

## PETRONIJEVIĆ'S PAPERS IN ASTRONOMY

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**Abstract.** Branislav Petronijević (1875-1954), Academician and Professor at the Belgrade University, the most distinguished Serbian philosopher of the first half of the XX century, was also interested in problems of natural sciences and mathematics. He also published numerous papers belonging to the field of astronomy which are here briefly considered.

### 1. INTRODUCTION

Branislav Petronijević (1875-1954), member of the Serbian Academy of Sciences, Professor at the Belgrade University, is the most distinguished Serbian philosopher of the first half of the XX century. He was very much engaged in the fields of natural sciences and mathematics. His views were exposed in numerous papers - his bibliography contains more than 400 items - of different character: systematic manuscripts, textbooks, monographs and other studies, critical reviews, popular contributions (Cekić, 1975 - p. 143).

Petronijević was born in Sovljak, near townlet Ub (Central Serbia). After finishing the Grand School in Belgrade he studied in Leipzig where he obtained his Ph degree with the thesis: "Der Satz vom Grunde". In 1898 he began his lecturing at the Belgrade Grand School. There in 1903 he became Professor. In 1905 the Grand School became a university. Petronijević's professorship lasted till 1927 when he left the Belgrade University on his own will, the reason was his desire to devote his activity to the research in philosophy and science. His original philosophical views were presented in the main work "Prinzipien der Metaphysik", two volumes 1904-1911 (Petronijević, 1986). The philosophical metaphysical system which he formed under some influence of H. Lotze, E. Hartmann and J. Folkelt is defined as empiriorationalism in gnosiology, i. e. monopluralism in metaphysics, where an attempt to synthetise in some way Spinoza's monism and Leibniz's pluralism is conspicuous. In the field of ethics he formed a specific concept of malism, "perspective indifferentism and transcendental optimism". In addition, Petronijević wrote several important works on history of philosophy, logic and psychology. His "Logic" is still used.

Petronijević also spent some time in Vienna as a student of medicine. He gave important contributions in paleontology, history and theory of science, mathematics.

Among others his interest in astronomical problems was also noticeable, several papers belonging to this science were written by him.

## 2. A BRIEF REVIEW OF PETRONIJEVIĆ'S WORK IN ASTRONOMY

By inspecting Petronijević's bibliography (Cekić, 1975) it is possible to establish that it contains over twenty papers on different astronomical subjects. Any exact classification of these papers without reading each of them is hardly possible. Therefore, the present authors would rather avoid it, stating only that on the basis of the mere titles given in the reference by Cekić, it can be concluded that among Petronijević's astronomical papers there seems to be both scientific and popular, but also a certain number of intermediate ones.

Their chronology indicates that they were being formed during the formation of his philosophical system presented in "Prinzipien der Metaphysik" mentioned above. At that time he published a paper entitled "O beskrajnosti sveta" (in Serbian - On World's Infinity - republished in 1920) in which he advocated the finitistic standpoint saying that the universe is finite. In support he presented both mathematical and astronomical "proofs", respectively, also advocated and extended in his main philosophical work mentioned above. These "proofs" are based on the following conclusions that

- i) "if the universe were infinite, then the number of dimensions within it would have to be also infinite, whereas according to experience the real space has only three dimensions";
- ii) "the notion of something infinite is contradictory in itself";
- iii) "our Galaxy is the only existing stellar system".

From the same epoch come his other papers: "O entropiji vasiona" (in Serbian - On the Entropy of the Universe - published in 1901), "O stanovnicima na planetama" (in Serbian - On the Inhabitants of the Planets - publ. in 1906) and also the polemical article "Svetomir Ristić i entropija vasiona" (in Serbian - Svetomir Ristić and Entropy of the Universe - in 1910).

After the First World War he published the papers "O planeti Marsu" (in Serbian - On planet Mars - in 1925, republ. in 1932), "Kako je pronadjena nova deveta planeta sunčanog sistema" (in Serbian - How was the new, ninth, planet of the Solar System discovered - in 1932), the review article "Kako je zamišljena vasiona u toku vekova" (in Serbian - How has the Universe been imagined over centuries - in 1926, republ. in 1932), the textbook "Osnovi astronomije i matematičke geografije" (in Serbian - Fundamentals of Astronomy and Mathematical Geography - in 1928) together with Borivoje Ž. Milojević where an endeavour of the authors towards a synthetical unification of facts within a given scientific field is noticeable. Finally there is the article "Geometrisko izvodenje zakona i formula za centralno kretanje" (in Serbian - Geometric Derivation of Laws and Formulae for Central Motion - in 1933). This article was republished in 1933 under a new title: "Zakoni centralnog kretanja po Njutnu i drugima" (in Serbian - Laws of Central Motion following Newton and others).

Unlike the original research results achieved by him, above all in paleontology, in astronomy Petronijević used the results of other scientists for the purpose of confirming his own philosophical views.

### 3. PETRONIJEVIĆ'S ARTICLE CONCERNING INFINITY VIEWED FROM MODERN STANDPOINTS

The three basic ideas of Petronijević's article "On World's Infinity" (Petronijević, 1920) have been already mentioned in the preceding section. It is seen that the first two are rather of mathematical, resp. philosophical, nature, whereas the last one belongs to astronomy. The question of finite and infinite is an old one and in this connection much can be said. The space allotted being limited here, the present authors cannot discuss it. The considerations concerning geometrical forms, for example the relationship circle - straight line, deserve attention. At this point Petronijević approached modern concepts of geometry of the universe (the Riemann geometry substituting the Euclidian one). His standpoint that an infinite space containing all matter means at the same time that this matter is also infinite is also interesting. It agrees well with general relativity where the unification of space, time and matter is postulated. The article was first published in 1904, thus on the eve of very important events in the history of physics (astronomy) which dramatically changed the views having dominated before. As said above, Petronijević followed his own metaphysics. According to the presented comments one can see its possibilities.

Finally, comes the last among Petronijević's arguments against an infinite universe. This is his identification of the Milky Way and the universe as a whole. Again, the article was republished in 1920, just on the eve of the third decade of XX century, the decade when extragalactic astronomy was born. At this point Petronijević appears conservative viewed from the modern science. He even mentions Seeliger's results concerning the size of the Milky Way (12 000 light years) where he assumes this amount as the size of his "Milky-Way" universe. However, some astronomical facts known at the time when the article was written, but which can be subjects of quite different (just opposite) interpretations if other important facts are unknown, should be, certainly, taken into account in a discussion like the present one. For example, Petronijević insists on the apparent distribution of nebulae (probably spiral) which, just as that of star (open) clusters, seems to be dependent of the galactic plane. Of course, Petronijević could not know of the existence of interstellar absorption which causes this very well-known avoidance zone for spiral nebulae.

### 4. CONCLUSION

As well known, Petronijević's scientific interest was very broad; it included philosophy, mathematics, psychology, biology, etc. In the present article his interest in astronomy is indicated. It is noticeable that Petronijević was interested in astronomical problems and that many facts of the contemporaneous astronomy were known to him. Of course, how correct his positions were, especially from the modern point of view, is a special question deserving additional treatments. It should be also said that a thorough study of his astronomical activity is very desirable. It certainly requires all the relevant papers to be read, after which a special list containing Petronijević's astronomical papers only could be formed and where each paper would be classified, say, as scientific, popular or intermediate, as it has been briefly commented in the present text.

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