

Relativity: from principles to theories

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There are many ideas on relativity (including the relativity of motions) in the history of culture. Let us remember on Zeno of Elea stadium-‘*aporia*’ or its Aristotelian criticism in the ancient Greek philosophy; the Galilei’s relativity principle in the Modern Age, or the well known Mach’ principle in our age. Most part of these ideas has been formulated as a specific *principle* to understand or explain the motion of bodies. However we had to wait to the *theory* of relativity until the twentieth century. Why? This is the topic of my lecture.

To answer the question first of all we have to study and characterize the concepts of principle and theory, and their role and relationships in the scientific practice. In this respect we will disclose the philosophical and the technological components of the sciences, and we will show them in the different historical versions of sciences. Generally speaking the principles in a science belong to its philosophical part. In order to build up a theory around a (or a few) principle we have to discover or create a special kind of technology for the treatment of relationships following from the principle(s). In many cases this means a simple application of a kind of mathematical tools. So in the simplest cases we can declare that a scientific theory includes at least one (or a few) principles (of natural philosophy) and some useful mathematical tools.

Based on this simplified imagination of the scientific theories we try to analyze and characterize the most significant theories of relativity created by Poincaré, Einstein, and others from structural point of view.

Besides the position of philosophy of science there is another context to answer our previous question: the historical/social context. In this respect we can consider and characterize the concrete value-ladenness of the historical versions of relativity principles and theories. Because the emergence of the modern value system can be considered as the most significant development in the European culture, we try to identify the premodern, the modern and the postmodern values included into the principles and theories of relativity.

In this way we can follow and understand the historical way of relativity from principles to theories.