

## Thermodynamics and critical behaviors of long-range interacting magnetic system using Tsallis non-extensive statistics

### ABSTRACT

In this paper, we review non-extensive statistics (Tsallis conjecture), and continue by analyzing thermodynamic properties and critical behaviors of systems which follow this statistics. Following that, we present a suitable algorithm in Monte Carlo method (Metropolis algorithm) to simulate spin systems with long-range interactions according to the Hamiltonian of Ising model in Tsallis statistics with suitable boundary conditions. In conclusion, we proceed to analyze thermodynamic properties related to this system and compare obtained results such as magnetization, internal energy, specific heat and magnetic susceptibility to known results in short-range systems in Boltzmann-Gibbs statistics.

**Keyword:** Long-range interactions; Monte-carlo simulation; Thermodynamic properties; Tsallis statistics