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From zero-temperature unitarity to quantum Boltzmann equation

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Within the classical Boltzmann approach, we include all number-changing processes in which the particle participates, typically decays or scatterings. At higher orders, other types of reactions may become relevant as well. We formulate a diagrammatic unitarity-based algorithm to complete the set of contributing reactions. Initially, the particles are treated as classical point-like objects whose interactions are described through zero-temperature quantum field theory. Remarkably, the algorithm automatically accounts for the effects of thermal corrections. The framework will be demonstrated by including anomalous thresholds leading to thermal mass and wave function renormalization effects.

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