

SYNTHESIS OF "LIGHT" HEAVY ELEMENTS UNDER EXPLOSION OF LOW-MASS NEUTRON STAR

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Observation of lanthanides in the spectrum of kilonova after gamma-burst and gravitational waves registration [1] confirmed theoretical r-process scenario [2], connected with the neutron star merger (NSM) at the end of close binary system evolution.

After numerous investigations of the neutron star merger process and following registration of NSM it became definitely clear, that such a scenario is the main one for formation of majority heavy nuclei in the r-process. But Neutron stars evolution in close binaries depends strongly on their masses. Merger process is investigated rather well, but when masses of stars in close binary differs strongly, merger scenario develops in different way [3] and nucleosynthesis of heavy elements as well [4].

In present report we considered the nucleosynthesis during the explosion of low-mass component in close binary, which lost its mass due to transfer of matter to the heaviest component and blowing up when hydrodynamically unstable configuration was reached [3].

The matter of the exploded remnant is expanding and explosive nucleosynthesis of new elements takes place before density decrease strongly. Nucleosynthesis mainly occurs in the mantle layers with initial electron-to-baryon ratio $Ye \sim 0.3-0.4$. Nucleosynthesis in the considered scenario was calculated along evolutionary trajectories of passive particles, connected with different mantle zones. Based on fulfilled numerical calculations it was shown that synthesis of heavy elements formed in the r-process is possible, at least the light part of them. The work was done under financial support of Russian Science Foundation (project №. 21-12-00061).

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2. J. Cowan, C. Sneden, J. E. Lawler, et al. // *Rev. Mod. Phys.* 93. id. 015002. (2021).
3. S. I. Blinnikov, D. K. Nadyozhin, N. I. Kramarev, A. V. Yudin // *Astronomy Reports*. 65. 385. (2021).
4. I.V. Panov, A.V. Yudin // *Astronomy Letters*. 46. 518. (2020).

The speaker is a student or young scientist

No

Section

1. Neutrino physics and nuclear astrophysics

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