WELCOME

to the *Helmholtz International Summer School*

Quantum Field Theory at the Limits: from Strong Fields to Heavy Quarks

Dubna, July 22-August 2, 2019

Oleg Teryaev,
Head of "Fundamental Interactions Theory" Research Group,
Bogoliubov Laboratory of Theoretical Physics,
Joint Institute for Nuclear Research

JINR today

Being a worldwide centre for fundamental physics research,
JINR sets ambitious goals, which assumes the corresponding high level of international cooperation and integration into the global and first of all the European research programmes, and wide developing of the multidisciplinary research, including innovation studies and also the modern advanced educational programmes.

18 Member States
(incl. 5 from EU):

Azerbaijan
Armenia
Belarus
Bulgaria
Vietnam
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Kazakhstan
Cuba
DPRK
Moldova
Mongolia
Poland
Russia
Romania
Slovakia
Uzbekistan
Ukraine
Czech Republic

About 800 research partners in 62 countries

6 Associate Members (inl. 3 from EU) :
Hungary, Germany, Egypt, Italy, Serbia, SAR

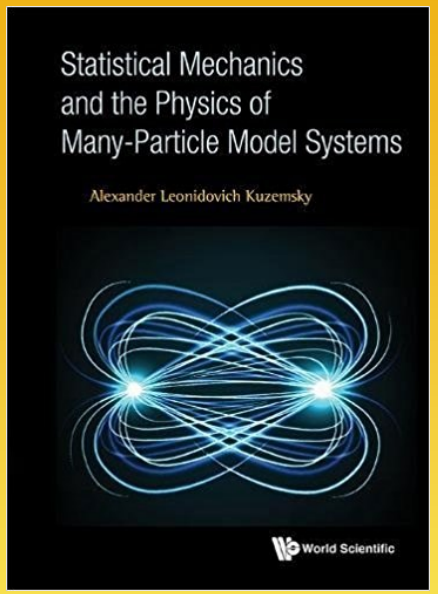
Theoretical Physics at JINR

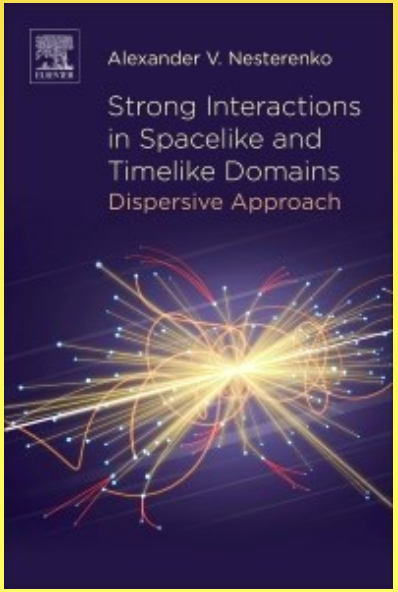
Multidisciplinary research:

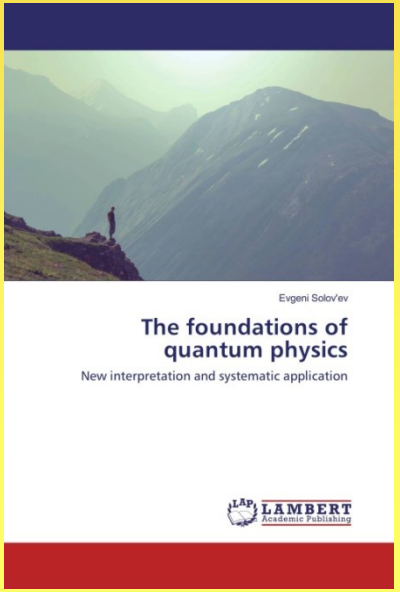
- **Theory of Fundamental Interactions**
- **Theory of Nuclear Structure and Nuclear Reactions**
- **Theory of Condensed Matter**
- **Modern Mathematical Physics: Strings and Gravity, Supersymmetry, Integrability**
- **Research and Educational Project "Dubna International Advanced School of Theoretical Physics" (DIAS-TH)**

Journals (390) & Conf. Proc. (170) ~ 560

Monographs - 4







Fundamental Interactions of Fields and Particles

Leaders: D.I. Kazakov, O.V. Teryaev

Participating countries and international organizations:
Armenia, Azerbaijan, Belarus, Bulgaria, Canada, CERN, Chile, China, Czech Republic, Finland, France, Georgia, Germany, Hungary, ICTP, Italy, Japan, Kazakhstan, Mexico, Mongolia, Netherlands, Norway, Portugal, Poland, Republic of Korea, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, USA, Ukraine, United Kingdom, Uzbekistan, Vietnam.

Issues addressed and main goals of research:
The main aim of the research within the theme is the construction of theoretical models and their application to the description of properties of elementary particles and their interactions. This research includes the following directions of activity.

The development of quantum field theory formalism in gauge and supersymmetric theories. Construction and investigation of the models of particle physics beyond the Standard Model. Theoretical support of experiments at the Large Hadron Collider on the search of new physics and the study of the properties of the Higgs boson.

Calculation of radiative corrections to the processes of particle creation within the Standard Model and its extensions. Investigation of neutrino properties and neutrino oscillations. Investigation of the hadron properties within quantum chromodynamics and phenomenological quark models. Study of the hadron spin structure with the help of generalized and transverse momentum dependent parton distributions and theoretical support of NICA/SPD program.

Study of heavy quark properties and exotic hadrons. Lattice simulations for obtaining nonperturbative results in gauge theories. Investigation of dense hadronic matter and theoretical support of the NICA/MPD program .

Theoretical support of a wide range of current and future experiments at JINR, IHEP, CERN, GSI, JLab and other physics centers.

Directions of BLTP Research

1. Quantum field theory and physics beyond the Standard Model	**D.I. Kazakov** **A.V. Gladyshev** **A.V. Bednyakov**
BLTP	A.N. Baushev, A.T. Borlakov, Ch.R. Das, V. Gnatich, A.V. Kotikov, G.A. Kozlov, L. Mizhishin, V.A. Naumov, A.V. Nesterenko, A.I. Onishenko, A.F. Pikelner, R. Remetsky, D.M. Tolkachev, S.I. Vinitsky, A.A. Vladimirov, R.M. Yakhibbaev, 5 students
2. QCD parton distributions for modern and future colliders	**I.V. Anikin** **O.V. Teryaev**
BLTP	V.V. Byt'yev, M. Deka,, A.V. Efremov, S.V. Goloskokov, D.B. Kotlorz, Y.A. Klopot, S.V. Mikhailov, A.A. Pivovarov, G.Yu. Prokhorov, A.G. Oganesyan, O.V. Selyugin, A.J.Silenko, N.I. Volchanskiy, 6 students
VBLHEP	Yu.I. Ivanshin, A.P. Nagaitsev, I.A. Savin, R. Tsenov
DLNP	A.V. Guskov
3. Strong interactions phenomenology and precision physics	**M.A. Ivanov** **V.I. Korobov** **A.E. Dorokhov**
BLTP	A.B, Arbuzov, D. Alvarez, A.K. Bekbaev, Yu.M. Bystritsky, S.M. Eliseev, C. Ganbold, S.B. Gerasimov, A.N. Isadykov, L. Martynovich, K. Nurlan, H.-P. Pavel, A.A. Osipov, A.V. Sidorov, Yu.S. Surovtsev, Zh. Tyulemisov, M.K. Volkov, S.A. Zhaugasheva, 5 students
4. Theory of Hadronic Matter under extreme conditions	**D. Blaschke** **V.V. Braguta** **E.E. Kolomeitsev** **S.N. Nedelko**
BLTP	D.E. Alvarez-Castillo, N.Yu. Astrakhantsev, T. Bhattacharyya, M. Deka, S. Dorkin, A.E. Dorokhov, A.V. Friesen, A.A. Golubtsova, M. Hnatic, M. Hasegawa, Yu.B. Ivanov, E.-M. Ilgenfritz, L. Kaptari, A.S. Khvorostukhin, A.Yu. Kotov, K. Maslov, V.S. Melezhik, A.V. Nikolsky, S. Pandiat, A. Parvan, A.M. Snigirev, V.D. Tainov, O.V. Teryaev, V.D. Toneev, V.E. Voronin, D. Voskresensky, G.M. Zinoviev, 4 students
5. Theory of electroweak interactions and neutrino physics	**A.B. Arbuzov** **V.A. Naumov** **F. Simkovic**
BLTP	A. Babic, A.V. Bednyakov, Yu.M. Bystritskiy, V.V. Byt'yev, A.E. Dorokhov, M.I. Krivoruchenko, K.S. Kuzmin, A.F. Pikel'ner, D.S. Shkirmanov, G. Seylkhanova, I.A. Sokal'skiy, 1 student

Anatoly Kotikov (JINR)

"Calculation of massive Feynman diagrams"

Igor Anikin (JINR)

"LCSRs for Nucleon Gravitational Form Factors"

Mkhail Ivanov (JINR)

Nonleptonic decays of doubly charmed baryons"

Aidos Issadykov (JINR & INP Almaty)

"Study of B_c decays"

David Blaschke (JINR Dubna & Uni Wroclaw)

"Particle production in strong, time-dependent fields"

Opportunities at BLTP

- http://theor.jinr.ru/postdoc/BLTP_JINR_Postdoc_fellowship_2019_2.pdf

BLTP JINR: Postdoctoral Research Fellow in Theoretical Physics

General information

***Date of publication*:** 15 May 2019
Workplace: Bogoliubov Laboratory of Theoretical Physics, JINR
***Type of contract*:** research fellow
***Contract period*:** 36 months
***Expected date of employment*:** 1 December 2019
***Proportion of work*:** Full time
***Remuneration*:** 150 000 roubles gross per month (equivalent approximately to 2300$ for the date of publication), 13% income tax is applied in accordance with the RF regulations, travel support for participation in conferences and short term visits
Social package: free medical insurance in the frame of the Russian compulsory medical insurance system, partial compensation for accommodation/rent of apartment

Field of research

QCD and 3D/spin hadron structure (theory):
Investigations of inclusive and exclusive processes involving transverse momentum dependent and generalized parton distributions. Calculations of spin and angular asymmetries, perturbative and non-perturbative QCD effects.

Skills required

***Desired level of education*:** PhD or its equivalent in JINR Member States
***Experience required*:** not more than 5 years of postdoctoral experience

The applicant is expected to have a solid background in quantum field theory, theoretical elementary particle and nuclear physics (including PhD in the field).

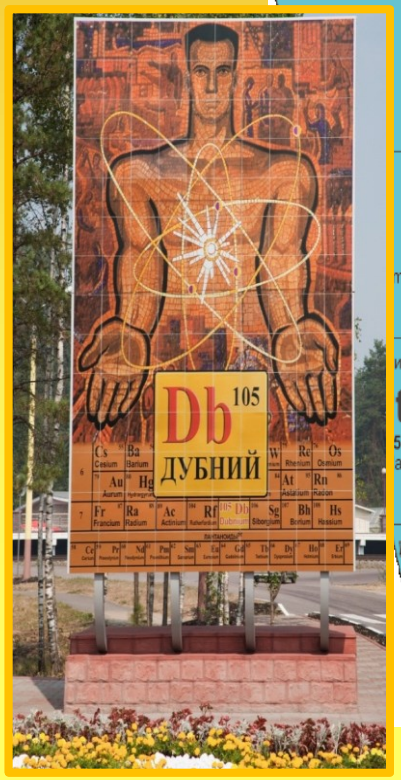
Proficiency in English is essential.

Application

Application should be sent by e-mail to *bltp@theor.jinr.ru*
Application should include: Application in the name of the JINR Director, academic CV, list of publications, scanned copies of documents of higher professional education and conferment of scientific degree, recommendation letters (not less than three) including the recommendation from the leader of the appropriate research group at BLTP.
Dates: The applications are accepted starting from the date of publication. The review of applications will begin on 01.09.2019 and will continue until the opportunities are filled.
Questions and information: For additional information please e-mail to *andreev@theor.jinr.ru* (sc. secretary of BLTP Dr. Alexander Andreev)

D.I. Mendeleev's Periodic table of elements

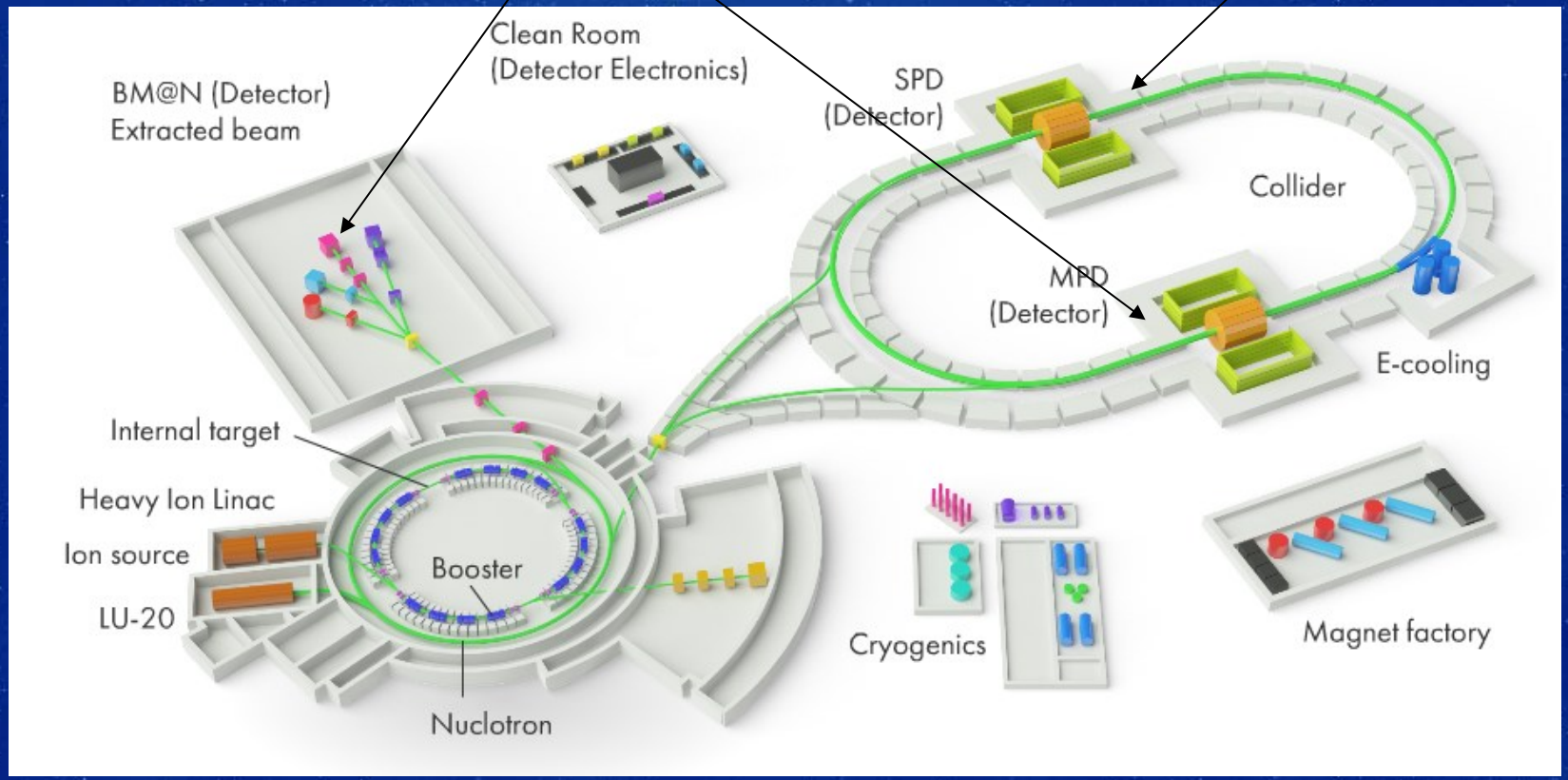
105
Db
Dubnium



Бор 5																	Неон 10
B																	Ne
10,81																	20,18
Boron																	Neon
Углерод 6																	Фтор 9
C																	F
12,011																	18,998
Carbon																	Fluorine
Азот 7																	Кислород 8
N																	O
14,007																	15,999
Nitrogen																	Oxygen
Алюминий 13																	Аргон 18
Al																	Ar
26,982																	39,948
Aluminum																	Argon
Кремний 14																	Хлор 17
Si																	Cl
28,085																	35,45
Silicon																	Chlorine
Фосфор 15																	Сера 16
P																	S
30,974																	32,06
Phosphorus																	Sulfur
Никель 28	Медь 29	Цинк 30															Криптон 36
	Cu	Zn															Kr
	63,546	65,38															83,798
	Copper	Zinc															Krypton
	Серебро 47	Кадмий 48															Ксенон 54
	Ag	Cd															Xe
	107,87	112,41															131,29
	Silver	Cadmium															Xenon
	Золото 79	Ртуть 80															Радон 86
	Au	Hg															Rn
	196,97	200,59															[222]
	Gold	Mercury															
	Дармштадтий 110	Рентгений 111	Коперникий 112	Нихоний 113													
	Ds	Rg	Cn	Nh													
	[281]	[282]	[285]	[286]													
	Darmstadtium	Roentgenium	Copernicium	Nihonium													

Флеровий 114	Московий 115	Ливерморий 116	Теннессин 117	Оганесон 118
Fl	Mc	Lv	Ts	Og
Flerovium	Moscovium	Livermorium	Tennessine	Oganesson

NICA: heavy ions and hadrons



Large External Fields and Heavy Quarks@NICA

- Heavy-Ion collisions largeset ever magnetic fields (~m_{π}^2): contribute to particles polarization

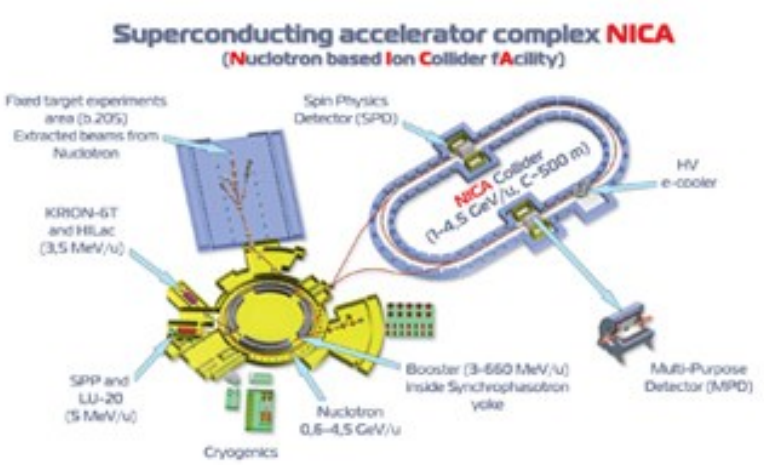
- Heavy quarkonia production: tool for studies of nucleons 3D/Spin structuire

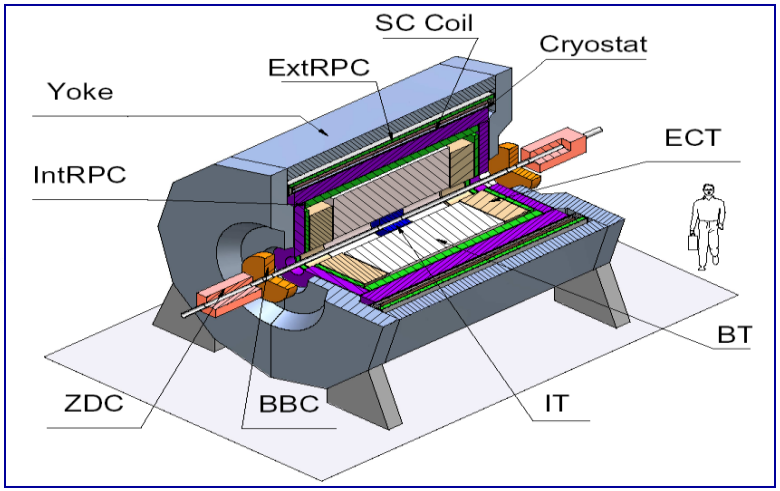
WELCOME!

- HAVE A NICE STAY IN DUBNA AND VERY FRUITFUL SCHOOL!

NICA @ JINR

NICA/MPD – Nuclotron-based heavy Ions Collider fAcility and Multi-Purpose Detector





Aim – experimental study of dense QCD matter and search for signals of mixed phase and critical point in heavy ions collisions

Phase diagram :
From ALICE to NICA/MPD