

## **Johan Arnt Myrstad**

*Kepler, Galilei, Kant: The troubled history of the principle of inertia.*

### **Abstract**

How does the principle of inertia relate to causation? This is far from clear. As Max Caspar, a well-known interpreter of Johannes Kepler's work, states, Kepler was held back from reaching the Newtonian understanding of the planetary system, mainly because he held a restricted, Aristotelian, principle of inertia. The arguably most important result of Galileo Galilei's dialogues is his thought experimental demonstration of the extended principle of inertia. Unbeknown to most, Immanuel Kant, in an early work, argued that the accepted conception of inertia was wrong-headed and claimed to have demonstrated a corrected version of the principle. This line of development should still command our interest. In my talk I will mainly attend to Kant's argument.

The principle of inertia is still conceived by many physicists, as well as by some laypersons, as enigmatic, though the mathematical meaning and its application are considered straightforward. Why? In his little paper Kant addressed exactly this character of inertia, and claimed, as will be shown, with some intuitive right, that he had resolved the problem.

The presentation of the solution in this paper is not something Kant gave up on later; his solution is an integral part of his critical *Metaphysical Foundations of Natural Science*.

In the transformation that physics has experienced in the last hundred years or so, there are plenty of other enigmas, so the strangeness of inertia, at least as given in the classical aspects of present-day physics, is not felt as acute, as in earlier times. However, the solution to the "problem" of inertia is part and parcel of an approach to the metaphysics of physics, which also promises to lead to solutions of the modern-day enigmas. To some degree these lines will be drawn at the end of my talk, or, at least, in a follow-up paper.