In Table IIIA-6 the effect of further increases in system size on system characteristics is summarized. First, as expected, larger systems have more macrostates per particle than smaller systems. ($N = 4$, $I^*/N = 1.25$; $N = 30$, $I^*/N = 13.9$). The number of microstates increases even more rapidly with the addition of particles. And, as expected, the *absolute probability* of the *most probable macrostate decreases with increased system size;* but the *relative probability increases.* Thus, in larger systems the distribution of probability is increasingly *distorted toward more probable macrostates,* i.e., those with high relative probability. In that sense the larger system is spending more, not less, time in high-probability macrostates. But not in *the* most probable, which is simply one member of the group of high-probability macrostates.

TABLE IIIA-6: EFFECT OF SIZE ON SYSTEMS OF BOLTZONS

N	I*	I*/N	W	W/N	P_{MP}	R_{MP}	$\frac{\lvert\hat{\varepsilon}^{\frac{1}{2}}_{MP} - \overline{\varepsilon^{\frac{1}{2}}}\rvert}{\hat{\varepsilon}^{\frac{1}{2}}}$ %
4	5	1.25	$6.03 \cdot 10^{2}$	$1.5 \cdot 10^{2}$	0.537	2.68	0.442
6	10	1.66	$8.66 \cdot 10^{5}$	$1.4 \cdot 10^{4}$	0.505	5.05	0.333
10	28	2.80	$1.06 \cdot 10^{9}$	$1.1 \cdot 10^{8}$	0.313	8.75	0.329
14	60	4.28	$1.17 \cdot 10^{13}$	$0.8 \cdot 10^{12}$	0.153	9.18	0.267
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
30	419	13.9	$2.65 \cdot 10^{29}$	$0.9 \cdot 10^{28}$	0.064	26.71	0.209
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.

N = No. of particles, I* = Total no. of macrostates, W = Total no. of microstates. All systems have average energy $9\,B_0$ and the same 5 levels.

What about properties? To see the relationship between the group of probable macrostates and those of the system consider the 30-particle example. Since it has 419 macrostates we present only an extract of its data, Table IIIA-7. The characteristics of the most, 10th, 20th, 219th-most and the least probable macrostates are listed. None of the individual macrostates is very probable. But the relative probability of even the twentieth most probable macrostate is quite large, $R_{XX} = 6.78$. Thus, though the system will rarely be found in any specified individual macrostate, it is very likely to be found within the group of high relative probability macrostates. Table IIIA-7 shows that the system spends 87.6% of its time in one of the 42 most probable macrostates, Group 1, and 98.1% in the first 84, Groups 1 and 2.

TABLE IIIA-7: SUMMARY OF PROPERTIES OF A 30-PARTICLE SYSTEM OF BOLTZONS

$I^* = 419$ $\quad W = 2.648 \cdot 10^{29}$ $\quad \hat{\varepsilon}^{\frac{1}{2}} = 2.9644\, B_0^{\frac{1}{2}}$

i	$n_{1,i}$	$n_{2,i}$	$n_{3,i}$	$n_{4,i}$	$n_{5,i}$	P_i	R_i	$\left(\frac{\hat{\varepsilon}^{\frac{1}{2}} - \overline{\varepsilon^{\frac{1}{2}}_i}}{\hat{\varepsilon}^{\frac{1}{2}}}\right)$ %
I	1	7	10	9	3	$6.39 \cdot 10^{-2}$	$2.64 \cdot 10^{1}$	0.209
X	3	5	7	12	3	$2.71 \cdot 10^{-2}$	$1.13 \cdot 10^{1}$	0.334
XX	1	7	11	6	5	$1.62 \cdot 10^{-2}$	$6.78 \cdot 10^{0}$	0.185
CCIX	5	0	13	6	6	$3.01 \cdot 10^{-6}$	$1.26 \cdot 10^{-3}$	0.663
CDIXX	10	0	0	0	20	$1.13 \cdot 10^{-22}$	$4.73 \cdot 10^{-22}$	2.62

Groups of Macrostates	Number of Microstates	Total Probability	$\left[\frac{\sum_{i=1}^{42}\left(\hat{\varepsilon}^{\frac{1}{2}} - \overline{\varepsilon^{\frac{1}{2}}_i}\right)^2}{42[\hat{\varepsilon}^{\frac{1}{2}}]^2}\right]^{\frac{1}{2}}$ %
1	$2.32 \cdot 10^{29}$	$8.76 \cdot 10^{-1}$	0.298
2	$2.81 \cdot 10^{28}$	$1.05 \cdot 10^{-1}$	0.382
3	$3.86 \cdot 10^{27}$	$1.45 \cdot 10^{-2}$	0.564
4	$7.09 \cdot 10^{26}$	$2.6 \cdot 10^{-3}$	0.570
5	$1.09 \cdot 10^{26}$	$2.6 \cdot 10^{-3}$	0.570
6	$1.31 \cdot 10^{25}$	$5.0 \cdot 10^{-5}$	0.849
7	$1.16 \cdot 10^{24}$	$4.4 \cdot 10^{-6}$	0.855
8	$1.03 \cdot 10^{23}$	$3.9 \cdot 10^{-7}$	1.01
9	$2.73 \cdot 10^{22}$	$1.0 \cdot 10^{-8}$	1.17
10	$1.34 \cdot 10^{19}$	$5.2 \cdot 10^{-11}$	15.3

Notice that the distributions of the three probable macrostates listed are similar to one another in form; each has a rather "disordered" distribution among the states.