

PREFACE

The 20th International Symposium on Spin Physics (2012) that was held in Dubna from September 17 to 22 was attended by about 300 participants from 22 countries. Since the Rochester Conference in 1964, this was the first Dubna forum that attracted so many scientists. This Symposium is one of the largest IUPAP conferences. The previous Symposia of this series were organized in Germany, the USA, Japan, Italy, and so on around the circle. Most participants of the Dubna Symposium were from JINR, the USA, Russia, Germany, Japan, and Italy. The program of the Symposium included 6 plenary sessions, at which 32 invited talks were presented and discussed, and 9 sections with 145 presentations devoted to the spin structure of hadrons, spin effects in reactions with lepton and hadron beams, spin physics beyond the Standard Model, future experiments as well as to the technique of polarized beams and targets and application of spin phenomena in medicine and technology. Almost all these talks are presented in the Proceedings.

Among the future projects, the Nuclotron-M–NICA project at JINR VBLHEP should be mentioned, the program of which is able to bring the Institute to prominence in investigations of spin phenomena. The spin community of the Symposium supported the plans to create new unique possibilities for conducting polarization studies at this accelerator complex. The obtained data will complement the global treasury and help to resolve the puzzles of the spin effects having no solution since the 70s of the last century. The JINR Director V. A. Matveev announced an open competition for the position of a leader of the NICA spin program.

Of great impression is the JLab program on increase of energy of a continuously circulating electron beam of their accelerator up to 12 GeV and upgrading of most of the detectors for carrying out a cycle of experiments on the Generalized Structure Functions. This Laboratory also considers potentialities for construction of an accelerator of electrons with protons and nuclei accelerated up to 250 GeV. Analogously, a 10–30 GeV electron accelerator is also planned at BNL for collision of electrons with polarized protons and RHIC nuclei, including polarized ^3He nuclei for investigation of the neutron spin structure. At CERN, the project COMPASS-II has been accepted and already started to study production processes of muon pairs in collisions of pions with polarized nucleons for

investigation of the nucleon spin structure and deeply virtual exclusive production of photons and mesons for measuring the contribution of the orbital angular momentum to the nucleon spin. Also, the program was presented for obtaining polarized proton beams from lambda-particle decay at the accelerator U-70, IHEP for spin studies at the SPASCHARM facility being now under construction.

Great interest was generated by the plans to establish a unique European complex in Jülich, Germany for determining the Electric Dipole Moment (EDM) of the proton and nuclei. The fact is that the dipole moment of fundamental particles violates both space and time parity. Its detection would indicate the violation of the Standard Model and, in particular, would make it possible to approach the problem of understanding the baryon asymmetry of the Universe. The planned complex will reduce the measurement limit of the deuteron EDM up to $12^{-24} e \cdot \text{cm}$.

Great interest was aroused by the first results of experiments at the Large Hadron Collider (LHC) at CERN relating to spin physics. In particular, many discussions were focused on the role of the spin in studying the recently discovered Higgs-like boson with mass of 125 GeV, in polarization of W and Z bosons and also in the heavy quark physics.

The success of the Symposium was facilitated by the financial support from the T. Jefferson Laboratory, Brookhaven National Laboratory and the RIKEN BNL Centre (USA), the Research Centre in Jülich (Germany), the Russian Foundation for Basic Research, the «Dynasty» Foundation, the JINR Heisenberg–Landau, Bogoliubov–Infeld, Blokhintsev–Votruba and Ter-Antonyan–Smorodinsky Programs of international collaboration, as well as the scientific and industrial organizations: «Neutron Technologies», «Atom» and «CryoInnovations». This made it possible to provide considerable financial support to young participants from different countries. At a meeting of the International Committee on Spin Physics, its members noted a good organization and great success of the Dubna Symposium, and decided to organize the following 21st Symposium on Spin Physics in Beijing (China) on October 20–24, 2014.

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