The emission of neutrons in collapsing bubble filled by hydrogen isotopes

Khokonov A.Kh.[1,2,@], **Akhmatov Z.A.**[1,3,4], **Gangapshev A.M.**[1,4], **Kuzminov V.V.**[1,4] **and Sergeev I.N.**[1]

[1] Institute for Nuclear Research of the Russian Academy of Science, Prospekt 60-letiya Oktyabrya 7a, Moscow, 117312, Russia
[2] Kabardino-Balkar Scientific Center of the Russian Academy of Sciences, Inessa Armand 37, Nalchik, 360051, None
[3] Institute of Applied Mathematics and Automation of the Kabardino-Balkar Scientific Center of the Russian Academy of Sciences, Shortanova 89a, Nalchik, 360000, Russia
[4] Kabardino-Balkarian State University, Chernyshevskogo Street 173, Nalchik, 360004, Russia

[@] azkh@mail.ru

Until now, the question of the attainability of conditions for the implementation of fusion reactions of light nuclei during ultrasonic or laser cavitation remains unclear [1]. The low-background conditions of the Baksan Neutrino Observatory make it possible to measure ultra-low neutron fluxes in the $d + d -> {}^3He + n$ reaction, as well as the residual activity of tritium synthesized in the $d + d -> t + p$ channel. Tritium will decay according to the ${}^3H -> {}^3He + e + \tilde{\nu}$ scheme with a period of 12.32 years, which makes it possible to register single acts of beta decay on low-background installations. An experimental setup for ultrasonic and laser generation of bubbles in deuterated liquids with the ability to measure light, sound and neutron signals is presented. Preliminary experimental results on the dynamics of the collapse of bubbles filled with argon in distilled water are analyzed. The interpretation of the experiment was carried out within the framework of the generalized Rayleigh-Plesset model [2], as well as the analytical model developed in work [3].

[1] Nigmatulin R, Lahey R, Taleyarkhan R and et al 2014 *Phys. Usp.* **184** 947–960
[2] Plesset M 1949 *J. Appl. Mech.* **16** 277–282
[3] Khokonov A K 2016 *Nucl. Phys. A* **945** 58–66