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New Insights into Galileo's Contribution to the First Two Laws of Motion

This paper discusses Galileo's contribution to the understanding of the principles of dynamics. Much has been said about his contribution to the formulation of the principle of inertia and about his experimental confirmation of horizontal inertia. Yet Newton, in his *Philosophiae Naturalis Principia Mathematica*, stated that Galileo had knowledge of the first two laws of dynamics, thanks to which he had demonstrated the free-fall law of the square of time and had shown that the trajectory describing the motion of a projectile is parabolic. The work of some scholars who have cited Newton's statement will be discussed, providing a new perspective. In his *Discorsi su Due Nuove Scienze*, Galileo described some motions with a precision that only an understanding of the second law of motion would have made possible, even though he had not formulated the second law in its generality nor did he express any clear considerations about the concept of inertial mass: an enlightening example is Galileo's description of the motion of bodies falling in viscous fluids, which is accelerated in the first phase of the motion but for which the variations in velocity are increasingly smaller until the final velocity of fall is reached.

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