PROTON-ELECTRON MODEL OF BALL LIGHTNING

1Oreshko A.G., 2Oreshko A.A., 1Mavlyudov T.B.

1Moscow Aviation Institute, National Research University, Moscow, Russia,  
 [Oreshko\_Alex@mail.ru](mailto:Oreshko_Alex@mail.ru)  
2National Scientific Research Institute of Physical-Technical and Radiotechnical  
 Measurements, Russia, Mendeleevo

There are a huge number of models of ball lightnings that were obtained as a result of mental experiments and analysis of visual observations of ball lightnings that drift in a free space. An only common a feature for most models is that ball lightning is generated in electric discharge. As known, the fidelity criterion of any theoretical model is its experimental verification. Ball lightning structure model as an electrical domain of a spherical shape was proposed in [1]. The main aim of this work is to create a model of ball lightning based on the obtained experimental datа. The experiments on investigation of the ball lightning structure were carried out at normal atmospheric conditions on the experimental facility “Prometheus”. The installation for obtaining ball lightnings consists of capacitive energy storage, diagnostic devices, a high-voltage charger, a commutation unit and a device for creation of the ball lightning – an electric or inductive spheretron [2]. In the experiments, both electric and inductive spheretrons were used. Experiments were performed in which the decay of the ion nuclei as a result of the nuclear photoeffect has been detected during generating of a ball lightning. The decay of the ion nuclei was accompanied by a neutrons burst, with the magnitude exceeding the level of the natural neutrons background in absence of the ball lightning. The measured value of the potential of the ball lightning after its formation by means of probe was within 15-20 MV. This means that the energy of the hard quantums inside the ball lightning is about 15 MeV.

High values of potential lead to the conclusion that nuclear photoeffect is the single possible cause of neutron emission in the stage of ball lightning generation. The decay of the nucleus is accompanied by the appearance of protons and neutrons, as is well known. Due to presence of the charge, the protons remain in the external spherical shell of the ball lightning under the influence of its electric and magnetic fields. Neutrons leave the region of the ball lightning generation due to diffusion. Proton-electron model of ball lightning is created. Ball lightning is an electrical domain of spherical shape, which external spherical shell mainly consists of high-energy protons whereas the kernel consists of electrons.

The presence of high-energy protons allows giving a correct explanation for the effect of the pas-sage of ball lightning through solids [3]. Change of the magnetic field of the ball lightning with ti-me leads to an increasing of its potential in accordance with the Faraday law and correspondingly to significant increasing of the energy of the charged particles when a ball lightning approaches to an obstacle (solid body or target). The proton energy becomes sufficient to generate elementary parti-cles including muons and muon neutrinos. A similar mechanism of particles and fields generation also exists in the Sun during changing the diameter of the sunspots [4].

References

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