ҚАЗАҚСТАН РЕСПУБЛИКАСЫ БІЛІМ ЖӘНЕ ҒЫЛЫМ МИНИСТРЛІГІ
Л.Н. ГУМИЛЕВ АТЫНДАҒЫ ЕУРАЗИЯ ҰЛТТЫҚ УНИВЕРСИТЕТІ

ЕУРАЗИЯ ҰЛТТЫҚ УНИВЕРСИТЕТІ

ЖАС ҒАЛЫМДАР КЕҢЕСІ

Студенттер мен жас ғалымдардың «ҒЫЛЫМ ЖӘНЕ БІЛІМ - 2016» атты XI Халықаралық ғылыми конференциясының БАЯНДАМАЛАР ЖИНАҒЫ

СБОРНИК МАТЕРИАЛОВ XI Международной научной конференции студентов и молодых ученых «НАУКА И ОБРАЗОВАНИЕ - 2016»

PROCEEDINGS of the XI International Scientific Conference for students and young scholars «SCIENCE AND EDUCATION - 2016»

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Жинаққа студенттердің, магистранттардың, докоранттардың және жас ғалымдардың жаратылыстану-техникалық және гуманитарлық ғылымдардың өзекті мәселелері бойынша баяндамалары енгізілген.

The proceedings are the papers of students, undergraduates, doctoral students and young researchers on topical issues of natural and technical sciences and humanities.

В сборник вошли доклады студентов, магистрантов, докторантов и молодых ученых по актуальным вопросам естественно-технических и гуманитарных наук.

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Moreover, by addition of 1.0 wt% CNT, thermal conductivities of ternary PLA/G/CNT composites were found to increase at least by 40 % of magnitude as compared with binary PLA/G composites other things being equal. All developed PLA-based composites can be processed by conventional processing methods such as extrusion or injection molding. It has been shown that the PLA-based composites filled with CNTs or natural graphite powder can be used for fabricating 3D biodegradable scaffolds and heat sinks by the fused deposition modeling or injection molding.

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ANGULAR AND ENERGY DISTRIBUTIONS OF SOLAR COSMIC RAYS IN THE EARTH'S ATMOSPHERE

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The precise knowledge of the flux of atmospheric cascade particles induced by galactic and solar cosmic rays in the Earth's atmosphere is of utmost importance for a large field of applications. We present results on the Solar Cosmic Rays (SCR) transport in the Earth's atmosphere based on the Geant4/Planetocosmics Monte Carlo simulation [1–4]. Solar cosmic rays have energies of ~10^7 to 10^{10}eV and are ejected primarily in solar flares and coronal mass ejections. They have a composition similar to that of the Sun, and are produced in the corona by shock acceleration, or when part of the solar magnetic field reconfigures itself.

By using the Monte Carlo PLANETOCOSMICS code based on Geant4 we simulate the interaction of different solar proton events with the Earth's atmosphere. The code takes into account the following processes: ionization, multiple scattering of particles, bremsstrahlung, formation of pairs, photoelectric effect, Compton effect, elastic and inelastic nuclear interactions and the decay of particles.

In these calculations, the differential energy spectrum of the SCR protons at the atmospheric boundary during solar activity minimum was taken in the form

$$J(\mathrm{E}) = \frac{\mathrm{DE}^{\mathrm{a}}}{(0.01\mathrm{E}+\mathrm{B})^4} + \mathrm{C}\exp(-0.1\mathrm{E}) \qquad (1)$$

where E is the proton kinetic energy in MeV, D=16, B=8, α=1.3, and C=1.1.

The angular distribution is determined by the following formula:

$$J(>E)\sim\cos^2\theta \qquad (2)$$

The primary proton energies ranged from 500 to 10^6 MeV. The calculations were performed using the international NRLMSISE00 model of the atmosphere [5]. For each solar protons we compute in all directions integrated flux of secondary particles (p, e^- , e^+, γ , μ^+ , μ^-) carried out for 28 levels in the range of residual atmosphere (X = 0.05-1000 g cm^{-2}).

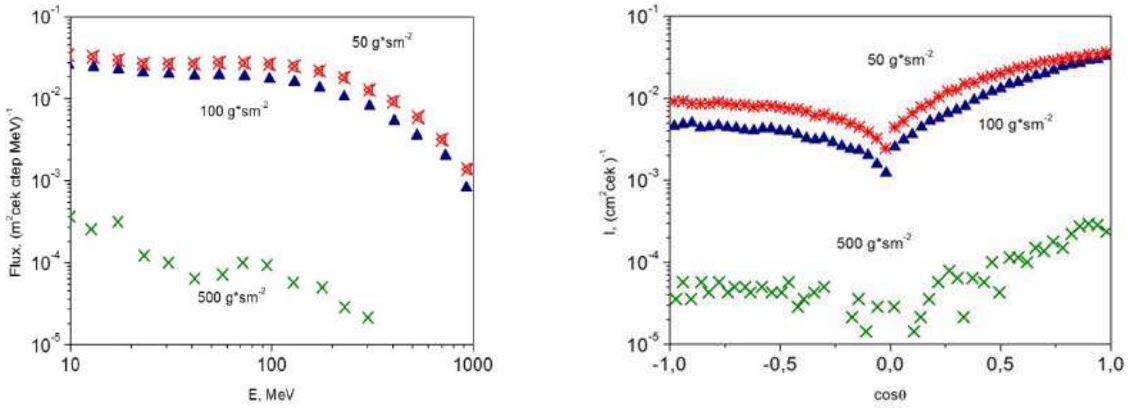

Fig. 1. Left - Energy spectra of solar protons at atmospheric depth levels X=50, 100 and 500 g·cm^{-2}; Right – angular distributions of solar protons at atmospheric depth levels X=50, 100 and 500 g·cm^{-2}.

The energy spectra of cosmic ray secondaries at different levels in the atmosphere, as well as their angular distributions are evaluated and several examples are shown below.

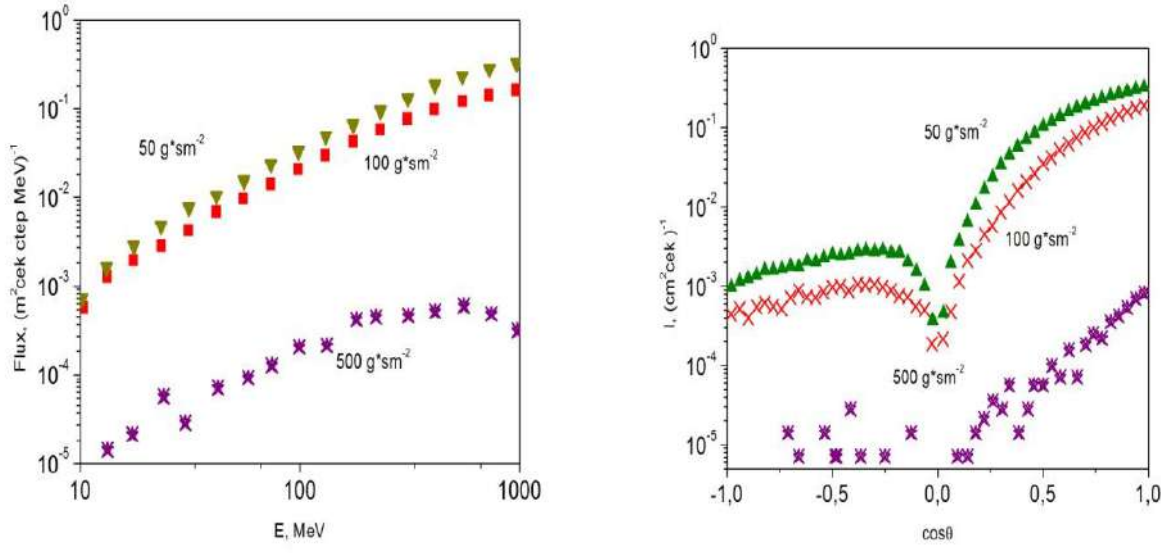

Fig. 2. Left - Energy spectra of electrons at atmospheric depth levels X=50, 100 and 500 g·cm^{-2}; Right – angular distributions of electrons at atmospheric depth levels X=50, 100 and 500 g·cm^{-2}.

Energy spectra of protons and electrons as well as their angular distributions at selected levels of the atmosphere are shown in Figure 1 and 2.

This calculation results are paramount importance for research fluctuations and events of the solar cosmic rays in the Earth's atmosphere.

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STATISTICAL CHARACTERISTICS OF NUCLEUS ^{9}BE IN THE EXCITED STATES

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Nowadays research of light nuclei is very important because of thermonuclear fusion. One of these nuclei is the nucleus of ^{9}Be. Beryllium is a good neutron moderator; also it has the property of a neutron reflector in nuclear reactors and the main property of this nucleus is a neutron generation. In this section we are going to research statistical characteristics of the nucleus ^{9}Be in the excited states. We have used the wave function of ^{9}Be in the ground and excited states in the three-body 2αn model (with the αα-Ali-Bodmer potential) [1].

The RMS charge radius of ^{9}Be

The root mean square charge radius of ^{9}Be in a cluster model can be found from the calculated by us formula:

$$\left\langle r_{ch}^2 \right\rangle = \left\langle r_{ch}^2(\alpha) \right\rangle + \frac{1}{4}\left\langle x_1^2 \right\rangle + \frac{1}{81}\left\langle y_1^2 \right\rangle, \quad (1)$$

where $\left\langle r_{ch}^2(\alpha) \right\rangle$- the mean charge radius of α-particle (1,6757 fm [2]), $\left\langle x_1^2 \right\rangle$ and $\left\langle y_1^2 \right\rangle$ - matrix elements in Jacobi coordinates (x_1, y_1), which define the mean square separation of 2 α-particles and the separation of neutron from the center of mass of these 2 α-particles respectively (Jacobi coordinates (x_1, y_1) are illustrated in fig. 1.).