

Twentieth Lomonosov Conference on Elementary Particle Physics

August 19 – 25, 2021
online conference



Dedicated to the Year of
Science and Technology

TWENTIETH LOMONOSOV CONFERENCE ON ELEMENTARY PARTICLE PHYSICS

Moscow, August 19 - 25, 2021

Mikhail Lomonosov
1711-1765

Electroweak Theory
Tests of Standard Model & Beyond
Neutrino Physics
Astroparticle Physics
Gravitation and Cosmology
Developments in QCD (Perturbative
and Non-Perturbative Effects)
Heavy Quark Physics
Physics at the Future Accelerators

XIV INTERNATIONAL
MEETING ON PROBLEMS
OF August 25, 2021
INTELLIGENTSIA

Under the patronage of
V. Sadovnichy
Rector of MSU

International Advisory Committee Organizing Committee

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V. Savrin (MSU)
V. Shakhov (MSU)
K. Stankevich (MSU)
A. Studenikin (MSU, JINR & ICAS)

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Joint Institute for Nuclear Research (Dubna)
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Moscow State University, 119991 Moscow, Russia
Phone (007-495) 939-16-17 Fax (007-495) 932-88-20 <http://www.lomcon.ru>

20th Lomonosov Conference on Elementary Particle Physics

Moscow State University,
19-25 August 2021,
Moscow, Russia

29 years of running
since 1992

www.lomcon.ru



**20th Lomonosov Conference on
Elementary Particle Physics** is organized by
Faculty of Physics of Moscow State University
under the patronage of Rector of MSU
Academician Victor Sadovnichy



This is the 20th event in the series that started in 1992 when the conference got the name of Mikhail Lomonosov

brilliant Russian encyclopaedist of the era of the Empress Catherine the 2nd

М.В.Ломоносова
(1711-1765)

Moscow State University was founded 266 years ago based on his plan and initiative

- Moscow University is named after Lomonosov



We are thankful to
Professor Nikolay Sysoev,
Dean of Faculty of Physics,
for steady support
of organizing committee
for more than a year period
of the conference preparation



It is a great honour for me to give the floor to
Vice Rector of Moscow State University

● **Professor Andrey Fedyanin**

thanks to whose personal efforts, the very holding of the
conference this year became possible

20th Lomonosov Conference
on Elementary Particle Physics

... in closed cooperation with

- Joint Institute for Nuclear Research
(Dubna)

Institute for Nuclear Research
of Russian Academy of Sciences



It is a great honour for me to give the floor to
Scientific Leader of JINR

- *Academician Victor Matveev*

Since 1992
the Lomonosov Conferences
have been supported by
Ministry of Science and
Higher Education of Russia

It is a great honour for me to give the floor to
Vice Director of the Department of State
Scientific, Technical and Innovation Policy of
Ministry of Science and Higher Education of
Russia

● Mr Andrey Romanov

20th Lomonosov Conference
on Elementary Particle Physics

... in closed cooperation with

Joint Institute for Nuclear Research
(Dubna)

- Institute for Nuclear Research
of Russian Academy of Sciences



It is a great honour for me to give the floor to
Vice Director of INR RAS

- Professor Grigory Rubtsov

Lomonosov Conferences on Elementary Particle Physics

since 1992

... short prehistory of Lomonosov Conferences

- in 80th a series of 4 workshops for young scientists “Synchrotron radiation and its applications” was organized by Moscow State University
- at 4th Workshop in 1988 the organizers decided to complete realization of these workshops
- a year later (1989) it was proposed by myself to renew that series of events on a new basis with much broader scientific programme and to include more general issues of particle physics
- the conference was planned to be held in September 1991 in world famous Samarkand (Uzbekistan – Soviet Union),
- ... was canceled because of unstable and unpredictable political situation (Putsch in Soviet Union, August 1991)

- the project of a new meeting was not given up and the conference on “Elementary Particles and External Fields” was organized by Moscow State University in Yaroslavl (Russia) , April 1992
- during preparation of that conference I proposed that we should start a series of full-scale international conferences under the title of

“Lomonosov Conference on Elementary Particle Physics”

... the birth of Lomonosov Conferences ...

- this story has been included into the preamble Yaroslavl conference 1992 programme

ШКОЛА МОЛОДЫХ УЧЕНЫХ МГУ "ЭЛЕМЕНТАРНЫЕ ЧАСТИЦЫ И ВНЕШНИЕ ПОЛЯ"
MOSCOW UNIVERSITY CONFERENCE "ELEMENTARY PARTICLES AND EXTERNAL FIELDS"

Ярославль, 20-25 апреля 1992 г.

Московский государственный университет им. М.В. Ломоносова
Ярославский государственный университет
ТОО "АВЕ"

Организационный комитет

А.А. Ансельм (ЛИЯФ)	А.И. Никишов (ФИРАН)
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В.М. Мостепаненко (СПТИ)	И.М. Тернов (МГУ) – председатель

Настоящая школа молодых ученых МГУ является пятой в серии конференций (Москва, 1983; Кишинев, 1985; Майкоп, 1989; Минск, 1990), проводимых кафедрой теоретической физики физического факультета МГУ при содействии совета молодых ученых МГУ. По первоначальному замыслу организаторов на конференциях должна была обсуждаться проблема квантовых процессов во внешних электромагнитных полях, однако уже со второй конференции (1985 г.) отчетливо проявляется тенденция к расширению тематики. В программы трех последних конференций наряду с вышеназванной проблемой включается широкий круг вопросов физики элементарных частиц, теории поля, гравитации и астрофизики. В дальнейшем данная серия будет продолжена под общим названием "Ломоносовские конференции по физике элементарных частиц". Шестая Ломоносовская конференция, запланированная на осень 1993 года, будет посвящена вопросам космомикрорезонансов и калибровочным теориям.

Участники конференции прозывают в гостинице исполкома г. Ярославля по адресу: ул. Свердлова, дом 16. Заседания проходят в конференц-зале дома № 5 по Волжской набережной, в этом же доме находятся оргкомитет и технический секретариат конференции.

Технический секретариат: Люба Василевская, Маргарита Кондратьева, Лена Мерзорова, Марина Геннадиевна Невзорова и Александр Пархоменко.

Programme of

"5th School of Young Scientists of Moscow State University on Elementary Particles and External Fields"

Yaroslavl, Russia,
April 20-25, 1992

"... in the future this series of conferences will be continued under the title
"Lomonosov Conference on Elementary Particle Physics"

ЗАСЕДАНИЕ 7: 11.35-13.50 (председатель В.А.Царев)

Л.А.Василевская, А.А.Гвоздев, Н.В.Михеев:

Физика массивных нейтрино во внешних электромагнитных полях (15 мин.).

D.Giugni:

Probing the Sun: Borexino experiment (30 min).

О.А.Займидорога:

Измерение магнитного момента нейтрино на уровне 10^{-12} магнетона Бора (30 мин.).

Uitiello:

Massive neutrinos, their oscillations and unitary inequivalent representation (30 min).

А.В.Кузнецов, Н.В.Михеев:

Тормозное излучение при рассеянии нейтрино в поле кулоновского центра (15 мин.).

ОБЕД : 14.00

about
30 presentations

ЗАКРЫТИЕ КОНФЕРЕНЦИИ : 19.00 .

СПИСОК УЧАСТНИКОВ КОНФЕРЕНЦИИ

Артимович Геннадий Константинович (Филиал ЭТИ)

Багров Владислав Гаврилович (ИСЗ СО РАН)

Белов Владимир Владимирович (МИЭМ)

Болтовский Дмитрий Владимирович (ТПИ)

Василевская Любовь Александровна (Яр.ПИ)

Uitiello Giuseppe (Univ. of Salerno, Italy)

Займидорога Юрий Сергеевич (МГУ)

Волкова Юлия Львовна (МИЭМ)

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Giugni Danilo (INFN-Milan, Italy)

Голубчиков Алексей Валерьевич (ОИЯИ)

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Кречет Владимир Гергиевич (Яр.ПИ)

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Лихачев Геннадий Геннадиевич (МГУ)

Лобанов Андрей Евгеньевич (МГУ)

Мерзонова Елена Владимировна (МГУ)

Михеев Николай Владимирович (Яр.ГУ)

Мостепаненко Владимир Михайлович (СПТИ)

Никишов Анатолий Ильич (ФИРАН)

Обухов Валерий Владимирович (ИСЗ СО РАН)

Пархоменко Александр Яковлевич (Яр.ГУ)

Першин Владимир Демьянович (ТГУ)

Рогова Анна Марковна (ТГУ)

Святовой Виталий Борисович (ИМАН)

Скобелев Владимир Васильевич (МЭПИ)

Смирнов Александр Дмитриевич (Яр.ГУ)

Spillantini Piero (INFN-Florence, Italy)

Старинец Андрей Олегович (МГУ)

Студеникин Александр Иванович (МГУ)

Трифонов Андрей Юрьевич (ТПИ)

Тернов Игорь Михайлович (МГУ)

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Филиппов Геннадий Михайлович (Чувашский ГУ)

Фильченков Михаил Леонидович (МНТП "Брейнштурм")

Харитон Наум Григорьевич (Яр.ГУ)

Hokee Minn (Seoul National Univ., Korea)

Царев Владимир Александрович (ФИРАН)

50 participants

За информацией о Ломоносовских конференциях по физике элементарных частиц обращайтесь, пожалуйста, в оргкомитет к А.И.Студеникину:

119899, Москва, Ленинские горы, МГУ, физический факультет, кафедра теоретической физики, тел.: 939-31-77.



1992-2021

29 years
of
Lomonosov Conference

...that was hard job to start the conference ...

Since very beginning the project of

international

Lomonosov Conference
on Elementary Particle Physics

attracted interest and support of the

Russian national and international

scientific communities



Professor

Giordano Diambrini-Palazzi
(1926-2012)

“Sapienza”
Universita di Roma

“The status of the
MQC experiment in Italy”
August 30, 1997

1997 – 8th Lomonosov Conference on
Elementary Particle Physics

PARTICLE PHYSICS, GAUGE FIELDS AND
ASTROPHYSICS

PROCEEDINGS

5th and 6th Lomonosov Conferences on Elementary Particles Physics:

Elementary Particles and External Fields
(Yaroslavl, Russia, 20-25 April 1992)

Cosmomicrophysics and Gauge Fields
(Moscow, Russia, 24-31 August 1993)

Edited by
Alexander I. Studenikin

Proceedings of
Lomonosov
Conferences

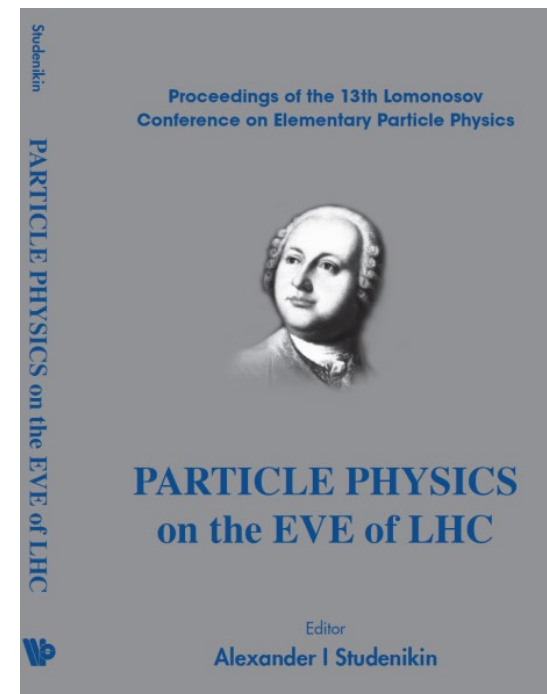
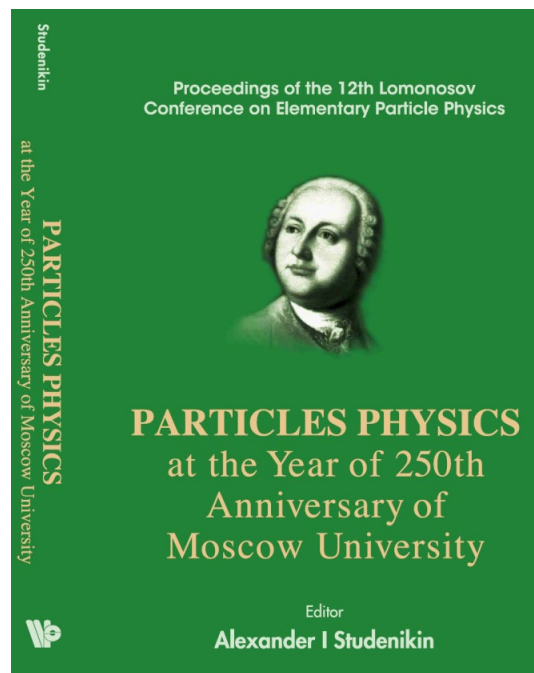
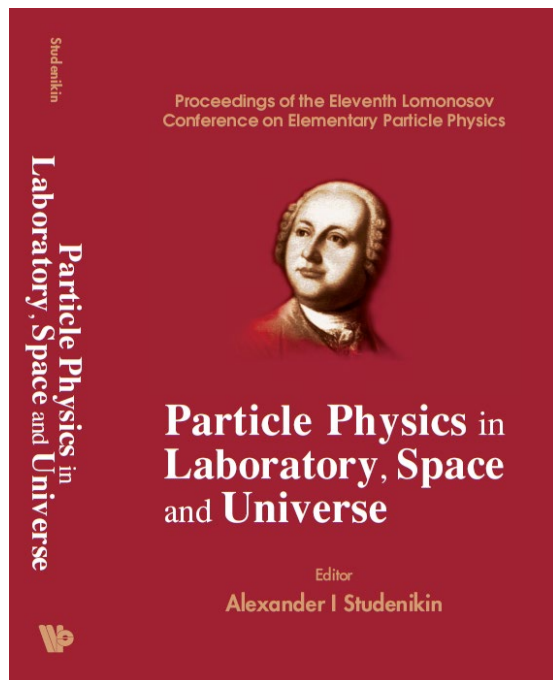
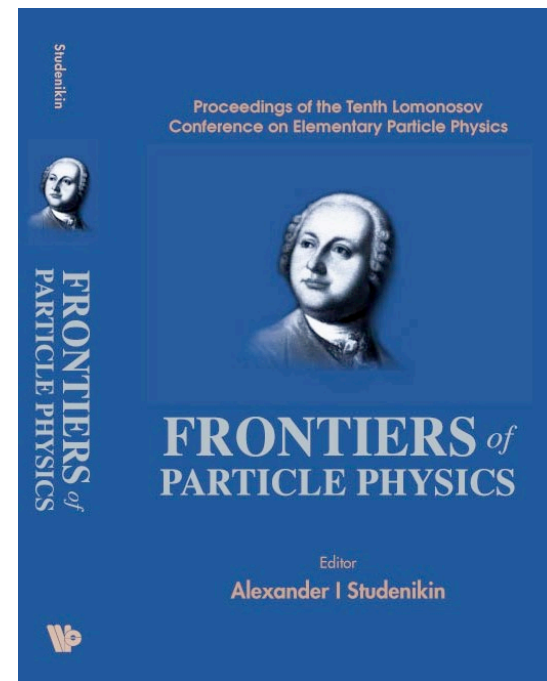
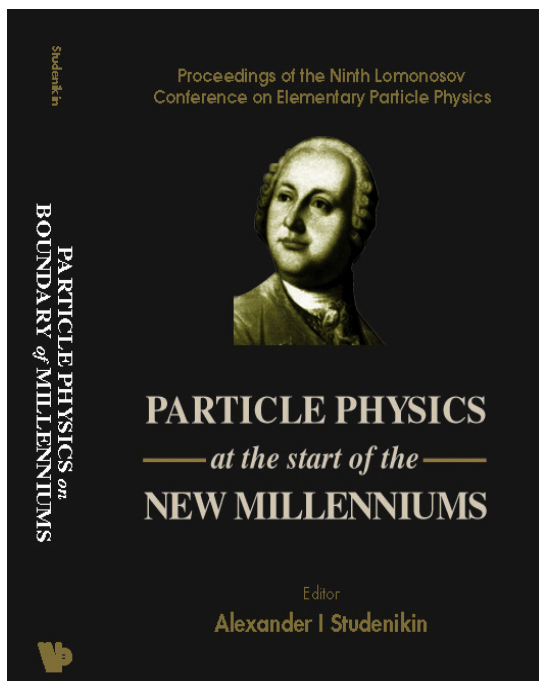
1992
and
1993

published by

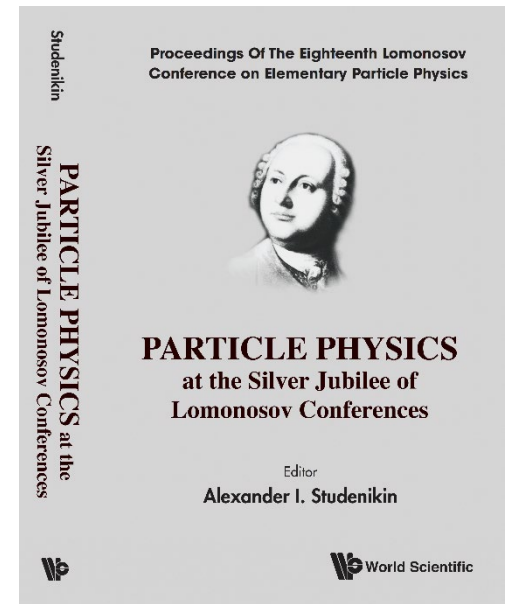
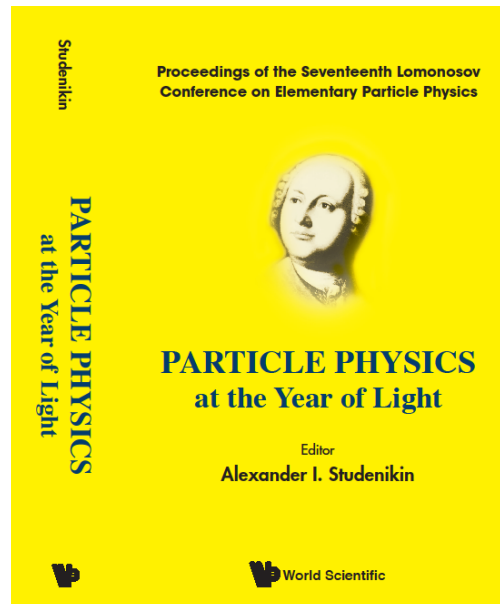
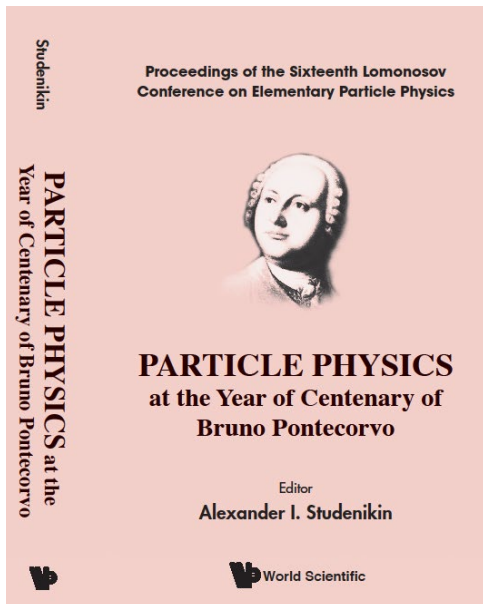
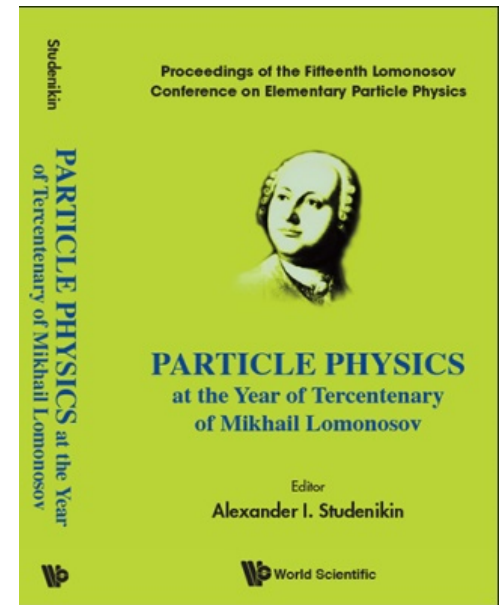
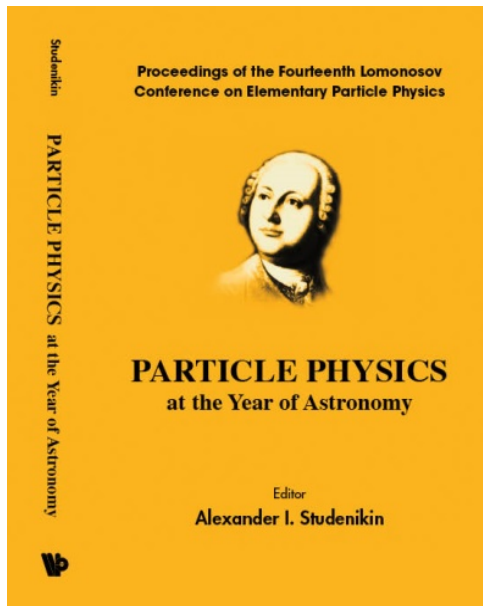
Accademia Nazionale dei
Lincei
Rome, Italy

...thanks to kind decision of
President Giorgio Salvini

Proceedings of
Lomonosov Conferences
1999, 2001, 2003,
2005, 2007
published by
World Scientific Co
Singapore

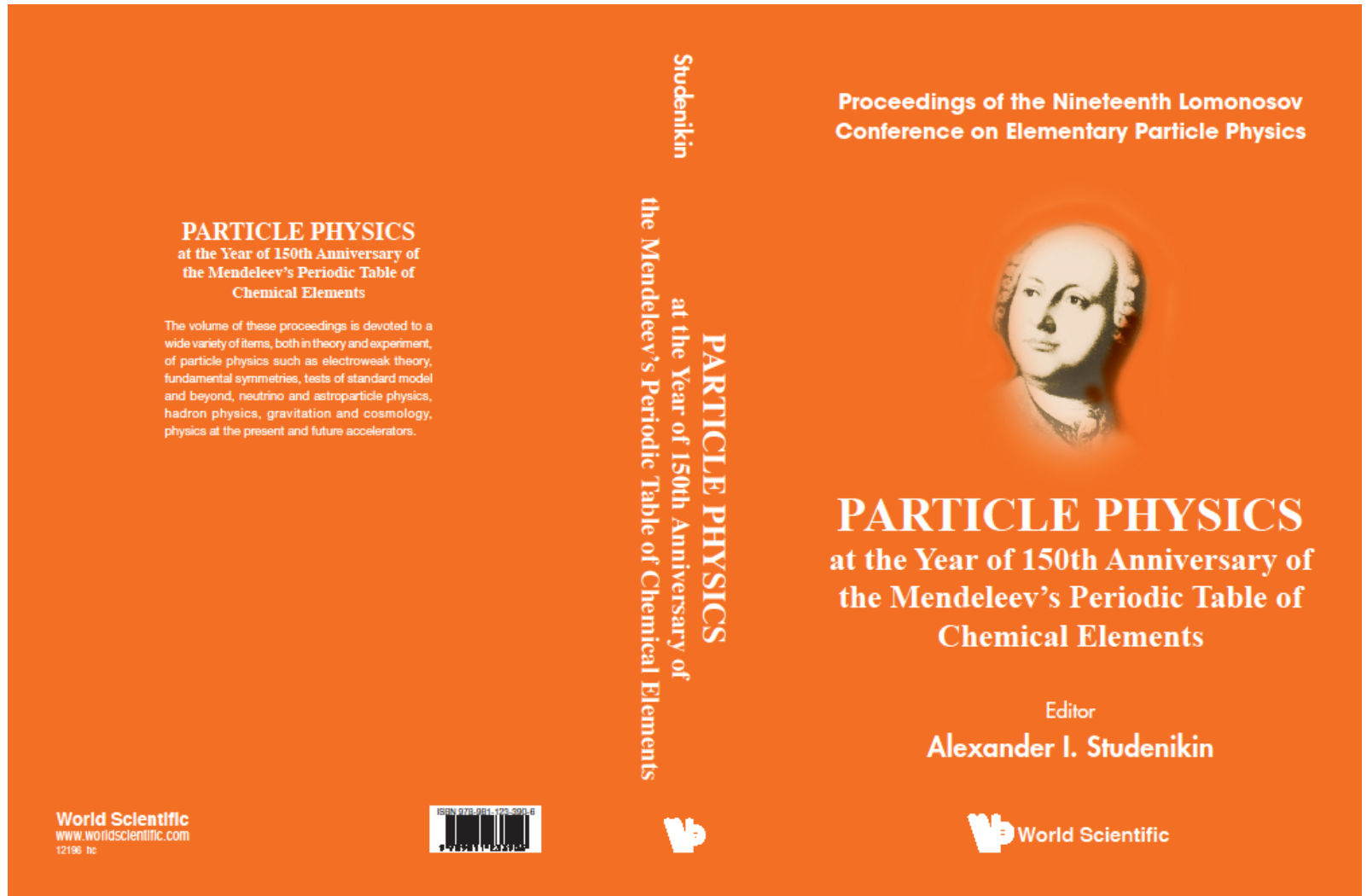


Proceedings of
Lomonosov Conferences
2009, 2011, 2013,
2015, 2017
published by
World Scientific Co
Singapore



The **proceedings** of 19th Lomonosov Conference on Elementary Particle Physics

World Scientific, Singapore

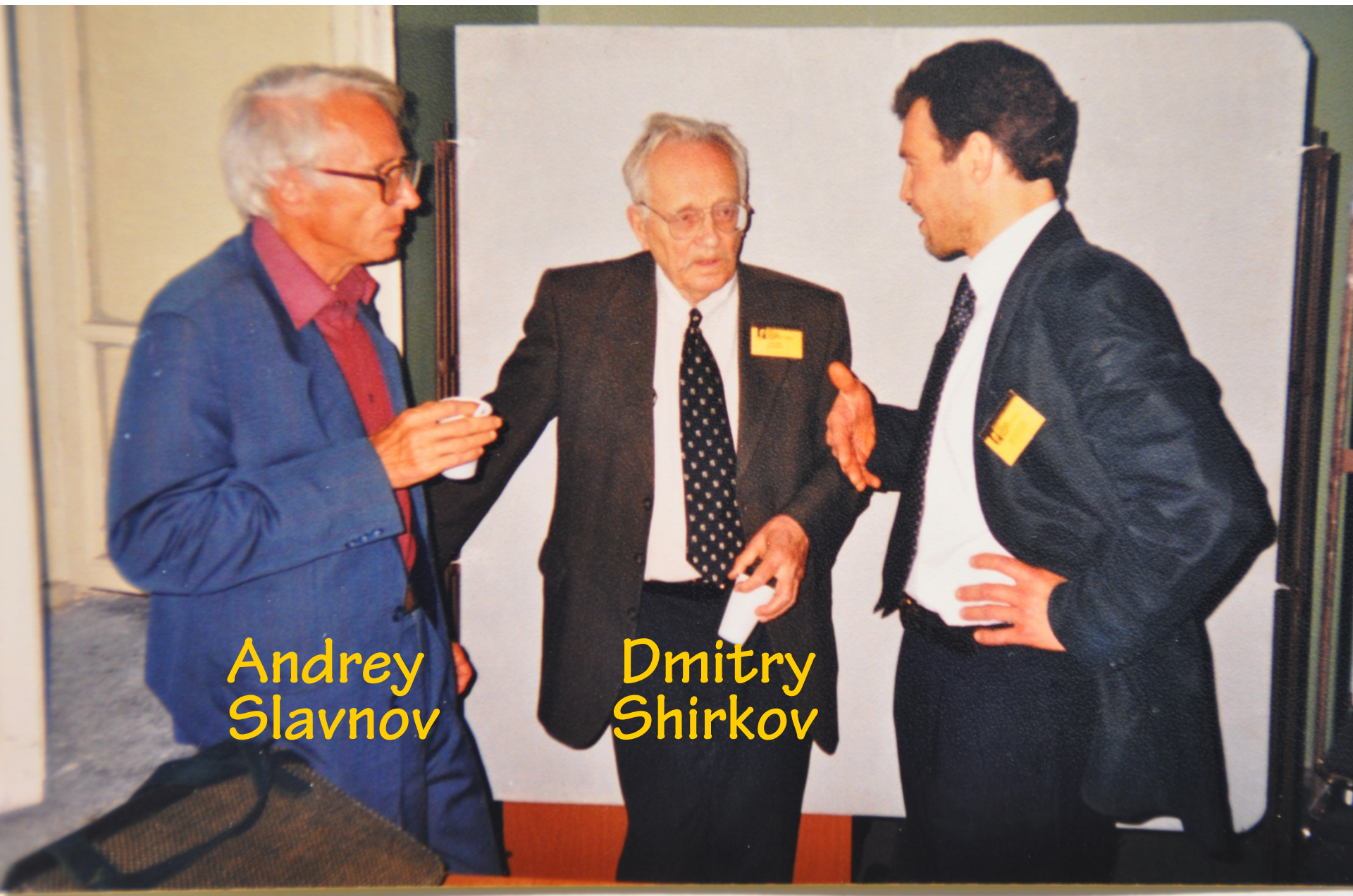


Lomonosov Conferences on Elementary Particle Physics

received reasonable support inside Russia and

rising of the scientific value of the conference has
been provided by the personal participation in the
events of distinguished Russian scientists

... I would like to nominate Russian scientists who have
provided very important contribution to organization of
Lomonosov Conferences and to forming the scientific
programmes during passed 29 years



Andrey
Slavnov

Dmitry
Shirkov



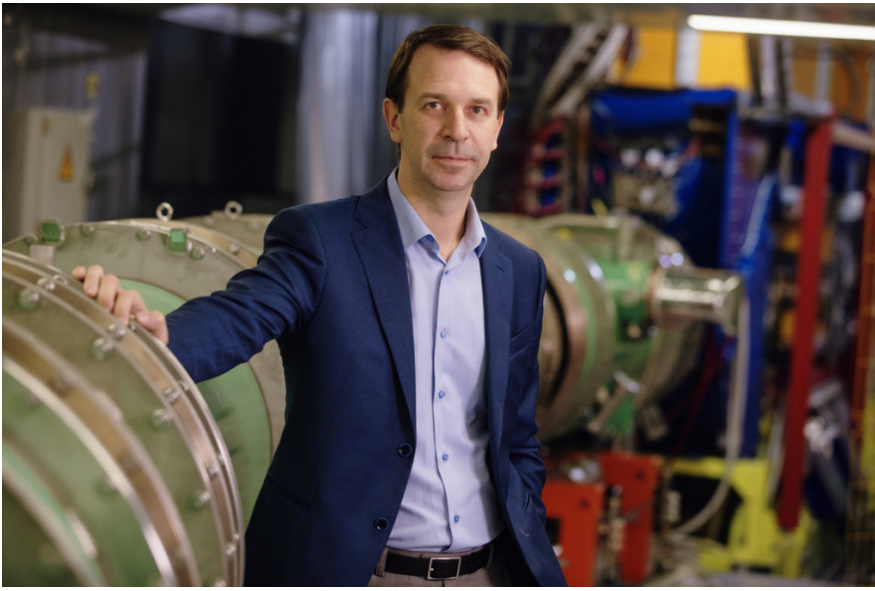
Lev
Okun

18th Lomonosov Conference 2017



Victor Matveev,

**Institute for Nuclear Research of
Joint Institute for Nuclear Research (Dubna)**



Academician Grigory Trubnikov,
Director of JINR

The **proceedings** of **20th** Lomonosov Conference on Elementary Particle Physics

will be prepared
within collaboration of



and



- will be published by **JINR**

... **deadline** for sending contributions to the editor is
December 15, 2021...

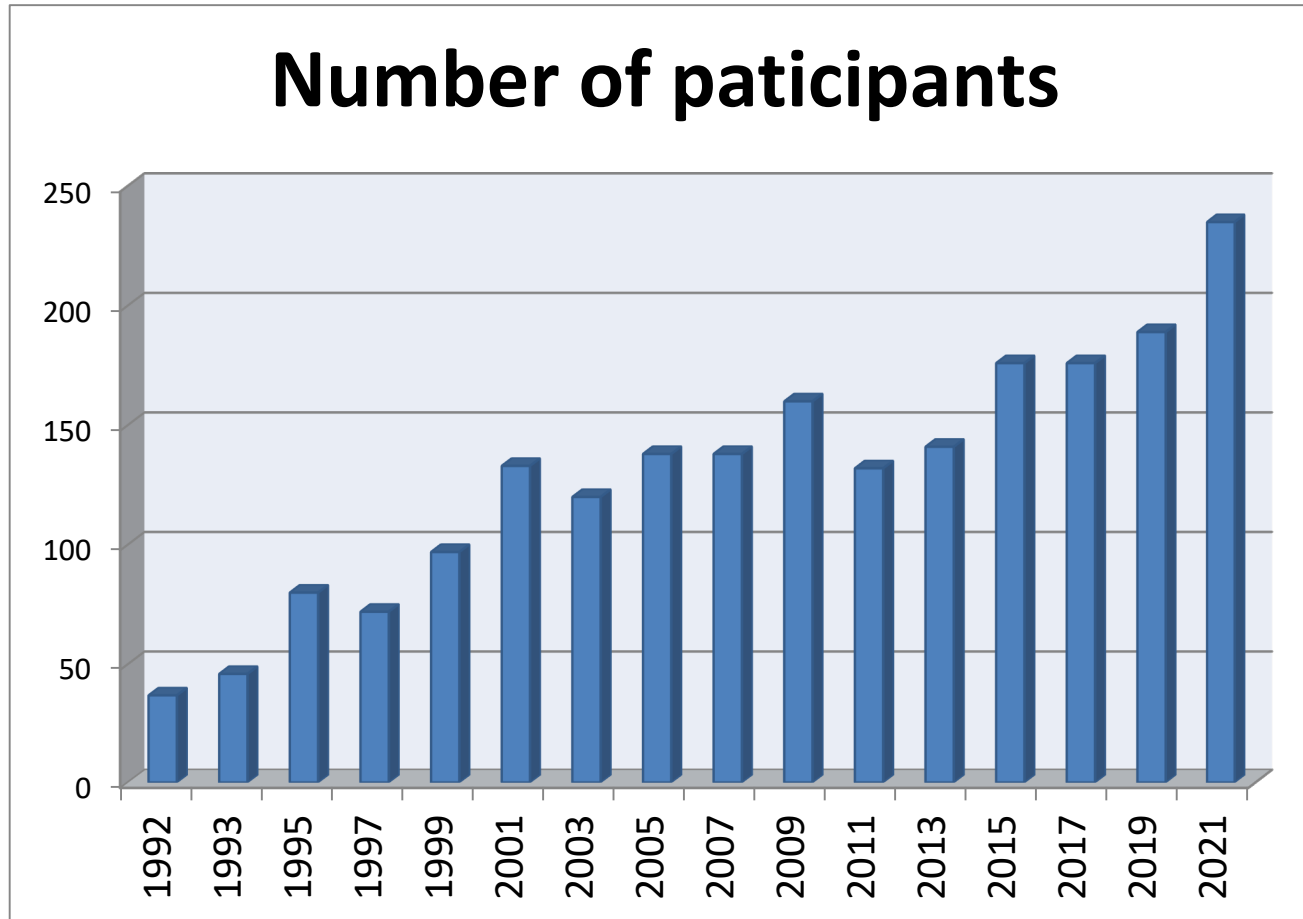
20th Lomonosov Conference on Elementary Particle Physics

We are proud

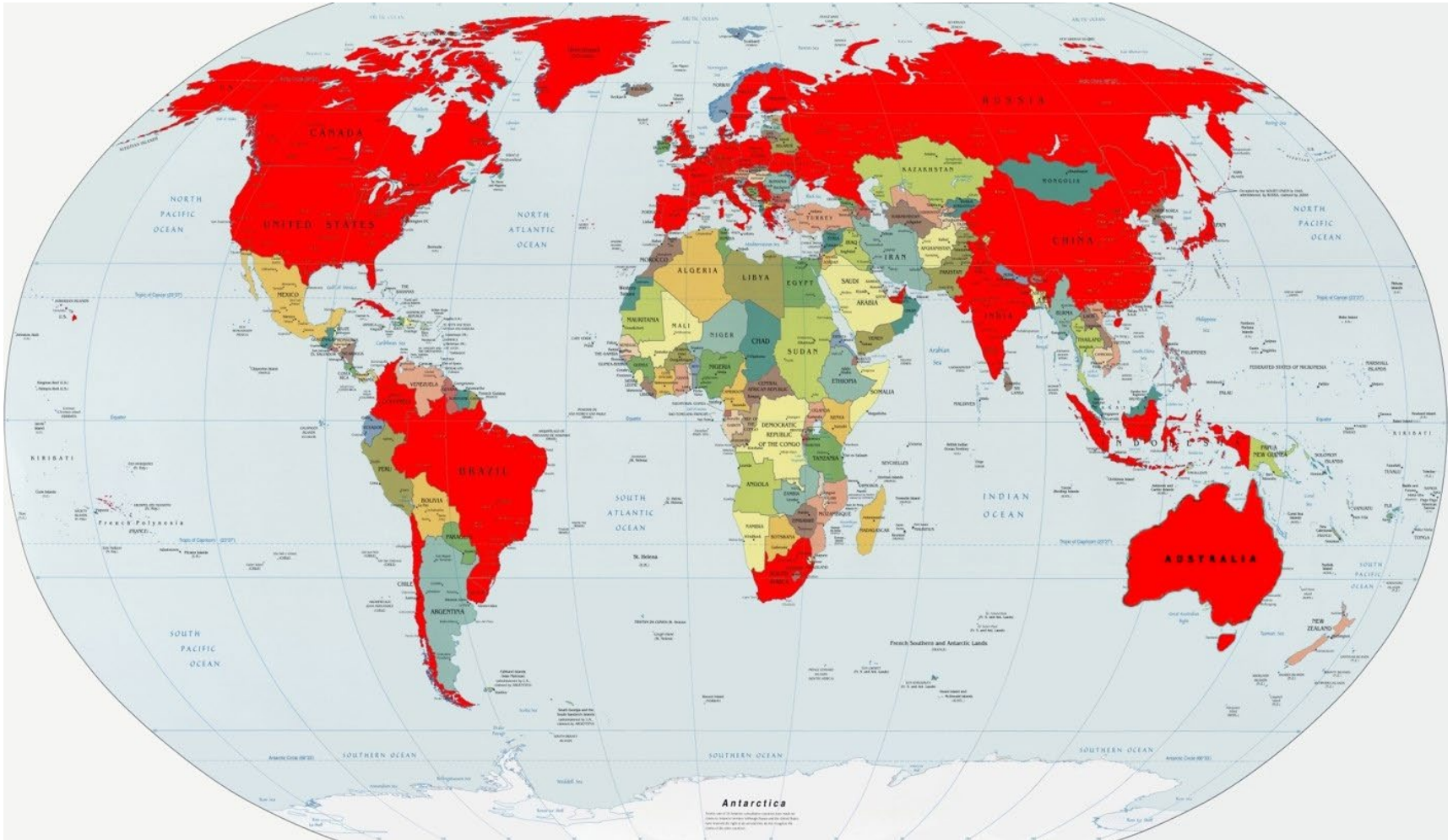
- that many world famous scientists
and also happy
- that many young researches

from 34 countries are speakers at the
Conference

1992 Lomonosov Conference 2021



Map of the Lomonosov Conferences on Elementary Particle Physics



20th Lomonosov Conference 2021

- The conference programme covers a broad set of items on high energy physics, astroparticle physics, cosmic rays, gravitation and cosmology

The main goals of the conference are:

- to bring together scientists from different fields and to stimulate exchange of results and ideas
- maintainig collaboration between different universities and institutes
- to promote communication between young and senior scientists
- to establish relations between scientists from different countries

... striking example of multidimensional unifying nature
of international Lomonosov conferences

by Dr Alexey Lokhov

- graduate of master's degree and post-graduate school of Faculty of Physics of MSU
- member of group on ν physics of MSU
- employee of INR RAS
- has been key figure of LomCon organizing committees
- staying in Germany (Univ. of Münster) for several years

has become an important member of KATRIN Coll.

... a review talk at LomCon20 on behalf of KATRIN on
fundamental problem of ν mass

... before to start the scientific programme let me announce an urgent request (sorry, more precisely, just a demand) to speakers and Chairpersons

we have: • 235 presentations

- 7 working days (no free day in the middle)

- quite short time for tea breaks and lunches

- from +8 to -10 hours spread of time zones for different speakers

therefore we kindly ask all participants strictly follow time schedule

we recommend to reserve for discussions:

- | | | |
|-----------------------|---|-------|
| • 25 min presentation |  | 5 min |
| • 20 min presentation |  | 4 min |
| • 15 min presentation |  | 3 min |
| • 10 min presentation |  | 2 min |

(duration of 25 (20/15) min talks includes 5 (3) minutes for discussion)
Please note that the program schedule is indicated in **CERN zone time**
(Central European Summer Time)

19 August, Thursday

09.00 – 09.30 **Opening**
Central European Summer Time

Chair: Alexander Studenikin, Chairman of Organizing Committee, MSU & JINR

Welcome on behalf of Moscow State University
Welcome on behalf of Ministry of Science and Higher Education of Russia, Andrey Romanov
Welcome on behalf of JINR, Victor Matveev
Welcome on behalf of INR RAS, Grigory Rubtsov

PLENARY SESSIONS (9.30-15.15)

09.30 – 13.20

Chair: Valery Rubakov

09.30 **V.Matveev** (JINR) *On the 65 anniversary of JINR: Present status and Development strategy* (25 min)
09.55 **Y.Wang** (IHEP, Beijing) *Particle and Astroparticle physics in China* (25 min)
10.20 **C.Vallee** (CPPM, Marseille) *Physics Beyond Colliders prospects at CERN* (25 min)
10.45 **I.Bozovic Jelisavcic** (Univ. of Belgrade) *Higgs physics with future linear colliders* (25 min)

11.10 – 11.25 Tea break

Chair: Gioacchino Ranucci

11.25 **J.W.F.Valle** (IFIC, CSIC-Univ. Valencia) *Neutrinos as a new physics pathfinder* (25 min)
11.50 **J.A.Formaggio** (Massachusetts Inst. of Techn.) *Direct measurements of neutrino mass* (25 min)
12.15 **M.Klasen** (Univ. of Münster) *Absolute neutrino mass as the missing link to the dark sector* (25 min)
12.40 **R.Dvornicky** (JINR & Comenius Univ.) *Neutrino telescope in Lake Baikal: The recent status and future perspectives* (25 min)

13.05 – 13.35 Lunch

Chair: Francesca Di Lodovico

13.35 **A.Castellina** (INAF, Torino) *The quest for the sources of ultra-high energy cosmic rays: Results and perspectives* (25 min)
14.00 **J.Berdugo** (CIEMAT) *Latest results of the Alpha Magnetic Spectrometer on the International Space Station* (25 min)
14.25 **K.Scholberg** (Duke Univ.) *Present and future of CEvNS* (25 min)
14.50 **C.Giunti** (INFN Torino) *Theoretical overview on coherent neutrino-nucleus scattering* (25 min)

15.15-15.30 Tea break

... let me wish an interesting Lomonosov Conference

PARALLEL SESSIONS (15.30-18.00)
Central European Summer Time

SESSION 19.08. A (Collider Physics)

Chair: Lidija Zivkovic

15.30 **H.Ahmed** (Univ. of Victoria & St. Francis Xavier University) *Tests of the Standard Model by means of $\Upsilon(3S)$ decays with the BaBar detector* (15 min)
15.45 **I.Altshbeev** (St.Petersburg State Univ.) *Overview of recent ALICE results on particle correlations and fluctuations* (15 min)
16.00 **P.Gandini** (INFN, Milan) *Spectroscopy at LHCb* (15 min)
16.15 **R.Wang** (Harvard Univ.) *Measurements of multi-boson productions including vector-boson fusion and vector-boson scattering at ATLAS* (15 min)
16.30 **S.Petrushanko** (SINP MSU) *Heavy-ion physics at CMS* (15 min)
16.45 **T.Agatonovic Jovin** (VINCA Ins. of Nucl. Sciences) *CP violation in Higgs production in ZZ-fusion at 1 TeV ILC* (15 min)
17.00 **A.Ahmad** (CERN) *The ATLAS Tile Calorimeter performance and its upgrade towards the High-Luminosity LHC* (15 min)
17.15 **T.Karavicheva** (INR RAS) *ALICE upgrade overview for Run 3 and 4 at the CERN LHC* (15 min)
17.30 **S.Fil'chagin** (Russian Federal Nucl. Centre, Sarov) *TBA* (15 min)
17.45 **M.Arsentyeva** (Budker Institute of Nucl. Phys.) *Advanced accelerator concepts for future accelerators* (10 min)

SESSION 19.08. B (Neutrino Experiments)

Chair: Yuri Gornushkin

15.30 **J.H.Jo** (Yale Univ.) *Latest results from MicroBooNE* (20 min)
15.50 **A.Norricks** (FNAL) *Latest neutrino oscillation results from NOvA* (20 min)
16.10 **N.Rossi** (LNGS, INFN) *First detection of solar neutrinos from the CNO cycle with Borexino* (20 min)
16.30 **S.Zavatarelli** (INFN, Genoa) *Geoneutrino detection and other non-solar physics achievements of Borexino* (20 min)
16.50 **Yu.Kudenko** (INR RAS) *Physics and status of the SuperFGD detector for the T2K experiment* (20 min)
17.10 **M.Torti** (Univ. of Milano Bicocca & INFN Milano Bicocca) *The NP06/ENUBET project: towards a monitored neutrino beam* (20 min)
17.30 **S.Qian** (IHEP, CAS) *The R&D of the Ultra Fast 8X8 Readout MCP-PMTs* (20 min)
17.50 **A.Yukhimchuk** (Russian Federal Nucl. Centre, Sarov) *Highly intensive antineutrino tritium source: Specifics of physical experiment* (10 min)