Preface

It is known that in spite of its great success Boltzmann–Gibbs statistical mechanics is actually not completely universal. A class of physical ensembles involving long-range interactions, long-time memories, or (multi-)fractal structures can hardly be treated within the traditional statistical-mechanical framework. A recent nonextensive generalization of Boltzmann–Gibbs theory, which is referred to as nonextensive statistical mechanics, enables one to analyze such systems. This new stream in the foundation of statistical mechanics was initiated by Tsallis' proposal of a nonextensive entropy in 1988. Subsequently it turned out that consistent generalized thermodynamics can be constructed on the basis of the Tsallis entropy, and since then we have witnessed an explosion in research works on this subject.

Nonextensive statistical mechanics is still a rapidly growing field, even at a fundamental level. However, some remarkable structures and a variety of interesting applications   have   already appeared. Therefore, it seems quite timely now to summarize these developments.

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