

# Comparing Relativistic and Newtonian Dynamics in First Order Logic

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This talk is strongly related to the talks of Hajnal Andréka, István Németi and Gergely Székely.

We introduce and compare Newtonian and relativistic dynamics as two theories of first-order logic. To illustrate the similarities between Newtonian and relativistic dynamics we axiomatize them such that they differ in one axiom only. This one axiom difference, however, leads to radical differences in the predictions of the two theories. One of their major differences manifests itself in the relation between relativistic and rest masses.

The statement that the centerlines of a system of point masses viewed from two different reference frames are related exactly by the coordinate transformation between them seems to be a natural and harmless assumption; and it is natural and harmless in Newtonian dynamics. However, in relativistic dynamics it leads to a contradiction. We are going to present a simple geometric proof for this surprising fact.