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Inflation in a self-interacting gas universe

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Abstract

We show that de Sitter spacetime is a solution of Einstein's field equations with the energy momentum tensor of a self-interacting, classical Maxwell-Boltzmann gas in collisional equilibrium. The self-interaction is described by a four-force which is quadratic in the (spatially projected) particle four-momenta. This force does not preserve the particle number and gives rise to an exponential increase in the comoving entropy of the universe while the temperature of the latter remains constant. These properties of a gas universe are related to the existence of a "projector-conformal" timelike Killing vector representing a symmetry which is in between the symmetries characterized by a Killing vector and those characterized by a conformal Killing vector.
