Biomedicine"

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Research Centre, Joint Institute for Nuclear Research, ul. Świerkowa 203, 05-400, Swierk, Mazowieckie, Poland
Tel/Fax: (+4822) 6467-0000 E-mail: jzeman@fu.jinr.pl
Adam Mickiewicz University, Faculty of Physics, ul. Umjastka 6, 61-133 Poznań, Poland
Tel/Fax: (+4861) 261124 E-mail: jankowski@fu.jinr.pl
http://fu.jinr.pl/summer2003



Yudina Anna (MSU)
Magnetic resonance imaging (MRI) research
at MSU's MRI and Spectroscopy Centre

Lipengolts Alexei (MEPhI)
Boron neutron capture therapy research
at the IRT reactor of MEPI



Kłos Alexandra (Poland)
Statistic analysis of results from in vivo dosimetry in
radiotherapy with the use of electron beams

Conferences held by JINR in 2003

■ 56 Conferences, Workshops, Schools,

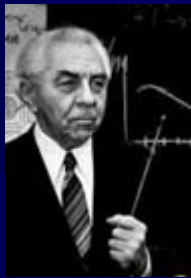
- ~4900 participants, including
 - ~400 physicists from the JINR Member States (without Russia),
 - ~600 scientists from the other countries.

■ Place:

- 45 conferences in Dubna,
- 11 conferences outside Dubna: in Armenia, Belarus, Bulgaria, the Czech Republic, Poland, the Russian Federation, the Slovak Republic, and Ukraine.



8th International Conference on Nucleus-Nucleus Collisions. Moscow, 17-21 June 2003.



- 90th anniversary of the birth of V.P. Dzhelepov (1913-1999). One Day Scientific Conference. Dubna, 11th April 2003.



- Meeting dedicated to the 90th anniversary of the birth of G.N. Flerov (1913-1990) 3 March, Dubna



- XII International Conference “Selected Problems of Modern Physics”. Dedicated to the 95th anniversary of the birth of D.I. Blokhintsev (1908-1979), 8-11 June, Dubna



- 2nd International summer students school on High Energy Physics in Memory of B.M. Pontecorvo (1913-1993), 7-18 September, Alushta, Ukraine



- International Conference dedicated to the 95th anniversary of the birth of I.M. Frank (1908-1990), 23-24 October, Dubna



**I.M. Frank, D.I. Blokhintsev, M.A. Markov.
Moscow State University, 1929**

Science Bringing Nations Together

CERN and JINR joint exhibitions:

- 1997: University of Oslo (Norway)
- 1998: UNESCO, Paris
- 1999: UN Office in Geneva
- 2000: European Parliament in Brussels
- 2001: Russian State Duma
- 2002: Ministry of Education and Sciences, Bucharest, Romania
- 2003: Yerevan University, Armenia

Science Bringing Nations Together



Diplomatic Academy, Moscow, 30 October 2003

Scientific Programme in 2004



JOINT INSTITUTE FOR NUCLEAR RESEARCH

11-8185

**TOPICAL PLAN
FOR JINR RESEARCH
AND INTERNATIONAL COOPERATION
IN 2004**

Dubna 2003



ОБЪЕДИНЕННЫЙ ИНСТИТУТ ЯДЕРНЫХ ИССЛЕДОВАНИЙ

11-8184

**ПРОБЛЕМНО-ТЕМАТИЧЕСКИЙ ПЛАН
НАУЧНО-ИССЛЕДОВАТЕЛЬСКИХ РАБОТ
И МЕЖДУНАРОДНОГО СОТРУДНИЧЕСТВА
ОБЪЕДИНЕННОГО ИНСТИТУТА
ЯДЕРНЫХ ИССЛЕДОВАНИЙ
НА 2004 ГОД**

Дубна 2003

Research Themes in 2004

Field of activity	Number of topics
Theoretical physics	5
Elementary particle physics	26
Relativistic nuclear physics	11
Heavy-ion physics	3
Low- and intermediate-energy physics	3
Nuclear physics with neutrons	2
Condensed matter physics	5
Radiation and radiobiological research	2
Networking, computing, computational physics	3
Educational programme	1
Total:	61

Priority Activities in 2004

■ in-house facilities

- operation and development of the Nuclotron focused on the further efficiency of the complex and achievement of a wider range of accelerated nuclei for the users, development of the Nuclotron beam extraction system and of external beam lines;
- modernization of the IBR-2 reactor according to the schedule of activities approved by the Agreement between JINR and the Russian Ministry for Atomic Energy: final assembly and bench-tests of the new movable reflector MR-3, its assembly at a regular site near IBR-2 and the start-up of the reactor with the MR-3 in 2004; delivery of the reactor's new fuel and organization at JINR of a working area for the assembly of fuel elements into fuel cassettes;
- reconstruction of the U400 accelerator, completion of Phase I of the Dubna Radioactive Ion Beams (DRIBs) project, implementation of work on the realization of Phase II of the project, start of physics experiments with radioactive ion beams;

Priority Activities in 2004

■ facilities under construction

- decommissioning of the IBR-30 reactor and construction of the IREN facility according to the revised schedule of October 2003 and dedicated funding with a view to completion of its first stage in 2006;
- further development of JINR's telecommunication links, networking, computing and information infrastructure, including Grid technologies;

Priority Activities in 2004

■ ongoing research programmes and projects

- studies in modern mathematical physics; theoretical studies in particle physics, nuclear physics, and condensed matter physics, first of all with a view to supporting experimental work in these fields;
- continued participation in frontier experiments aimed at studying the fundamental properties of elementary particles and their interactions, study of rare weak processes aimed at verification of the Standard Model of particle interactions and search for new physics phenomena beyond the Standard Model, precise measurement of direct CP-violation, studies of the nucleon structure as well as thorough investigations of neutrino properties and nature at high, low and intermediate energies, participation in high-energy experiments at accelerator facilities at IHEP (Protvino), CERN, DESY, BNL and FNAL;
- participation in construction of accelerator subsystems for the LHC as well as development of promising accelerator technologies;

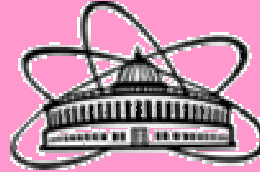
Priority Activities in 2004

- continuation of relativistic nuclear interaction studies focused on the search for manifestations of quark and gluon degrees of freedom in nuclei and on properties of nuclear matter at high energies, as well as studies of the spin structure of the lightest nuclei; in-house experiments mainly at the Nuclotron, as well as experiments at accelerators of other centres: CERN (SPS), BNL (RHIC), GSI (SIS), Uppsala University (CELSIUS), RIKEN;
- experiments on the synthesis of superheavy nuclei with $Z=116$ and 118 using the upgraded Gas-Filled Recoil and VASSILISSA separators, experiments on the chemical isolation and identification of superheavy elements with $Z=112$ and 114 , study of the fusion-fission reactions with ^{48}Ca , ^{58}Fe , ^{64}Ni ions using the CORSET+DEMON facility, study of the structure of light exotic nuclei and of the mechanism of nuclear reactions with radioactive and stable ion beams using the ACCULINNA, COMBAS, MSP-144 and ISTRAS set-ups, construction of the MASHA separator;
- research, development and manufacturing of neutron detectors, sample environment systems and data acquisition systems for the IBR-2 spectrometer complex; development of the FLNP local area network;

Priority Activities in 2004

■ other items that deserve attention

- development of the JINR Educational Programme, including special-purpose training of specialists for the Member States; in particular, the new activity “Dubna International Advanced School of Theoretical Physics” and annually held summer student practical courses in JINR's fields of research;
- investigation of effects induced in biological objects by ionizing radiation with different linear energy transfers, participation in the development of new radiopharmaceuticals for cancer diagnostics and treatment.



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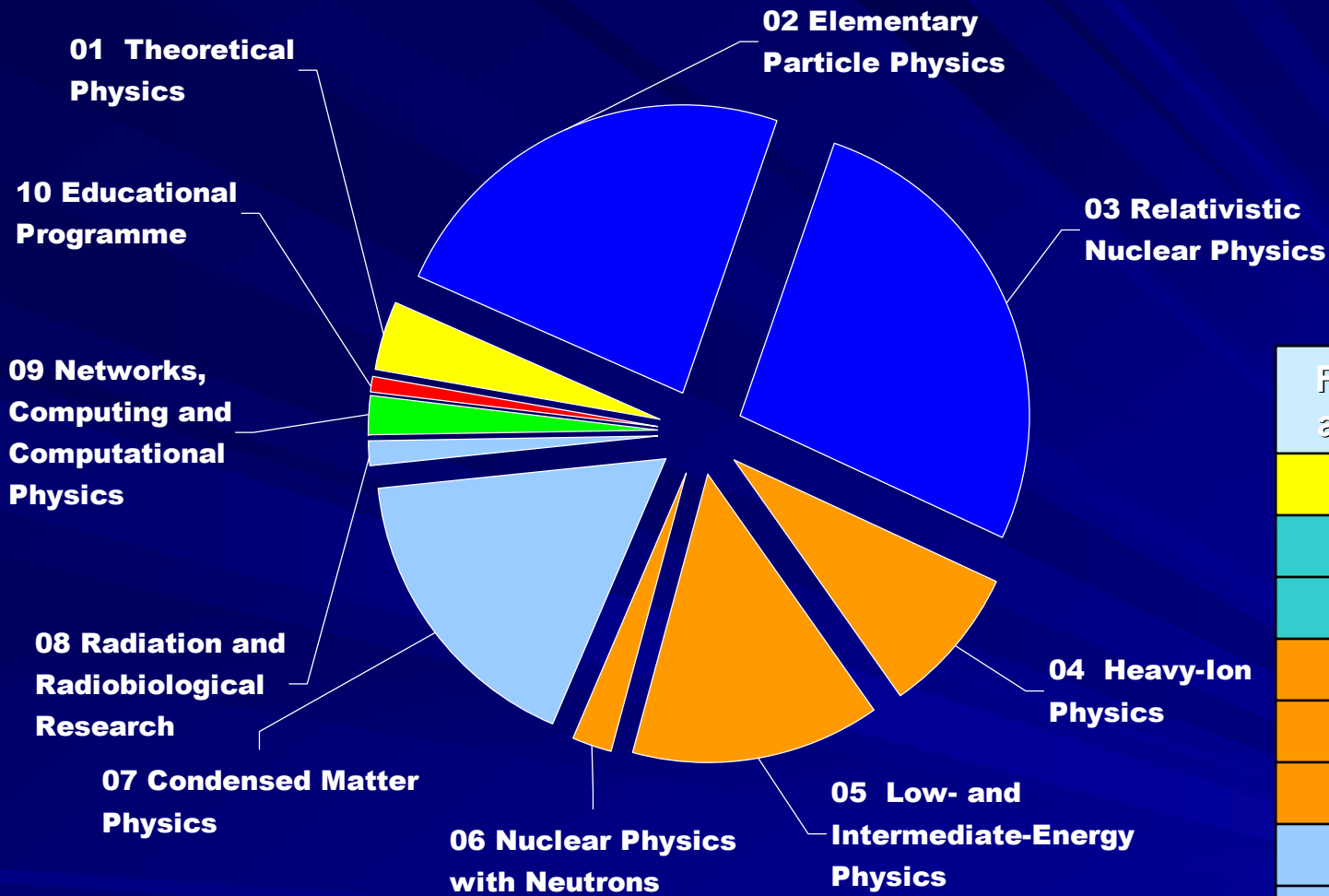
11-8178

**THE PROGRAMME
OF THE SCIENTIFIC RESEARCH AND DEVELOPMENT
OF THE JOINT INSTITUTE FOR NUCLEAR RESEARCH
FOR THE YEARS 2003-2009**

Dubna 2003

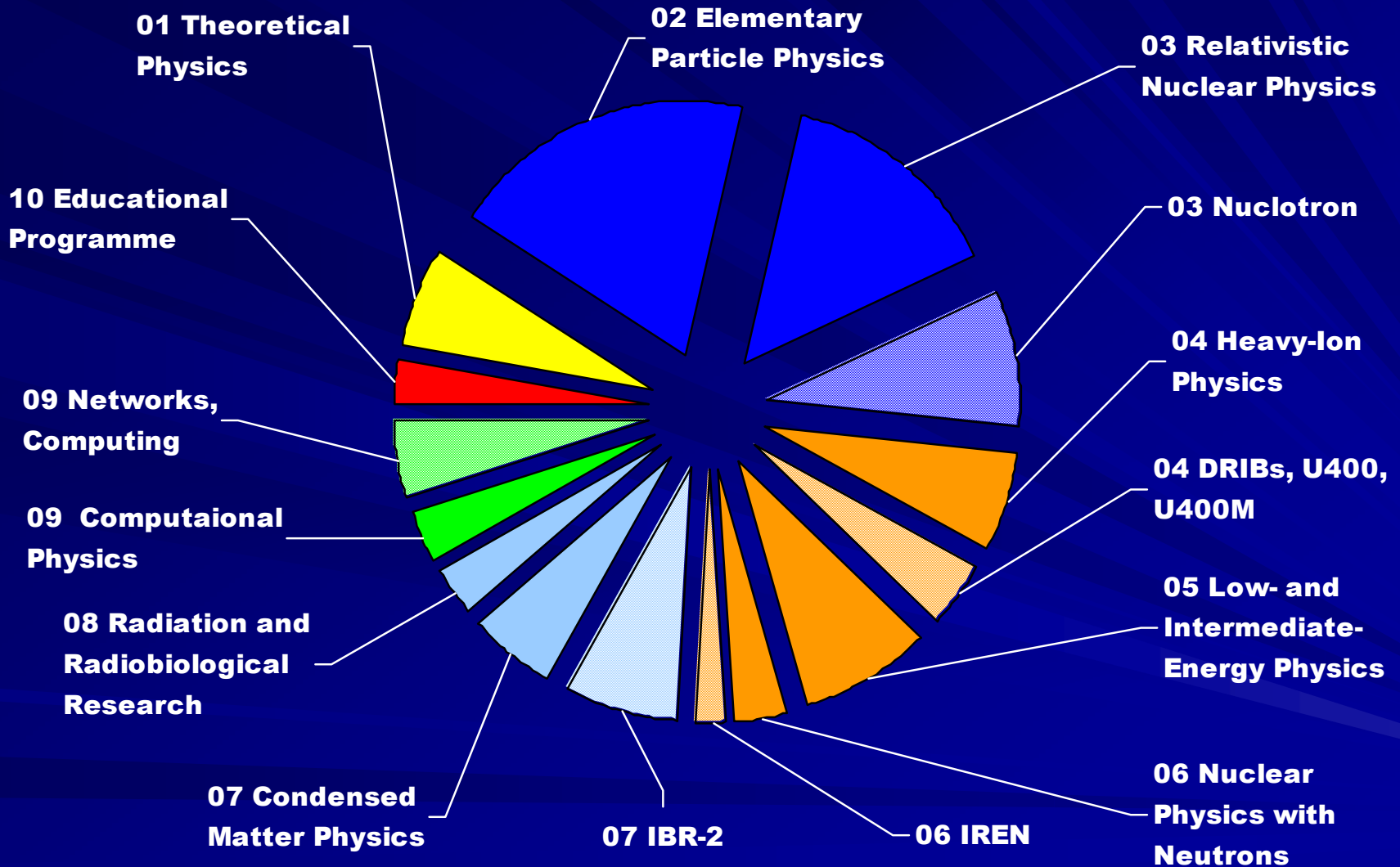
Supplements to the 7-year Programme

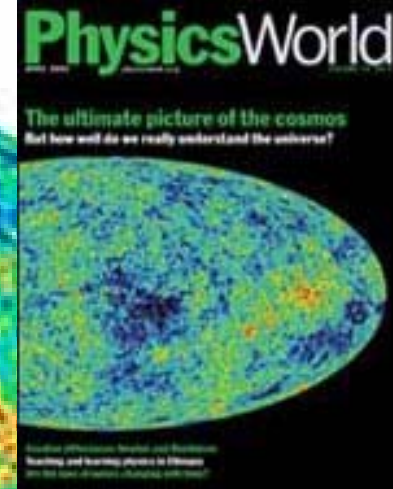
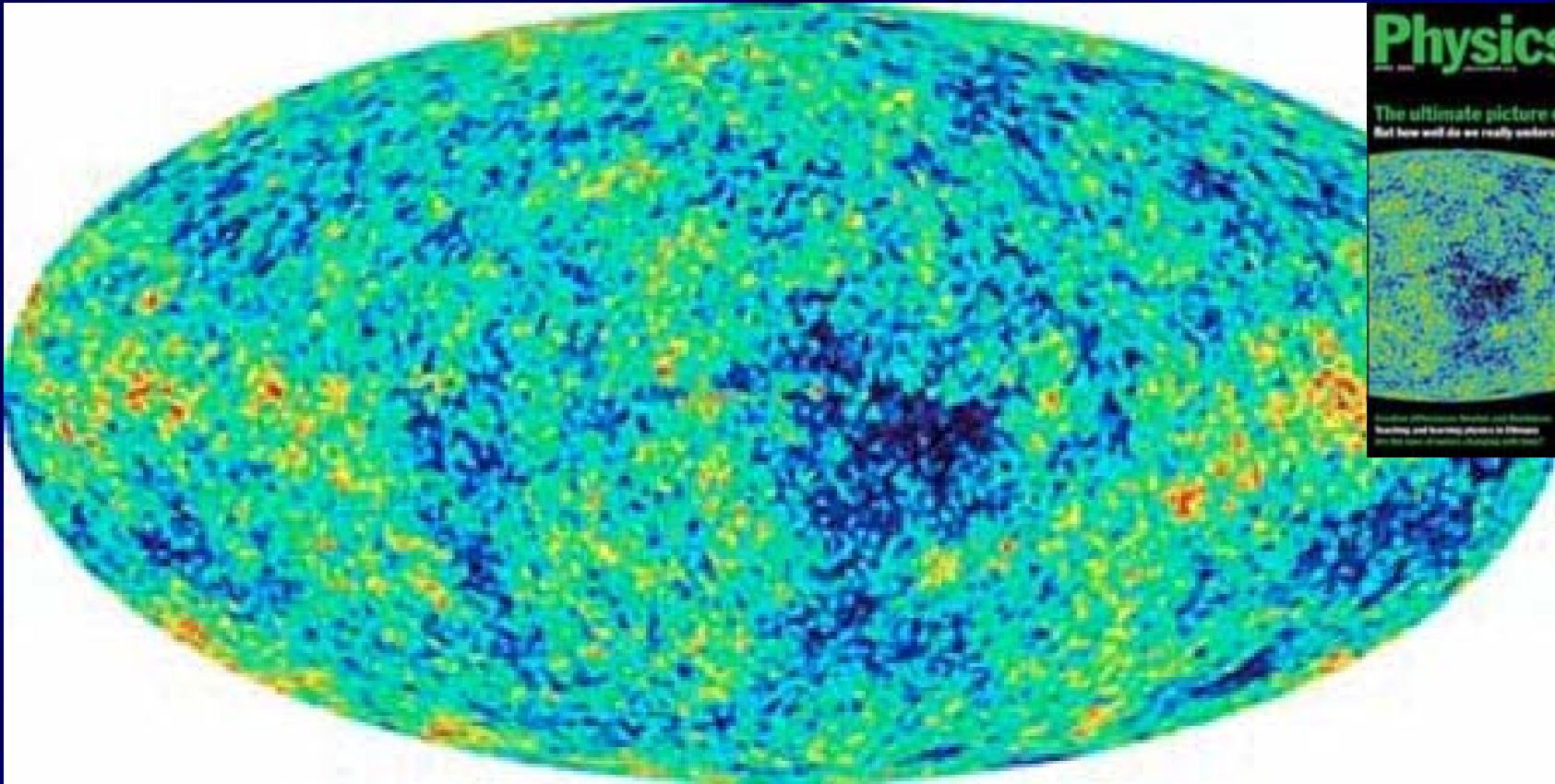
- Summaries of two supplements are presented in written form:
 - “Programme of the Development of the JINR Engineering and Technical Infrastructure”,
 - “Young Staff at JINR”,
- Booklet of projects and themes:
 - booklet is available on site (from November 2003):
<http://www.jinr.ru/abstracts>
 - contents of the booklet on the paper (131 projects);
 - full electronic version of the booklet on CD.



Field of activity	Number of Projects
01	5
02	31
03	35
04	11
05	18
06	3
07	22
08	2
09	3
10	1

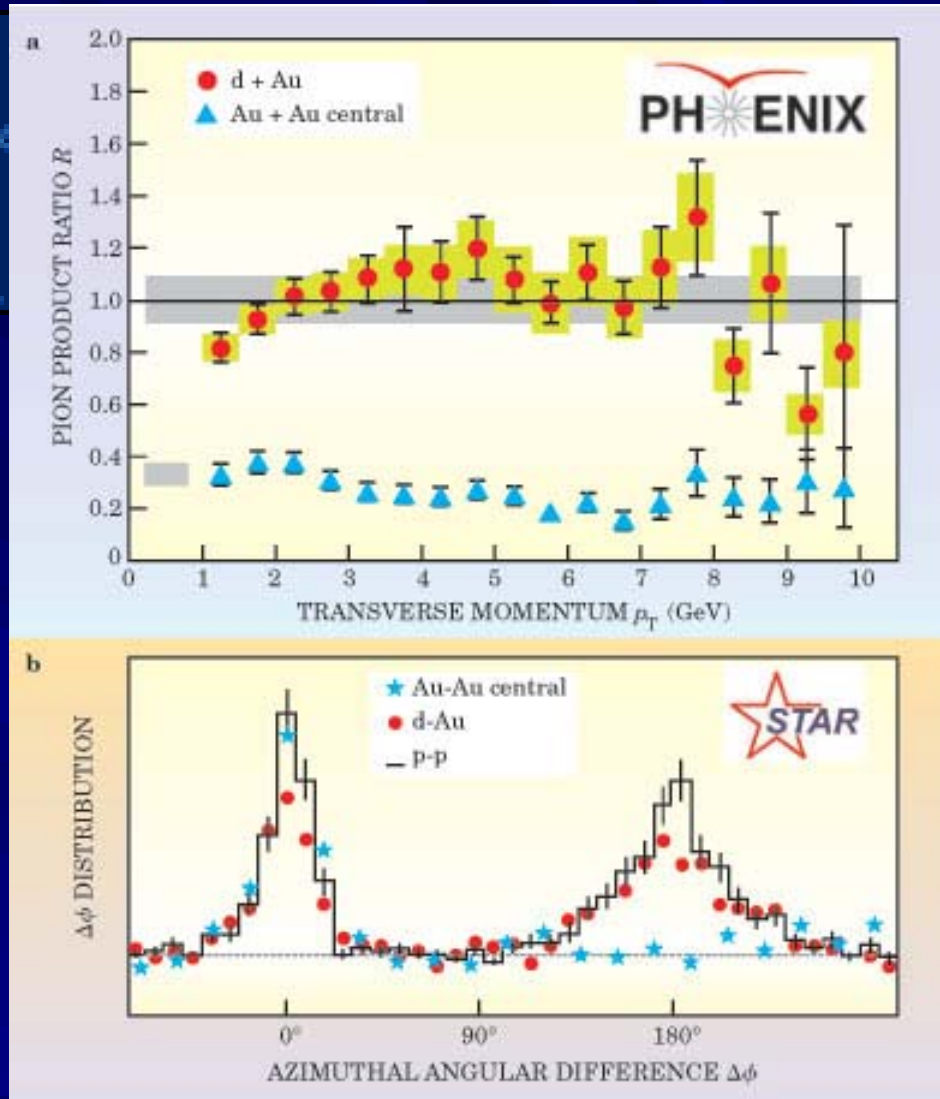
Manpower





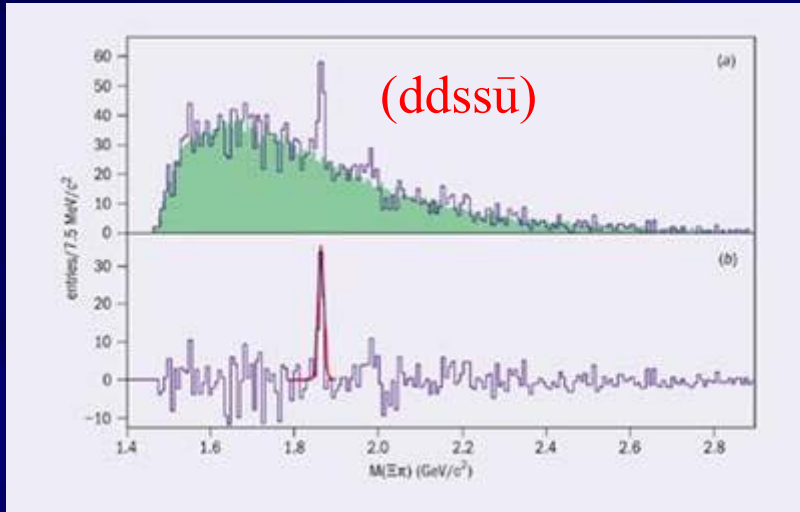
The whole-sky image of the cosmic microwave background taken by NASA's Wilkinson Microwave Anisotropy Probe (WMAP) satellite

- ❑ the Universe is now about 13.7 billion years old;
- ❑ 4% ordinary matter, 23% dark matter and 73% dark energy.



Evidence of jet quenching in high-energy collisions between gold nuclei
(from "Physics Today", vol. 56, p.48, 2003)

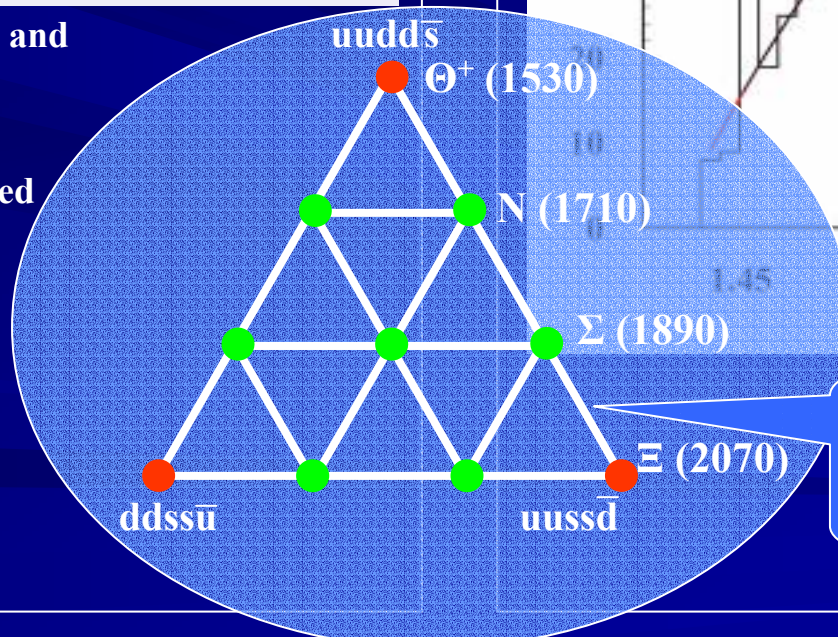
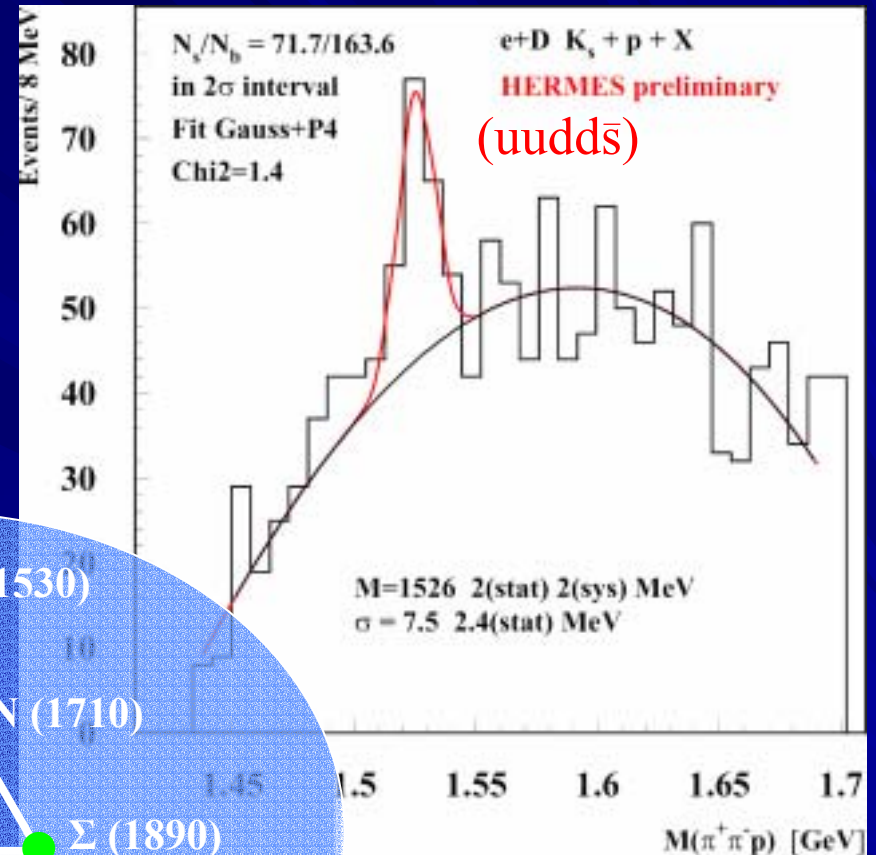
NA49 (CERN)



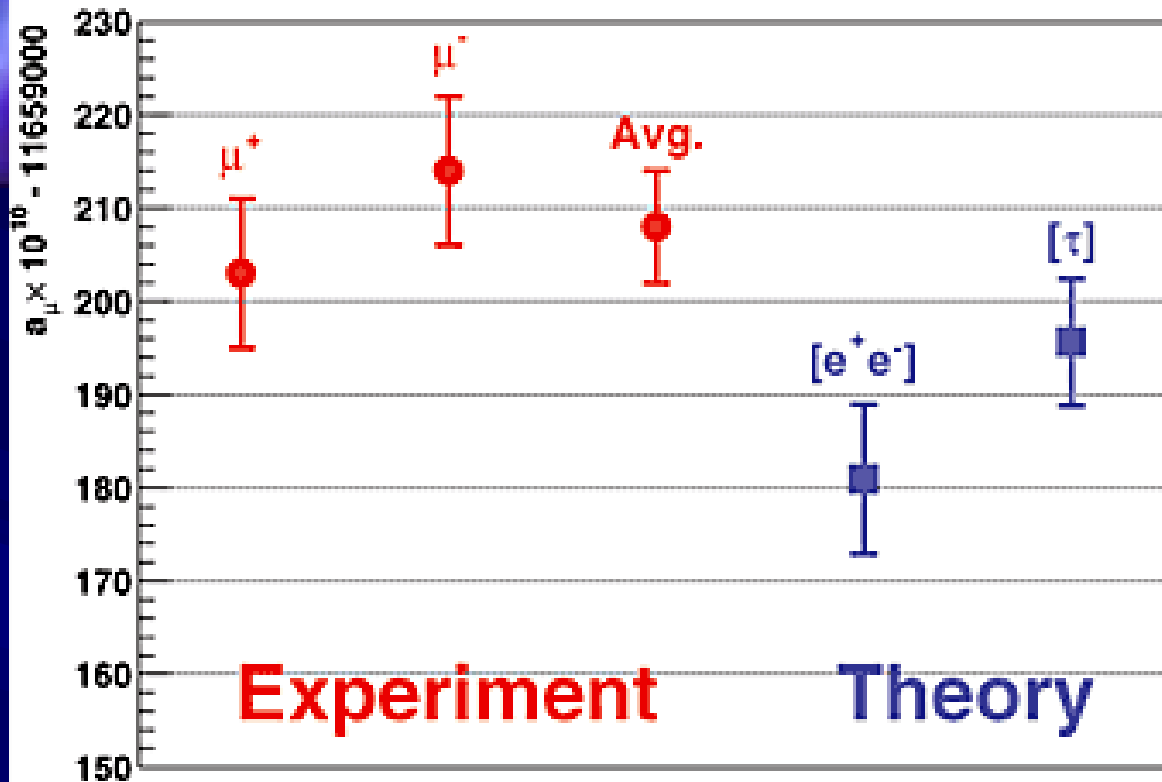
- (a) The sum of $\Xi^- \pi^-$, $\Xi^- \pi^+$ and $\Xi^- \pi^-$, $\Xi^- \pi^+$ invariant mass spectra.
- (b) Background subtracted spectrum.

Co-authors from VBLHE (JINR):
 B. Baatar,
 V.I. Kolesnikov,
 A.I. Malakhov,
 G.I. Melkumov

HERMES (DESY)



A hypothetical antidecuplet of pentaquark baryons



The results from E821 for the muon anomalous magnetic moment. Shown are is the average of three measurement for the positive muon, the new result for the negative muon, and their combined value. Also shown are the direct (e^+e^- based) and indirect (τ based) theory values taken from Davier, et al., Eur. Phys. J. C31, 503 (2003)



**Dušan Podhorský, President of the Slovak Office of Standards, Metrology and Testing, at the bench for the magnet of the cyclotron DC-72.
11 December 2003, JINR, Dubna**



**President of Romania I. Iliescu and
Director of JINR V.G. Kadyshevsky
Moscow, 4 July 2003**

COOPERATION BETWEEN JINR
AND ROMANIAN SCIENTIFIC
CENTRES AND UNIVERSITIES





Cooperation with India



Dr. D.D. Bhawalkar, Director of Centre for Advanced Technology, visited JINR on 27 September 2002



Prof. V. Ramamurthy, Secretary of Science & Technology, visited Moscow on 11 November 2003



Dr. R. Chidambaram (Bombay) visited JINR on 19 November 2003



Department of Atomic Energy and Department of Science and Technology have agreed in principle for India becoming an Associate Member of JINR.

Cooperation between JINR and the Research Centres of South Africa



UNISA, Pretoria



University of Cape Town



University of Witwatersrand, Johannesburg



**МИНИСТЕРСТВО
ИНОСТРАННЫХ ДЕЛ
РОССИЙСКОЙ ФЕДЕРАЦИИ**

**ДИРЕКТОРУ ОБЪЕДИНЕННОГО
ИНСТИТУТА ЯДЕРНЫХ
ИССЛЕДОВАНИЙ, АКАДЕМИКУ
РОССИЙСКОЙ АКАДЕМИИ НАУК
В.Г. КАДЫШЕВСКОМУ**

Уважаемый Владимир Георгиевич,

Ваше предложение о проведении на базе Объединенного института ядерных исследований в г. Дубна заседания Совета глав государств СНГ с обсуждением проблем международного научно-технического сотрудничества

Your proposal for holding on the basis of JINR, in Dubna, of the summit of the Commonwealth of Independent States dedicated to international cooperation in science and technology has been forwarded to the CIS Executive Committee. This issue is planned to be included in the agenda of the CIS summit which is tentatively scheduled for June 2004 in Moscow.

Были бы признательны за предоставление необходимой информации.

С уважением,

Директор Первого департамента стран СНГ

А. Макаров



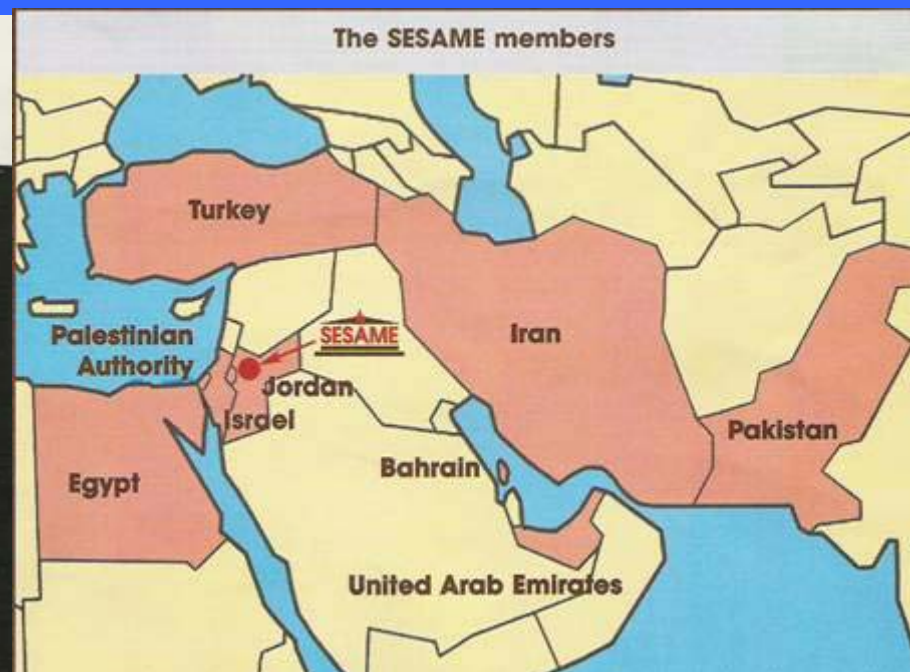
CERN

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SESAME

An international centre for research
and advanced technology
under the auspices
of UNESCO

SESAME: a research centre modelled on CERN and JINR



**V.G. Kadyshevsky (Director, JINR),
K. Toukan (Minister of Education, Jordan),
H. Schopper (President, Council of SESAME),
R. Sarraf (Director, Al-Balqa'
Applied University, Amman, Jordan).
18 December 2003, Marrakech, Morocco.**