Improvement of the high-accuracy ^{17}O(p,α)^{14}N reaction-rate measurement via the Trojan Horse method for application to ^{17}O nucleosynthesis

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The ^{17}O(p,α)^{14}N and ^{17}O(p,γ)^{18}F reactions are of paramount importance for the nucleosynthesis in a number of stellar sites, including red giants (RGs), asymptotic giant branch (AGB) stars, massive stars, and classical novae. In particular, they govern the destruction of ^{17}O and the formation of the short-lived radioisotope ^{18}F, which is of special interest for γ-ray astronomy. At temperatures typical of the above-mentioned astrophysical scenario, T = 0.01–0.1 GK for RG, AGB, and massive stars and T = 0.1–0.4 GK for a classical nova explosion, the ^{17}O(p,α)^{14}N reaction cross section is dominated by two resonances: one at about $E_R^{cm} = 65$ keV above the ^{18}F proton threshold energy, corresponding to the $E_X = 5.673$ MeV level in ^{18}F, and another one at $E_R^{cm} = 183$ keV ($E_X = 5.786$ MeV). We report on the indirect study of the ^{17}O(p,α)^{14}N reaction via the Trojan Horse method by applying the approach recently developed for extracting the strength of narrow resonance at ultra low energies. The mean value of the strengths obtained in the two measurements was calculated and compared with the direct data available in literature. This value was used as input parameter for reaction-rate determination and its comparison with the result of the direct measurement is also discussed in the light of the electron screening effect.