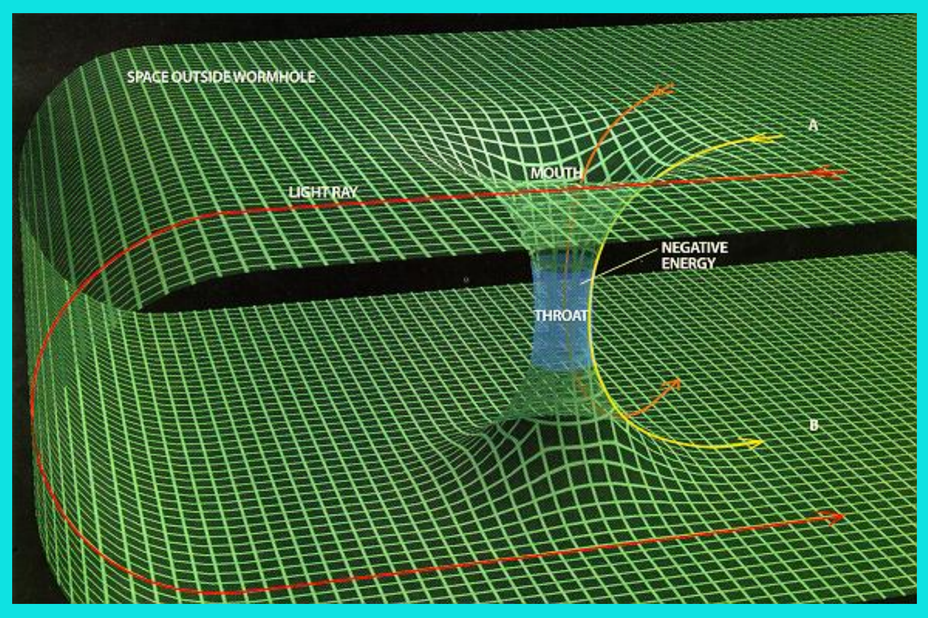
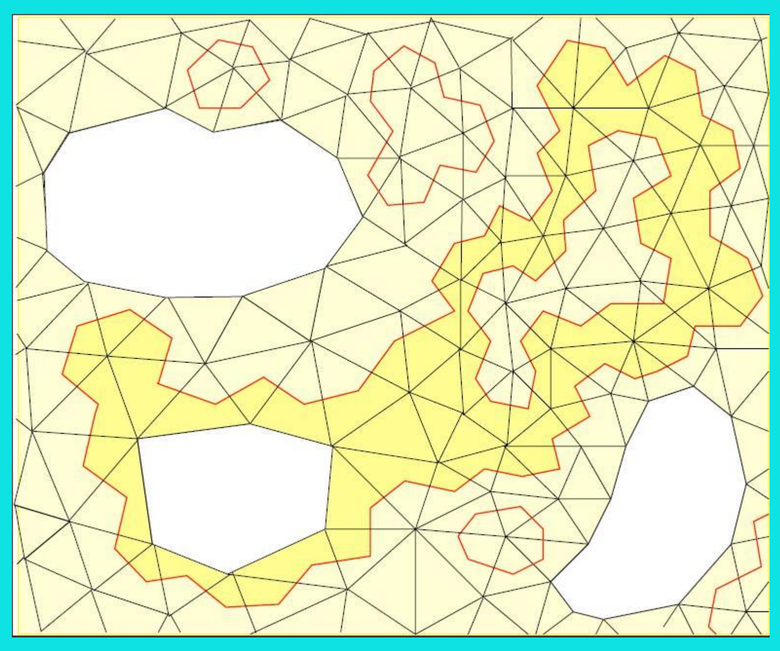
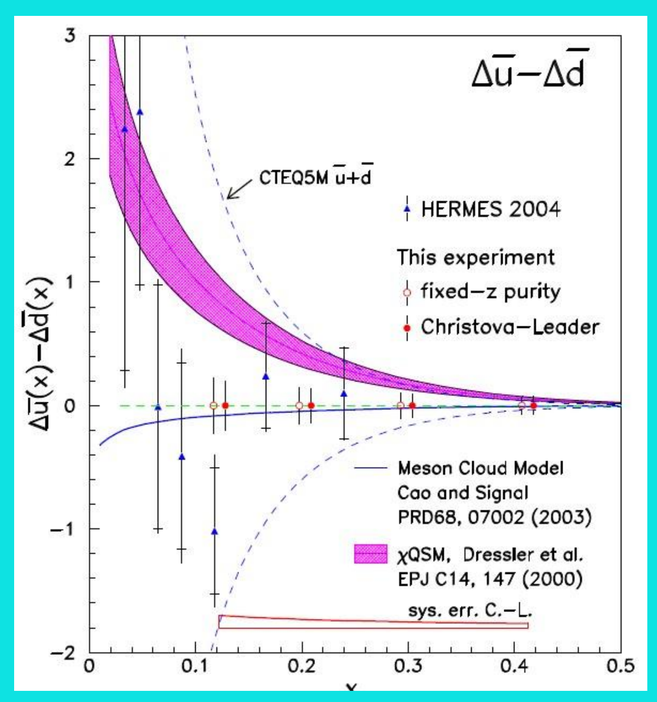
Bulgarian Academy of Sciences
Institute for Nuclear Research and Nuclear Energy
40 years 1972 - 2012
Laboratory “Theory of Elementary Particles”







Laboratory “TEP” on the International Science Landscape

Laboratory “Theory of Elementary Particles” (Laboratory “TEP” for short) was founded in the beginning of 1970-ies by **Prof. Ivan Todorov** (full member of Bulgarian Academy of Sciences (BAS)) as an integral unit within the “Nuclear and Elementary Particle Theory Division” headed by **Prof. Hristo Hristov** (full member of BAS) – the founding Director of the Institute for Nuclear Research and Nuclear Energy (INRNE). For an extended period of time a deputy-head of Laboratory “TEP” was **Prof. Dimitar Stoyanov** (corresponding member of BAS). Among the other senior members of the Laboratory are **Prof. Tchavdar Palev** (full member of BAS) and **Prof. Valentina Petkova** (corresponding member of BAS).

Already from the start the staff of Laboratory “TEP” engaged in an exceptionally active research in practically all “hot” areas of the theory and phenomenology of fundamental elementary particle interactions at high and ultra-high energies, modern mathematical physics, as well as it currently conducts theoretical research at the forefront of gravity research and cosmology.

Most of these scientific areas continue to be rapidly developing today as well. The most sigificant among them are: ***Axiomatic, group-theoretical and algebraic approaches in quantum field theory; Quantum models with generalized statistics; Conformal field theory with applications in string theory; Supersymmetry and supergravity; Non-perturbative phenomena and methods in quantum gauge field theories; Theory and applications of integrable dynamical systems (soliton theories); Hamiltonian dynamics of relativistic systems with constraints and applications in string and membrane theory; Lattice gauge theories and statistical mechanics of random surfaces; Theory and phenomenology of electroweak and strong interactions; Physics of massive neutrinos and neutrino oscillations; General relativity and astrophysics – exact solutions of Einstein equations***.

In the last decade the research arsenal of Laboratory “TEP” incorporated few new modern topical areas such as: ***Quantum groups and generalized symmetries; Duality between gravity and gauge field theories (Maldacena duality and its extensions), and integrability in string theory; membranes in black hole physics, cosmology and high-energy ellementary particle physics; Applications of conformal quantum field theory in the modern theory of quantum computers.***

The vast majority of the publications of the members of Laboratory “TEP” appear in the most prestigious international scietinfic journals such as: ***“Physical Review D”, “Nuclear Physics B”, “Journal of High Energy Physics”, “Physics Letters B”, “Communications in Mathematical Physics”, “Classical and Quantum Gravity”, “General Relativity and Gravitation”, “Journal of Mathematical Physics”, “International Journal of Modern Physics A”, “Modern Physics Letters”, “Letters in Mathematical Physics”, “Journal of Physics A”, “Rivista del Nuovo Cimento”, “Theoretical and Mathematical Physics”, “J.E.T.P. Letters”,*** etc.

A particularly commending achievement of the Laboratory are the **12 monographs** printed by world leading international publishing houses.

The scientific works of the members of Laboratory “TEP” have attracted significant interest in the scientific literature worldwide and have gained so far **more that 18000 (eighteen thousands) independent citations** by foreign authors.

In the mean time seven (already former) members of Laboratory “TEP” – **Stilian Kalitzin, Ivan Kostov, Mihail Minchev, Sergey Petcov, Emeri Sokachev, Galen Sotkov** and **Yassen Stanev** have been awarded with tenured positions in prestigious leading academic institutions abroad such as: University medical center, Utrecht University (**Utrecht, the Netherlands**); CEN Saclay (**Gif-sur-Yvette, France**); Scuola Normale Superiore (**Pisa, Italy**); SISSA (**Trieste, Italy**); Universite de Lyon (**Lyon, France**); Instituto di Fisica Teorica (**Sao Paulo, Brazil**) and Universidade Federal do Esprito Santo (**Vitoria, Brazil**); Universita di Roma II “Tor Vergata” (**Rome, Italy**).

The scientific research of Laboratory “TEP” is conducted in the framework of intensive collaboration with various world renown academic institutions such as:

(a) International centers – **Joint Institute of Nuclear Research** (Dubna, Russia); **CERN** (Geneva, Switzerland); **ICTP** and **SISSA** (Trieste, Italy); **Erwin Schrödinger International Institute for Mathematical Physics** (Vienna, Austria);

(b) National centers – **Armenia** (Physics Institute of Armenian Academy of Sciences, Erevan); **Austria** (Institute of High-Energy Physics, Vienna University); **Belgium** (Ghent University); **Brazil** (Instituto di Fisica Teorica, Sao Paulo; Universidade Federal do Esprito Santo, Vitoria); **France** (C.E.A. Saclay (Gif-sur-Yvette), Institut des Hautes Etudes Scientifiques (Bur-sur-Yvette); Université de Paris-Sud (Orsay), Ecole Polytechnique (Palaiseau), L.A.P.P. (Annecy); Université Paul Sabatier (Toulouse); Université Henri Poincaré (Nancy); Institut de Recherche Mathematique Avancée CNRS et Université de Strasbourg; Centre de Physique Théorique (Marseille)); **Hungary** (K.F.K.I., Budapest); **Germany** (DESY Hamburg, Institut für Theoretische Physik der Universität Göttingen, Technische Universität Clausthal, Max-Planck Institut für Mathematik (Leipzig), Institut für Theoretische Physik der Justus-Liebig-Universität (Giessen), Institut für Theoretische Physik der Universität Hamburg, Albert-Ludwigs-Universität Freiburg); **Greece** (University of Patras); **Ireland** (Dublin Institute of Technology); **Israel** (Weizmann Institute of Science (Rehovot), Hebrew University (Jerusalem), Ben-Gurion University (Beer-Sheva)); **Italy** (Trieste University, Universita di Roma II “Tor Vergata”, INFN); **Japan** (Osaka Prefecture University); **Korea** (Ewha University, Seoul); **Russia** (Mathematical Institute of Russian Academy of Sciences (St.Petersburg, Moscow), Physics Institute of Russian Academy of Sciences (Moscow), Institute of Theoretical Physics (Chernogolovka)); **Switzerland** (University of Geneva); **United Kingdom** (Imperial College and Kings College (London), University of York, University of Northumbria at Newcastle); **Ukraine** (National Polytechnical University (Odessa), National Antarctic Center (Kiev)); **USA** (Institute of Advanced Studies (Princeton, NJ), MIT (Cambridge, MA), University of Illinois at Chicago, Virginia Polytechnic Institute and State University (Blacksburg, Virginia), Pennsylvania State University (Abington), CLASS12 Collaboration at Jefferson Laboratory (Newport News, VA), University of Massachusetts (Amherst), University of Delaware (Newark); Michigan University (Ann Arbor), North Carolina State University (Raleigh)).

International Grants and Organizing Conferences

Significant number of members of the Laboratory have participated in large international projects and research networks financed by the EC within the 5th, 6th and 7th framework programs:

(a) FP5 Research Training Network “*EUCLID*” **HPRN-CT-2002-00325;**

(b) ***“Constituents, Fundamental Forces and Symmetries of the Universe”*** – FP6 Marie Curie Actions, Research Training Network, Project **MRTN-CT-2004-005;**

(c) ***“Tools and Precision Calculations for Physics Discoveries at Colliders”*** – FP6 Marie Curie Research Training Network, HEPTools, **MRTN-CT-2006-03550;**

(d) TMD network ***“Mapping out the Transverse Structure of the Nucleon”*** of the FP7 Hadron Physics2 Project;

(e) EU 7-th Framework ***"Partnership for Advanced Computing in Europe"*** (PRACE AISBL) - projects RI-261557 and RI-283493.

Members of Laboratory “TEP” are the core organizers of numerous prestigious international conferences such as the **Annual Workshops of the EC Research Training Networks “EUCLID” (2004) and “Forces-Universe” (2008)**, as well as the series of international workshops “Lie Theory and its Applications” (Varna – 2003, 2005, 2007, 2009, 2011).