

Abstract Submitted
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Inhomogeneous Galilei-invariant 4D variational principles for classically interacting point particles following from Poincaré-invariant ones¹ HARRY WOODCOCK, Philadelphia University — In a previous paper, we established the most general four-dimensional, non-instantaneous, non-particle symmetric inhomogeneous Galilei-invariant variational principle (VP) for classically interacting point particles. For a particular time-asymmetric retarded (advanced) interaction, the Galilei-invariant equations of motion and ten conserved quantities were shown not to involve integrals over worldliness and to have a Newtonian-like initial value problem, even though they are non-instantaneous. These might provide an alternative slow-motion approximation to the usual Newtonian one for celestial mechanics. However, they had no apparent connection to either SRT or GRT. Here, the general inhomogeneous Galilei-invariant VP is shown to follow as the non-relativistic limit of a general Poincaré-invariant VP with its interaction-arguments constructed from specific combinations of Poincaré-invariant two-body algebraic expressions. The approximately relativistic VP follows by a Taylor expansion of the Poincaré-invariant one.

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