Colloqium Summarum

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Dear friends and colleagues,

I am happy to state that our 3-days meeting came to its finish not dying but full of impetus directed to the future Workshops.

As usual I have to present my personal impressions as a "normal" participant though normal participants hardly listen to all talks (if any). First of all we continued the course taken several years ago: to present a wide scope of subjects from current research work in particle and gravitation physics up (or down) to philosophy, methodology and history. We strongly believe that such retrospective and general aspects are vitally needed for conscient and successful research work.

• Experimental status of modern particle physics was presented in the talk of A. Zaitsev (IHEP, Protvino). Modern high-energy physics is largely plagued by the searches for SUSY particles, Higgs, extra-dimensions. Up to now with permanent negative results. At the same time there is a certain neglect with respect to what is technically called "hadronic spectroscopy". Dr. A. Zaitsev has shown in a very persuasive way that such a neglect is everything but right attitude. Marvellous world of exotic mesons which can be a key to the mysterious confinement phenomenon was demonstrated in this talk.

The next talk by L.D. Soloviev (IHEP, Protvino) appeared to be very to the point because it gave us an opportunity to look how the famous "string" can work in real battle, not at academic and unachievable 10^{19} GeV.

Related but specifically featured topics were discussed by Dr. Y.-S. Kim.

Another treatment of the confinement mechanism was suggested in the talks by V. Khruschev (VNIIMS, Moscow) who presented a kind of relativistic potential formulation and use of the quark model, and O. Pavlovsky (Bogolubov ITPM, Moscow) who gave an original version of the "bag model" of hadrons based on some singular solutions of the Yang-Mills equations resembling black holes in general relativity. Nonstationary Selfconsistened Solutions in quantum field theory were discussed by Dr. M. Tchitchikina from the Lomonosov Moscow State University. Some hope for obtaining field-theoretic description of hadronic resonances could be got from this presentation.

So we see that both in experiment and in theory the hadronic spectroscopy is a really fundamental, evidently interesting and practically feasible research subject which merits much more attention.

• In addition to realistic trends in what concerns particle physics, we could also enjoy with some more ambitious ideas on a unified theory of all interactions and particles developed by Prof. H. Terazawa (KEK, Tokyo) in a very enthusiastic report. Together

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with the talks by F. Tikhonin (IHEP, Protvino) on physical potential of future muon colliders, by A. Smirnov (Demidov Yaroslavl' University) on some new limits for the search of scalar leptoquarks, and by B. Arbuzov (IHEP, Protvino) on a composite realization of the Higgs field, this group of talks left a good impression that future generations of physicists by no means will be unemployed.

• Five talks at the Workshop were devoted to gravitation in its various aspects.

A.A. Logunov described in detail what happens with a test particle in the vicinity of the Schwartzschild sphere of a massive body. In a sharp contrast with a popular black hole scenario in the General Relativity Theory where a particle disappears tracelessly when approaching this radius, in the Relativistic Theory of Gravity the particle hits the surface of the body and goes back away.

An old and seemingly discredited notion of ether has found its new incarnation in a "metric theory of gravity" by Dr. I. Shmeltzer (WIAS, Berlin), who managed to find for this new ether a consistent and instructive interpretation in terms of condensed matter physics. Since now at least some of us will have no more allergy to this term, "ether". Prof. A. Zakharov from ITEP (Moscow), the author of the recent book on gravitational microlensing, gave us a very scilfully composed pilot servey of this flourishing and promising field of modern gravitational physics.

Prof. A. Burinsky (NSI RAS, Moscow) has exhibited new ideas on such a familiar to particle physicists property as spin, which appears to have deep connections with "super-Kerr" black holes.

Yu. Vyblyi from Minsk (Institute of Physics) argued in favour of use of non-symmetric tensor potentials in the framework of Logunov Relativistic Theory of Gravitation. Some interesting thoughts of the origin of torsion of space-time deserve to be developed further.

I have to mention also the talk by A. Genk from the St.-Petersburg Association of Scientists spiritually close to the above mentioned group of talks. He raised (albeit not resolved) quite fundamental problems concerning invariant and covariant descriptions of so called "time deceleration" and similar effects*.

• Prof. C. Marchal from ONERA (Chatillon) concerned on one of the most difficult problems of physics and philosophy: arrow of time. He considered the problem in tight relation with the notion of determinism. In the course of his exciting talk, Prof. Marchal gave a full tribute to Henri Poincaré, great French philosopher and scientist, who greatly contributed into the field.

Prof. A. Tyapkin again attracted our attention to Henri Poincaré in relation with his views on revolution in physics. It was interesting to know that many of Thomas Kuhn's ideas can be traced back to Henri Poincaré.

Philosophy, but this time "the philosophy of Soviet physics", was also the subject of the talk by A. Pechenkin (IHST RAS, Moscow), who has found that philosophical background of L.I. Mandelstam and his school is to be qualified as a kind of operationalism.

*Note added in proof. I have to add here the contribution from Dr. A. Blanovsky (TTC, Los-Angeles), who, unfortunately, could not realize his strong intention to come to Protvino. In his report he described a new approach to the experimental study of the Sagnac effect. This approach in a more wide scope, naturally leads to the appearance of quantum-mechanical notions in a seemingly classical framework. Further development of this approach able to be applied to nuclear physics looks quite intriguing.

The problem of freedom in scientific researches was illustrated by D. Bayuk (IHST RAS, Moscow) on example of Galileo Galilei with new insights which show that the problem is still actual in our days.

Dr. K. Tomilin from IHST RAS (Moscow) told us an instructive story about the natural system of units in relation with the 100-year anniversary of the Planck's system. Planck length or Planck mass became now an obligatory attribute of modern physics and it is useful to remember their historical origins.

Basic principles of quantum theory is a permanent subject of disputes in physics community. Dr. N. Lunin from Nizhni Novgorod (IAP RAS) attacked in his talk the Superposition Principle, suggesting his own new version of the problem.

Quantum properties of matter become closer and closer to our everyday life. Prof. O.A. Khrustalev (Bogolyubov ITPM, Moscow) gave a microreview of a new field related to atomic-size computers. For us, "usual users", these trends look very exciting and much promising.

Dr. G. Harigel from CERN (Geneva) displayed in a very clear and complete way the situation in one of the most startling fields of human technological activity: radiactive waste rendering. These problems seem to be far from pure research but they present an exciting challenge to any creative mind.

Tomorrow this conference hall will be empty and silent. But the spirit of our disputes and discussions makes our future meetings here indispensible.

I wish you all the best. Thank you.