

METAPHYSICAL IDEAS IN ASTRONOMICAL AND PHYSICAL THEORIES

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Abstract. Some philosophical ideas of interest to both astronomers and physicists are presented.

1. INTRODUCTION

Theory, one of the basic tools in astronomy and physics, can be understood and explained in different ways. For instance, according to Bunge (1975) theory should be understood as an hypothetico-deductive system expressed in a variety of formulae derived from the initial assumptions by means of logic and mathematics. On the other hand, in Heisenberg's (1963) opinion, as a first approximation, a scientific theory can be determined as a relatively integral system of notions, laws and constants. The role of theory to explain and predict something is also well known, this is Nagel's (1974) standpoint. In this paper the authors will pay attention to the metaphysical character of theories in astronomy and physics. A more general review can be found in the work of one of the present authors (Obradović 2004).

2. STATUS OF METAPHYSICAL IDEAS

General theories in astronomy and physics are not autonomous. They are necessarily based on some positions having philosophical character. In the fundamentals of general theories in astronomy and physics there are also ideas of metaphysical character.

The metaphysical approach characterizing theories in astronomy and physics is based on claiming that there is a reality independent of brains which can be, in

some way, accessible. In other words, realities (objects, events, processes) exist independently of our brains.

Entities postulated in a theory, which is good or acceptable, do exist. Therefore, astronomical or physical objects exist, but their properties and existence do not depend on the circumstance whether they are understood, measured or not. Every object in astronomy and physics corresponds to a set of laws – stable and objective structures.

The standpoint is that laws of astronomy and physics are reachable, as well as some properties of individual physical objects. The given statements characterize theories in astronomy and physics and express metaphysical hypotheses in astronomical and physical studies, i. e. existence of the outer world. As such they cannot be rejected either theoretically or empirically.

Any study in astronomy and physics should be directed to clear and fruitful metaphysical systems avoiding the metaphysics of speculative thinking.

The origin of assumed entities and objective structures in theories of astronomy and physics is in the application of fundamental laws, corresponding mathematical and logical transformations and principles of philosophy of science. Such a process is characterized by introducing entities and their properties with a high level of reliability though not accessible to any direct verification. Only afterwards methods and conditions how to register them are introduced.

There are many examples in both astronomy and physics. For instance W. Pauli predicted the existence of neutrino (antineutrino) by applying the law of energy conservation. As well known, later experiments confirmed this prediction. Also Le Verrier (Adams should not be forgotten) predicted existence of a new planet beyond Uranus by applying Newton's law of universal gravitation which was confirmed observationally.

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