Laws of Superposition of Successive Collinear Lorentz Boosts

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Abstract
We derive the laws of superposition of multiple successive collinear Lorentz boosts by four different methods. The first method exploits the relation between the Pochhammers of 2x2 nonautonomous matrices and the symmetric functions. The second method proceeds by diagonalizing the Lorentz boost. The third method is based on the characteristics of the Pauli matrices. The fourth method makes use of the relativistic law of addition of multiple collinear velocities, as well as the polygonometric identities. We give expressions, for the laws of superposition, parametrized using velocity and rapidity, as well as expressions in compact, symmetric and unified forms. We also give the expressions of the laws of superposition in the special case of identical boosts, both for finite boosts, and for infinitesimal boosts. These latter results provide insight into the relation between Galilean (classical) and Lorentzian (relativistic) velocities.