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NUCLEOSYNTHESIS RATE AND ABUNDANCE OF HEAVY NUCLEI.

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Nucleosynthesis process, supported by multiple neutron captures (r-process) is responsible for the formation in nature more than the half of all the nuclei heavier iron, and the region of its propagation on the map of nuclei lies very close to neutron drip-line [1, 2, 3]. Nucleosynthesis rate of heavy nuclei formation in reactions with neutrons depends on astrophysical scenario and beta-decay rates of nuclei involved into the r-process. When r-process nucleosynthsis wave changes its speed on the way to heaviest nuclei region, the r-process path dependence on time is changing and the position and structure of the third peak on abundance curve of heavy elements is shifted also.
In a result the r-process modeling and calculations of heavy nuclei abundances, the dependence of the chemical elements abundances on nuclear input was evaluated. The influence of beta-decay rates, calculated in the framework of different theoretical approaches on the abundances of heavy nuclei was analyzed.
The calculations of the r-process have shown that predictions of beta-decay half-lives T1/2 can significantly influence on the physical processes leading to the formation of third peak on the abundance curve and forms its position and structure. This influence can be even significantly stronger than fission neutrons impact [4]. And the results of nucleosynthsis modeling show either the nonsystematic overabundance of beta-decay half-lives, predicted by some theoretical models [5, 6] for the nuclei from the r-process region. And it is clear that further work on development of microscopic models [7, 8] for global predictions of T1/2 is very important for the deep understanding of physical details of the r-process nucleosynthsis. The work was done with financial support of Russian Science Foundation (projects № 18-02-00670 and №. 20-12-00183).

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