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Critical exponents and the extensive nature of statistical entropy

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Abstract content
 (Max 300 words)

In numerical studies of a system of N independent, distinguishable, non-interacting particles in the microcanonical ensemble, we explicitly show for the first time that the entropy per particle, s_N , converges to a constant real number, s_∞ , in the thermodynamic limit, independent of the single-particle spectrum. We show in a direct manner the extensive nature of entropy, and we demonstrate universal scaling behaviour for $(s_N - s_\infty) \sim N^{-\alpha}$, where α is the critical exponent. We derive thermodynamic quantities, such as temperature and chemical potential, etc. for finite systems of size N .

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