

T3_85 AN INTRODUCTION TO THE BOLTZMANN FACTOR BY USING INFORMATION TECHNOLOGY TOOLS

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The Boltzmann factor describes and explains the behaviour of all natural systems (physical, chemical, or biological) at a given temperature. It links the microscopic mechanical world with the macroscopic thermodynamic world by connecting the energy of the system molecules with the temperature of the environment. To understand why the factor has its specific form involves a mathematical analysis whose flow of logic is hard to see and that is not always at the level of high school or college students' preparation. Here we present some experiments and simulations aimed at directly deriving the Boltzmann factor mathematical expression and at illustrating the fundamental concepts on which it is grounded. Experiments use easily available traditional or Microcomputer Based Laboratory apparatuses. Simulations are developed in the Net-Logo environment that, besides having a friendly user-interface, allows an easy interaction with the algorithm. The approach supplies a pedagogical support for the introduction of the Boltzmann factor at undergraduate level to students without a background in statistical mechanics.