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Solar flare 2.223 MeV gamma-line and experimental analysis of the solar lasma density

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Abstract. In the previous works we have shown the possibility of determining solar plasma density altitude profile in the period of solar flare by means of solar flare 2.22 MeV neutron capture gamma-line time profile analysis. The method is a unique possibility to experimentally investigate the deep layers - photospheric and subphotospheric, inaxessible to another methods. It have been shown that the most important factors, which impact on the 2.22 MeV gamma-line time profile, are characteristics of initial neutron flux, surrounding medium parameters, neutron decay, neutron and gamma-ray interactions with the medium. Previously we have made allowance for the most part of these factors. In the present work we present the exact calculaions of non-radiative absorption of neutrons by helium -3, as an additional loss of neutrons, which impacts substantially on the 2.22 MeV line time profile, and investigate this gamma-line time profile dependencies on initial neutron escape geometry. Then we apply the new calculated time profiles to the analysis of the solar gamma-flares experimental data within the framework of the method.