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Kinetic theory for nongeodesic particle motion: Self-interacting equilibrium states and effective viscous fluid pressures

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Abstract

The particles of a classical relativistic gas are assumed to move under the influence of a quasilinear (in the particle 4-momenta), self-interacting force in between elastic, binary collisions. This force, which is completely fixed by the equilibrium conditions of the gas, gives rise to an effective viscous pressure on the fluid phenomenological level. Earlier results concerning the possibility of accelerated expansion of the universe due to cosmological particle production are reinterpreted. A phenomenon such as power-law inflation may be traced back to specific self-interacting forces keeping the particles of a gas universe in states of generalized equilibrium.

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