



Report on the dissertation "Dark Matter and Galactic Halos" by Armine Amekhyan presented for the degree of candidate in physical and mathematical physics in 01.04.02 – Theoretical Physics

The studies on dark matter and dark energy are currently among the basic ones in theoretical physics. A number of models are proposed to address the dark sector problem, however still there are no secure concepts on its nature. Galactic halos are considered as remarkable objects for the investigation of the nature of dark matter, since the dark halos influence the dynamics of galaxies and also have to reflect the cosmological structure formation process. Therefore, the importance of the topic of this dissertation on the properties of galactic halos vs the dark matter theoretical models is out of question.

In the first chapter the methods of the analysis of cosmic microwave background (CMB) maps are described, along with the theoretical models responsible for the temperature anisotropy of CMB.

In the second chapter the analysis of CMB maps using the latest data obtained by Planck satellite are described. The halos for nearby edge-on galaxies are studied and frequency independent CMB temperature asymmetry of Doppler origin is revealed.

The third chapter is devoted to the theoretical models of dark matter halos, of interstellar dust, to describe the properties of the halos obtained from the microwave maps. Also, the modified gravity models proposed for the nature of dark matter, are involved to fit the revealed halo parameters.

Of course, one might suggest to use also other theoretical models or those of modified gravity, for the analysis of the CMB data, particularly, of the halo profiles at larger radii. Also, certain explanations, e.g. of the CMB secondary anisotropies, might be given in more details. Such work, certainly, can be the future continuation of the present dissertation.

In sum, the dissertation reflects the extensive theoretical and computational work on the analysis of Planck's microwave temperature maps and their theoretical interpretation. Such work needs essential classification and tedious work by the author. The confidence in the

importance of the obtained results is determined by their publication in prestigious international journals, including as a single author. The results of the dissertation can be used in the centers where studies of dark sector problems take place, including Sternberg Astronomical institute, Lebedev Physics institute, Institute of Theoretical and Experimental Physics. The synopsis correctly reflects the content of the dissertation.

The dissertation fulfills the requirements for the degree of candidate in physical and mathematical physics in theoretical physics and its author Armine Amekhyan deserves that scientific degree.

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The signature of Prof. Chechetkin is confirmed

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