

A welcome message

Dear colleagues,

It is our pleasure to welcome all participants of the first workshop on the Next Generation of AstroParticle Experiments in Space (NextGAPES-2019).

Astroparticle Physics and Gamma-Ray Astronomy presents the broadest field of research that covers experiments involving man-made machines as well as experiments that are running for billions of years by Nature itself. These involve all types of known and yet unknown particles and emissions in the broadest energy range possible, from nano-eV to 10^{21} eV, far exceeding the capabilities of terrestrial and extraterrestrial laboratories. Capturing and analyzing all sorts of emissions we can learn about the origin, properties, and destiny of the universe, the Milky Way and other galaxies, stars and planets including our Sun and Earth, and ourselves, humankind.

Last decade was rich on discoveries and breakthrough results in many areas of traditional astroparticle physics and gave birth to two brand new branches of astronomy: gravitational and neutrino. The changes are dramatic and, in many respects, invalidate the conventional astrophysics of high energies as we knew it for the last half of century. Understanding new phenomena requires significant advances in capabilities of new instruments that include broader energy coverage, manifold increases in statistics of collected events, and in the accuracy. This also includes traditional branches, such as astrophysics of cosmic rays and gamma-ray astronomy, and the discussions of the designs and goals of new missions and instruments should start now at the time when highly successful current missions are still operating.

The first NextGAPES-2019 workshop that addresses these issues and open for all participants throughout the world is organized with help of the International Advisory Committee at the M.V. Lomonosov Moscow State University on June 21-22, 2019. The location of the workshop is rather formal as it is done entirely using the Zoom web conference system, while online participation is completely free and open for all scientists.

The primary goals of the workshop are to discuss the results of the current experiments and feasibility and layouts of new experiments designed to address scientific challenges of the 21st century and to build upon an extraordinary success of the high impact missions, such as ATIC, BESS, CREAM, PAMELA, AMS-02, Fermi-LAT, NUCLEON, CALET, DAMPE, ISS-CREAM... The scope of the meeting includes advances in astrophysics of cosmic rays up to the knee and above, gamma-ray astronomy, search for signatures of dark matter, and other challenges with emphasis on space-borne heavy multi-ton detectors that provide considerable gains in accuracy and sensitivity.

One of the goals of the workshop is a preparation of a white paper for the Committee of Space Research of the Russian Academy of Sciences for inclusion a heavy detector

payload into the Russian Space Research Program. It is proposed that the multi-ton payload will be launched with a super-heavy booster “Enisey-5” currently under development within a framework of institutions participating in the Russian Federal Space Program. Its design and capacity are shown below.

The workshop is organized under the auspices of Section on Physics of Cosmic Rays of Committees on Space Research and on Cosmic Rays of the Russian Academy of Sciences, Russian Space Agency (ROSCOSMOS), and M.V. Lomonosov Moscow State University.

Mikhail Panasyuk, Moscow State University, Russia

Igor Moskalenko, Stanford University, USA

The Perspective Russian Launcher “Enisey”

