THE FIBONACCI NUMBERS AND THE "MAGIC" NUMBERS

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It was reported here (The Fibonacci Quarterly, issue 4, 1963) that one of the fundamental asymmetries in the world of atoms is asymmetrical distribution of fission fragments by mass numbers resulting from the bombardment of most heavy nuclei (by thermal neutrons).

The problem of this type of the asymmetry is one of most difficult problems in the branch of fission-physics.

It seems that by the here mentioned asymmetry there is a connection between the Fibonacci numbers (... 34, 55, 89, 144, ...) and the so-called "magic" numbers (2, 8, 20, 28, 50, 82 for protons and 2, 8, 20, 28, 50, 82, 126 for neutrons), which are well known in nuclear physics.

As a matter of fact the fission-nucleus ${}_{92}U^{236}$ possesses 144 neutrons and consequently a sufficient quantity of neutrons to form two neutron-shells: one with 50 neutrons and the other with 82 neutrons. If the rest of 12 neutrons [144 - (50 + 82)] divide in two equal parts, the whole number of neutrons in the heavy fragment is 82 + 6 = 88 (89) + and in the light fragments 50 + 6 = 56 (55).[1)]

The 92 protons of the nucleus ${}_{92}U^{236}$ can also form two shells with "magic" numbers of protons: 28 and 50 respectively. If the rest of protons [92 - (28 + 50)] = 14 divide in the same manner as the rest of the 12 neutrons, the whole number of protons in light fission-fragment should be: 28 + 7 = 35(34) and in the heavy fragment: 50 + 7 = 57(55).

These numbers of protons (35 and 57) and the neutrons (56 and 88) in both fission-fragments of the nucleus ${}_{92}U^{236}$ conform rather well the most experimental results.

\+ The number in parenthesis is the nearest Fibonacci number.

1) Mukhin, K. N., Introduction to Nuclear Physics. Moskow, USSR (1963), p. 350.

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