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1 **The internal energy expression of a long-range interaction complex system and its statistical**
2 **physical properties**

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7 **Abstract:** Considering the interactions of two arbitrary particles, we obtain an internal energy
8 expression of the complex system having long-range interactions. Based on the postulate of
9 “equal-probability principle” for all microstates, the probability distribution function of the system
10 is derived, and consequently, some main statistical physical properties of the system are revealed.
11 It is important to find that the properties of a long-range interaction system are very closely
12 dependent on the interaction coefficient and particle number.

13

14 **Keywords:** Long-range interaction; Internal energy; Probability distribution function

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