Science et Répresentations
Colloque International en mémoire de Pierre Souffrin

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Swinging and rolling: at the root of Galileo's new Theory of Motion

How did Galileo's new science of motion emerge? Giving a synopsis of my long-standing investigations into Galileo's notes on motion, I will argue that the realization of a close similarity between the swinging of a pendulum and the rolling of a ball down inclined planes provided Galileo with the initial stimulus for his new theory. After a first experimental test failed to meet his expectations, Galileo, in 1602, devised an ambitious research program to make sense of the relation between swinging and rolling. In the attempt to solve the problems that this program confronted him with, Galileo arrived at new insights and developed new methods, which soon became the core of his new theory of motion. Eventually, however, the challenge proved insuperable since Galileo's program rested on a false assumption: the alleged similarity between swinging and rolling is simply not valid. Thus, besides the need to revise existing accounts of the conceptual genesis of Galileo's theory of naturally accelerated motion, my interpretation raises profound epistemological issues, such as the question of how and under which circumstances false assumptions can become productive in conceptual development.