

# Aristotle's Prime Matter Through The Looking Glass of Quantum Mechanics and Physics of Elementary Particles

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## Abstract

The object of this paper is the exploration of those aspects of Aristotle's thought, that can serve as a conceptual link for the connection of the Stagerite's natural philosophy with contemporary science. To this purpose, I concentrate on the idea of matter, and in particular of *prime matter* (*πρώτη ὕλη*), believing that it offers an extremely interesting material for our understanding of the dynamic character of Aristotle's model of nature. The examination, however, of the Stagerite's conception of *prime matter* has provoked a long-standing controversy, due to the variety of definitions and the paradoxical way in which Aristotle tried to define matter. The question, therefore, that still remains open, is this: what did the Stagerite have in mind when he referred to matter as the "primary substratum of each thing (*τὸ πρῶτον ὑποκείμενον ἐκάστῳ*) from which it comes to be..." (*Phys.* 192a 32), or, when he claimed that "when we take away length and breadth and depth we can see nothing remaining, unless it be the something bounded by them; so that on this view matter must appear to be the only (*Met.* 1029a17–20)? Shall we say that *prime matter* was for Aristotle an empty concept deprived of all physical reality, or shall we rather claim that it was the real and ultimate substratum (*υποκείμενον*) of change in the physical world?

As a response to this question, there have traditionally been two basic approaches: A great number of Aristotle scholars have arrived at a completely negative picture. Prime matter has been characterised as a "bare stuff" lacking physical reality, a "fiction of the mind", that transcends "all possibilities of conceptual thought".

On the other hand, another stream of Aristotle scholarship has tried to rescue the physical reality of matter. On this view, if we accept that in Aristotle's scheme there are material substances possessing qualities which undergo changes, then there is always a proximate or relative to form matter, which persists through change; however, this *proximate matter* – they claim – cannot possibly be taken to be the *ultimate underlying* stuff of material things. As it is obvious, this approach leaves out of the picture the most significant part of prime matter. So, there is still room for a third reading, according to which prime matter is not only the *proximate* stuff of material things are made of, but also – and most importantly – it is the *ultimate, formless, undifferentiated substratum* of all change in the physical world.

What characterises this approach is the fact, that the main body of argumentation is derived from the depository of Aristotelian philosophy. The issue, however, as I believe, becomes far more challenging, if we try to relate Aristotle's *prime matter* to recent discoveries in contemporary Physics. For this reason, I develop my thesis in two parts: In the first part, my task is to explore the inner bond connecting the various ways Aristotle tried to define *prime matter*, so as to establish my thesis that *prime matter* is a real dynamic factor in nature. This inner bond, I argue, is the idea of *potentiality*, which, in my opinion, is the most essential feature of matter. In the second part, I focus on the conceptual relationship that allows us to link Aristotle's matter with the idea of matter emerging in the fields of Quantum Mechanics and Physics of Elementary Particles.

In this respect, I concentrate on two puzzling instances in the micro-world, the so called *virtual particles* and *quarks*, with the purpose of showing what is now generally accepted, that as we are entering into deeper levels of physical reality, the nature of what we call matter and the strange way in which it behaves, cannot fit into the framework of Classical Mechanics. I, thus, argue that it becomes all the more obvious that in order to comprehend the strange nature of the sub-atomic world, we need new categories and conceptual schemes, which point to the Aristotelian model of nature and in particular to Aristotle's conception of *prime matter*. My claim, therefore, is, that Aristotle's *prime matter* can find its

analogue in the picture of matter emerging in the world of Micro-Physics, where the idea of *well defined, stable, separate, individual* particles with determinations traditionally attributed to matter, has disappeared from the scene. Instead, what characterises the so called "particles" is their *ephemeral, unstable and continuously transformed* "existence".

It is, certainly, obvious, that my way of seeing Aristotle's prime matter is not compatible, in many respects, with the traditional reading of Aristotle. However, for all the risks that such an approach might involve, I believe that it leads to the following worth considering consequences: (a) it opens a promising perspective for a re-reading of Aristotle's work in the light of recent discoveries in Physics, (b) the new content thus bestowed on Aristotle's categories, offers, in its turn, an invaluable means for a deeper understanding both of contemporary science, and of the structure of the physical world. And last (c), but not least, it contributes to the building of a conceptual bridge, necessary not only for the unification of the different fields of science, but also for the re-unification of philosophical reflection with scientific thought.