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Transition from mesoscopy of low levels of the liquid-drop model of nucleus to macroscopy of critical mass of uranium and plutonium with regard to partition theory

V P Maslov

National Research University, Russia

The author changed and supplemented the standard scheme of partitions of integers in number theory to make it completely concur with the Bohr–Kalckar correspondence principle. We revise the partition theory of integers in accordance with the Bohr–Kalckar correspondence principle (1938) relating the physical notion of nucleus to number theory. This principle has given rise to a series of papers. We use results due to Auluck–Kothari (1946), Agarwala–Auluck (1951), and Srivatsan–Murthy–Bhaduri (2006). We understand entropy as the natural logarithm of the number $p(M)$ of partitions of with repeated summands and $q(M)$ of partitions without repeated summands. The transition of $\ln p(M)$ to $\ln q(M)$ through mesoscopic values of $M \rightarrow 0$ is studied. In order to make the analogy between the the atomic nucleus and the theory of partitions of natural numbers more complete, to the notion of defect of mass author assigns the “defect” $\{\bar{a}\} = [a + 1] - a$ of any real number (i.e., the fractional value that must be added to a in order to obtain the next integer). This allows to carry over the Einstein relation between mass and energy to a relation between the natural numbers M and N , where N is the number of summands in the partition of the given number M into natural summands, as well as to define a forbidding factor for the number M , and apply this to the Bohr–Kalckar model of heavy atomic nuclei and to the calculation of the maximal number of nucleons in the nucleus.

Biography

V P Maslov is a Professor of National Research University Higher School of Economics (School of Applied Mathematics). In 1984, he was elected to full membership of the Mathematical section of Russian Academy of Sciences directly, without passing through the corresponding member stage. He has published over 600 papers and over 20 monographs. He introduced a series of important notions of which Maslov-type index theory, Maslov classes, Maslov form, Maslov correction, Maslov WKB method, Maslov cycle, Maslov dequantization are best known.

vpmaslov@hse.ru

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